Environmental Planning Tools and Techniques

Linking Land Use to Water Quality Through Community-based Decision Making

State of Idaho

Division of Environmental Quality

Acknowledgments

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About the Cover

The cover photo by Steve Anderson, Idaho Falls Public Works Division, is a residential multifunctional landscaping technique at the intersection of St. Clair and Woodruff in Idaho Falls.

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Linking Land Use to Water Quality Through Community-based Decision Making

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State of Idaho
Division of Environmental Quality
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Executive Summary

Environmental Planning Tools and Techniques presents local/regional planners and land use decision makers alternative source control measures in a menu format. Communities throughout Idaho are encouraged to use site and watershed planning to integrate the broader application of comprehensive design principles that preserve the integrity of natural landscapes. Comprehensive and integrative land-use planning, when combined with natural engineering techniques, helps to preserve and enhance natural processes and/or features already present on a site. This combined planning and engineering approach minimizes adverse environmental impacts and maximizes economic benefits in a community. Many of these measures can also enhance local ordinances by encouraging greater flexibility in the land development process.

Nonpoint source pollution is polluted runoff created when water washes over the land's surface picking up all sorts of diffuse pollutants. The realm of managing urban stormwater runoff includes existing development, as well as plans for new development. In confronting both the correction of existing and the prevention of future impacts, two categories of Best Management Practices (BMPs) are often necessary: (1) watershed planning source control measures and (2) site design treatment measures. Watershed planning source control measures are used to minimize and/or prevent the source(s) of urban stormwater pollutants.

As the natural landscape is urbanized, more and more impervious area shifts the water cycle from its natural balance. This shift results in impacts to both water quantity and water quality: increased runoff discharges to receiving waters over a shorter time frame, decreased infiltration for ground water recharge/stream baseflows, and more pollution generated by land uses commonly associated with urbanization. It is important to recognize that drainage divides of the natural landscape or watershed boundaries, do not follow the jurisdictional boundaries of society. Surface water is often interconnected to ground water, and vice versa, making the protection of one integral to the protection of the other.

Urbanization is the change in land use from rural characteristics to urban or city-like characteristics.

Changes in land use can drive changes in local water quality. The most common nonpoint source pollutants from communities are derived from (1) a multitude of pollutants derived from activities associated with impervious surfaces, and (2) the transport of fine suspended sediment from construction site activities. Impervious surfaces serve dual functions, as a source for the accumulation of pollutants and as an express route for conveying storm water to local receiving water bodies without treatment. Direct connections be-

tween impervious surfaces and a local water body via storm drains, should be minimized through source control measures. Where source control measures are not sufficient or possible, runoff derived from impervious surfaces or an area should be treated prior to discharge to receiving water bodies.

The economics of protection have demonstrated over and over that it is much cheaper and easier to prevent water pollution, than it is to clean up pollution and reverse its subsequent cumulative impact. The protection of water quality for lakes, streams, rivers, and aquifers is often dependent upon the protection of sensitive open space areas or those areas most adjacent to a waterbody. Encouraging a multiple integrative goal of protecting sensitive open space and thus, the quality of local water resources, provides communities a much greater cost benefit. A compelling argument can be made that simultaneous benefits to a community are also seen with respect to enhancing community character and quality of life, neighborhood livability, air quality, and residential road safety, among others. The link between local land use and water quality is achieved through environmental planning that integrates development initiatives around protecting sensitive open space.

There are several planning tools and techniques that can be encouraged on a county-wide or watershed scale for reducing impervious area and soil loss due to erosion and hence, protecting sensitive open space associated with site development. Four environmental planning approaches: comprehensive planning, local integrative ordinances, preserving open space, and minimizing land disturbances, provide a variety of source control alternatives to traditional forms of costly treatment mitigation. A fifth planning approach, performance criteria, provide a flexible mechanism to encourage the use of general goals when considering site specific conditions. The chosen tool and/or technique will differ greatly among communities based on their given circumstances. Drawing from a menu of alternatives based on specific local conditions should encourage a greater flexibility for individual site design and community development.

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INTRODUCTION

Perhaps the greatest benefit provided by natural systems is their self-maintaining capability. When used within their tolerance levels, natural systems provide a variety of services efficiently, dependably, and at no cost. This self-maintaining capability is in direct contrast to most constructed systems that require money and energy to maintain.

— Richard R. Horner, and others, 1994.

Idaho has a rich and diverse landscape with tremendous variation in the natural environment. The varying natural environment includes areas of the landscape that are more suited to urban development. However, there are other parts of the natural landscape (i.e., ponds, lakes, streams, rivers, steep slopes, riparian vegetation, etc.) that have low tolerance to intensive development. These parts of the landscape are not as well suited for development, and if radically altered, can lose their function as natural detention and filtering systems.

Stormwater runoff is a concern to most cities under arid to semi-arid conditions of the west since they are developed adjacent to streams, rivers and lakes. In particular, many Idaho cities are designed and graded to purposely convey water toward nearby water bodies. The most typical storm water quality issues are those related to runoff from impervious areas (i.e., surfaces or covers) and soil loss from site construction activities adjacent to water bodies. Stormwater runoff in urban and urbanizing areas can collect a variety of pollutants, which can be conveyed and discharged to local water bodies.

Communities throughout Idaho can use site and comprehensive planning to encourage the broader application of comprehensive design principles that preserve the integrity of the natural landscape. Comprehensive planning, when combined with natural engineering techniques can help preserve and enhance the natural features and/or processes already on a site. By doing so, this combined planning and engineering approach can minimize adverse environmental impacts and maximize economic benefits. Site and comprehensive planning carries the additional benefit of providing a preventive dimension for local resource protection.

There are several compelling reasons to provide alternatives for reducing and preventing community nonpoint source pollution to local/regional planners and land use decision makers. The predominant reasons extend from the need to protect the quality of

water resources, especially those that are identified as water quality limited segments under the Clean Water Act. When not properly controlled through source and treatment measures, the process of urbanizing or developing the landscape and the various associated uses of land, generate known types of pollution and post-development site discharge volumes that are greater than pre-development levels. Superimposed upon water quality and water quantity control are the effects of rapid growth and development. With explosive growth and development and a projected continuation, there is greater imperative to protect the natural integrity of Idaho's diverse natural environment for its natural treatment functions and advocate maintaining post-development discharges at pre-development levels.

The DEQ Storm Water Program's objective is to provide education and technical assistance/support to Cities, Counties, Watershed Advisory Groups, and DEQ Regional Offices to protect and enhance surface water and ground water quality.

ORGANIZATION OF PUBLICATION

The first three chapters of the publication introduce key concepts and set the tone for tools and techniques presented in chapters 4 and 5.

The concept of sensitive open space, introduced in chapter 3, is a common theme throughout for directing site and watershed planning and development. Using environmental planning to protect sensitive open space serves a multi-functional role, serving other interests simultaneously within a community. When used as a community goal, the protection of sensitive open space is often integral in the protection of local water quality. Some of those other benefits can include improving community character and quality of life, neighborhood livability, recreational opportunities, residential road safety, and air quality, among others.

Each environmental planning tool and technique presented in Chapters 4 and 5 of this publication can be used individually or jointly to reduce impervious area, which is a predominant source of pollution based on urban and suburban-related land uses.

There are three supporting appendices that follow the text of the publication. Appendix A is a source of both qualitative and quantitative economic benefits provided by open space. Appendix B is an open space subdivision design model ordinance that can be modified based on local circumstances and needs. Appendix C is the Kootenai County *Site Disturbance Ordinance* that presents a "risk-oriented" approach for managing stormwater runoff and minimizing soil loss due to construction activities.

Chapter 1

Community Nonpoint Source Pollution

As the natural landscape is paved over, a chain of events is initiated that typically ends in degraded water resources. This chain begins with alterations in the hydrologic cycle, the way that water is transported and stored.

— Chester L. Arnold and C. James Gibbons, 1996

The quality of local water resources is directly influenced by land uses and activities. For Idaho communities and especially those that are seeing rapid growth and development, it is essential that local water quality protection be linked to land use. In natural landscapes, runoff or the portion of precipitation that ultimately reaches a water body, is generally perceived to be "clean" and not harmful to water quality. This perception seems justifiable since the quantity of pollution appears small from any one spot. However, the cumulative effect of all these small source areas can cause the deterioration of water quality through time, giving rise to nonpoint source pollution.

Nonpoint source water pollution is typically defined as pollution originating from sources which are diffuse and difficult to pinpoint, which is in direct contrast to the discrete nature of point source pollution (Table 1), where nonpoint source water pollution is caused by rainfall and snowmelt moving both over and through the ground and carrying with it a variety of pollutants associated with human land uses and activities. The Idaho Division of Environmental Quality defines nonpoint source as *a geographical area on which pollutants are deposited or dissolved or suspended in water applied to or incident on that area, the resultant mixture being discharged into the waters of the state* (Title 01, Chapter 02, Water Quality Standards and Wastewater Treatment Requirements [IDAPA 16.01.02.003.30]). Nonpoint source pollution is intermittent, highly variable, and closely related to human alterations of the landscape and hydrology of an area.

THE EFFECTS OF URBANIZATION

Urbanization (or suburbanization) is the change in land use from rural characteristics to one that is improved and being developed. In an undeveloped watershed, runoff is less pronounced and often characterized as sheet flow (shallow flow spread uniformly over the land's surface). The topographic relief of the land's natural surface eventually channels runoff toward draws and valleys, forming creeks and intermittent streams. In some cases, runoff may be stored in natural dips and depressions of the landscape; in

others runoff may contribute to recharging the ground water table. As runoff collects in channels and gradually cuts deeper into the landscape, moving further down gradient, there is a coalescence in perennial stream and river valleys and often a greater contribution of baseflow from ground water.

In contrast, the land's surface within an urbanizing watershed, typically cleared and graded, is paved and concreted over by impervious surfaces. Much of the natural retention provided by vegetation and soils is eliminated (Figure 1). The storage capacity of the landscape is smoothed over and covered. Traditional engineering designs typically promote an effective conveyance network for the removal of rainfall and snow-melt (e.g., curb/gutter). The result of this improved conveyance is change in the natural hydrology and morphology of the area. In turn, an improved conveyance network generates greater stormwater runoff volume and increased peak discharges over a shorter time-frame. The impact is an increase in the magnitude and frequency of erosive bankfill flooding due to stream channel widening and incision. Lower stream baseflows may result from the decrease in ground water recharge due to reduced infiltration.

The cumulative effects caused by urbanization are not only characterized by increasing imperviousness, but increased potential for soil loss in unstable stream channels and contributions from poorly contained construction activities throughout the watershed. The changes in land use caused by urbanization are often subtle and gradual. The process of erosion degrades streams in urbanizing watersheds, as more frequent channel scouring events reflect relatively unstable conditions. Channel instability causes the loss of in-stream habitat structures (i.e., pool and riffle sequences) and reduces wetted perimeters for vegetation. In addition, erosion may provide a greater load of nonpoint source pollutants.

Table 1. *General comparisons between nonpoint source and point source factors.*

FACTORS	NONPOINT SOURCE	POINT SOURCE
Input	Non-discrete	Discrete
Pollutant Source	Diffuse	Defined ("end-or-pipe")
Discharge Frequency	Intermittent	Continuous
Toxicity	Acute	Acute or chronic
Suspended solids	Highly Variable	Regulated
Control	Best Management Practices Performance Criteria	§NPDES Permitting

Source: Davis, P.H., 1995, Factors in Controlling Nonpoint Source Impacts, in *Herricks, E.E., ed., Stormwater Runoff and Receiving Systems. §NPDES is an acronym for the National Pollutant Discharge Elimination System, an U.S. EPA permitting program.*

Impervious area may be the most feasible and inexpensive environmental indicator for addressing urban runoff pollution at both the site level and watershed scale. Two major features of impervious area are its simplicity and measurability. Used as a land development unit by local and county planners, impervious area also serves an integrative function among professions for protecting environmental quality and in turn, the quality of the community. Impervious area can be determined for present community layouts and forecasted through current zoning to indicate an expected cumulative effect on stormwater runoff in the future. Impervious area does not generate pollution, but does:

- contribute to changes in the natural hydrology of a site,
- bypass the natural pollutant treatment removal mechanism of soil,
- reflect intensive land uses that often generate pollution, and
- redirect runoff containing pollutants to water bodies.

Research during the last fifteen years shows a strong linear correlation between the health of a receiving stream and the ratio of impervious area within a watershed (Arnold and Gibbons, 1996; Schueler, 1994; Booth and Reinfelt, 1993; Schueler, 1992; Todd, 1989; Schueler, 1987; Griffin, 1980; and Klein, 1979). Table 2 summarizes the impacts associated with streams in urban and urbanizing watersheds (Schueler, 1995). Conclusions from this research show that stream health and impervious area are strongly correlated and that this correlation is not limited by geography, specific environmental indicators, or a type of field method. Stream deterioration is expected to occur at relatively low levels of impervious area (10 to 15%) when planning and control measures are not in place. (Figure 2). The threshold of initial degradation (beyond 15%) appears to be consistent across the board regardless of evaluated criteria (Arnold and Gibbons, 1996).

Table 2. *Summary of stormwater runoff impacts associated with streams in urban and urbanizing watersheds.*

Changes in stream hydrology	**Changes in stream morphology**
Increased magnitude/frequency of severe floods	Channel widening and downcutting
Increased frequency of erosive bankfull and sub-bankfull floods	Stream bank erosion/channel scour
Reduced ground water recharge	Imbedding of stream substrate
Higher flow velocities during storm events	Loss of pool/riffle structure
	Stream enclosure or channelization
Changes in stream water quality	**Changes in stream ecology**
Sediment pulse during construction	Reduced diversity of aquatic insects
Nutrient loads promote stream and lake algal growth	Reduced diversity of fish
Stream warming	Decline in amphibian populations
Bacterial pollution during dry and wet weather	Creation of barriers to fish migration
Higher loads of organic matter, metals, hydrocarbons, and priority pollutants	Degradation of wetlands, riparian zones, springs, etc.

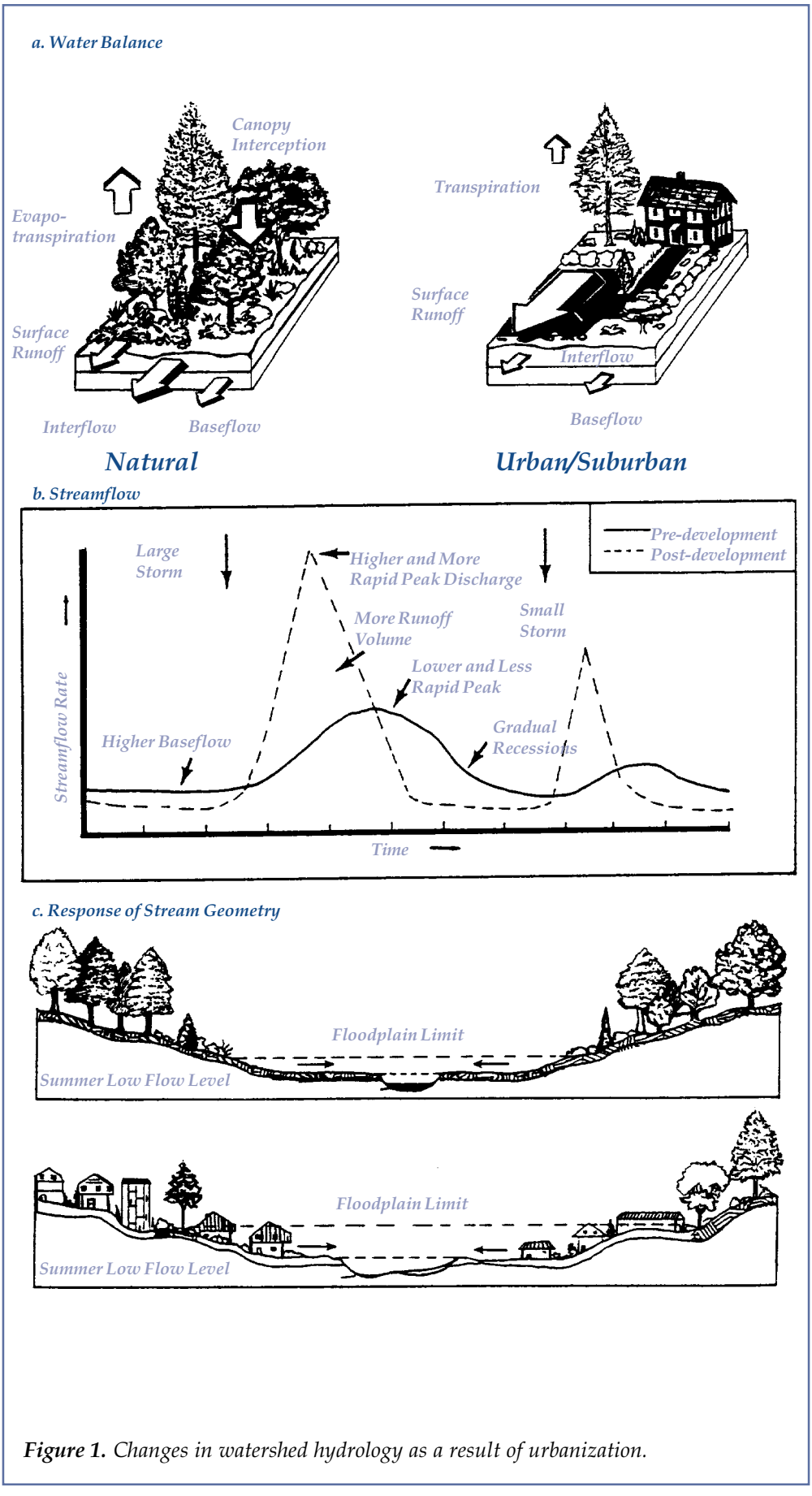


Figure 1. *Changes in watershed hydrology as a result of urbanization.*

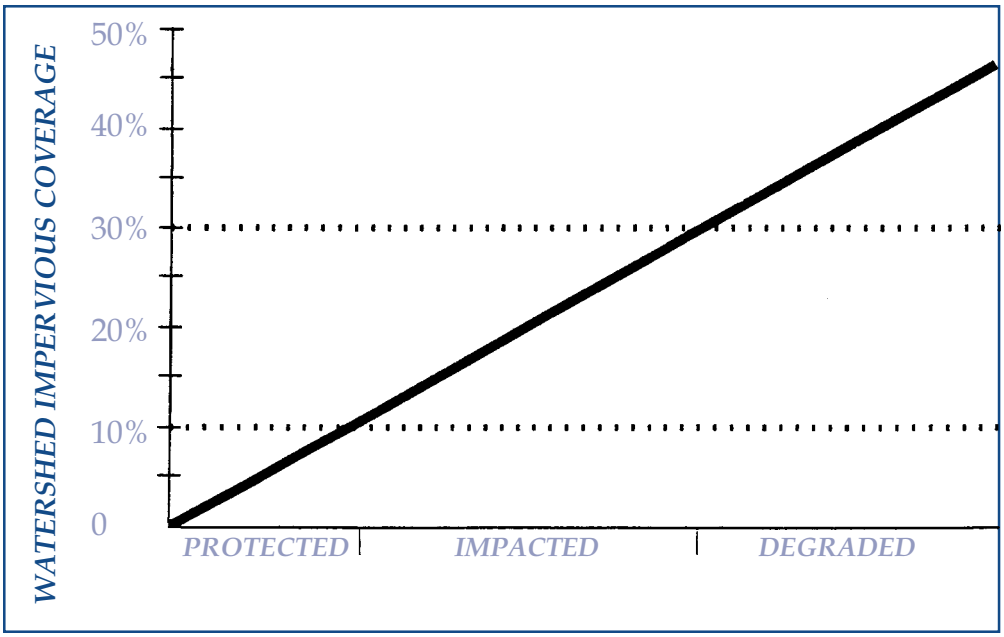


Figure 2. *The relation between impervious surface cover and stream health with three thresholds of stream health.*

CHARACTERISTICS OF URBAN STORMWATER RUNOFF

Changes in local water quality that are caused by nonpoint source pollution result from changes in land use associated with urbanization. The most common nonpoint source pollutants from communities are derived from: (1) a multitude of accumulated pollutants from impervious areas, and (2) the transport of suspended sediment from construction site activities (Table 3). Some characteristic changes in water quality related to runoff from impervious area are:

- increased nutrient input,
- increased pathogens,
- lower concentrations of dissolved oxygen,
- increased organic matter, and
- alteration of stream temperature.

Table 3. *Urban pollutants and their impacts within urban and urbanizing watersheds.*

Runoff Pollutants	Specific Constituent	Sources	Nonpoint Source Impacts
Suspended Sediment	total suspended solids, turbidity settleable solids	construction sites, agriculture runoff, and urban/suburban	Filling of ponds, reservoirs, and lakes. Increasing turbidity reduces light for photosynthesis. Acts as a sink or source of adsorbed nutrients and toxic materials.
Nutrients	total phosphorus total nitrogen	agriculture/urban runoff, atmospheric deposition, and erosion	Contributing factor for eutrophication of receiving waterbodies. Decreased level of dissolved oxygen available for fish species.
Pathogens	fecal coliform bacteria viruses	agriculture runoff, domestic animals, urban/suburban	High concentrations cause acute health concerns, limiting swimming, boating and other recreational activities. Prevents water from being potable.
Toxic metals	zinc, copper cadmium, chromium	urban/suburban	Bioaccumulative effects contribute to: human health advisories for fish consumption and other long-term toxic stress increases on the entire ecosystem.
Petroleum hydro-carbons	oil and grease total petroleum hydrocarbons	urban/suburban agriculture runoff	Toxic effects on all levels of the food chain, contributing to immediate declines in zooplankton and benthic organisms.
Synthetic organics	solvents, polynuclear aromatic	agriculture runoff, urban/suburban	Can bioaccumulate in organisms and create toxic health hazards within the food chain.
Pesticides		urban/suburban, agriculture runoff	Can bioaccumulate in organisms and create toxic health hazards within the food chain.

CHAPTER 2

BEST MANAGEMENT PRACTICES

Contributions from nonpoint source pollution, derived from urban runoff and storm sewers, still remain leading sources of water quality impairment of beneficial uses of rivers and lakes throughout the country.

— U. S. Environmental Protection Agency 305(b) report, 1994

The existing site topography and vegetation can often be effective in naturally treating and disposing of volume and quality of stormwater runoff, when left undisturbed or intact as much as possible. Typically, non-disturbed dips and depressions within a site are able to collect and store water, coupled with the site's existing vegetation, that provides a filter function for both pollutants and sediment. This natural drainage system works jointly to also regulate water quantity. When a site's hydrology is altered by the loss or the compaction of topsoil, impervious coverage by paving, asphalting, or concreting, post-development drainage if not controlled through either source or treatment control measures causes increased runoff. It may not necessarily be the individual development site, but rather, the cumulative effect of numerous site developments that cause a greater volume, and hence, an impact to nearby and local water bodies.

Best Management Practices (BMPs) are measures or a combination of measures that have been determined to be the most effective and practical means of preventing or reducing contamination to ground water and/or surface water pollution from nonpoint and point sources. The objective in implementing BMPs is to achieve water quality goals and protect the beneficial uses of the water body.

SOURCE AND TREATMENT CONTROL BMPS

Stormwater runoff usually consists of surface runoff from such nonpoint sources as streets, parking lots, and yards. It may also have point source contributions from accidental spills and leaks or illegal dumping of commercial and household wastes into storm drains. Stormwater runoff from residential subdivisions and commercial development contains many small source areas. This type of stormwater runoff is much different from that associated with separate storm sewers or other conveyances. Stormwater runoff discharged through conveyances such as separate storm sewers is legally, a point source under the Clean Water Act and is subject to the National Pollutant Discharge Elimination System (NPDES) program.

Structural or treatment control BMPs are designed to remove pollutants that are contained in stormwater runoff (Table 4). Treatment control BMPs use a variety of mechanisms to remove pollutants from storm water including sedimentation, filtration, plant uptake, ion exchange, adsorption, and bacterial decomposition. Examples of stormwater runoff treatment BMPs include infiltration trenches, wet ponds, biofiltration swales, and vegetative filter strips. The goal of storm water treatment BMPs is to treat at least 90 percent of the runoff generated by development.

Table 4. *The three functional groups of runoff treatment control BMPs.*

FILTRATION	Treating sheet flow by decreasing the velocity of energy of runoff as it moves through vegetation or sand. The method promotes infiltration and the settling of suspended solids and thus, prevents erosion. Vegetation controls are most effective when used in combination with other urban BMPs, serving as the first step in treating and disposing of storm water. Common examples: vegetated filter strips, grassed swales, sand filters, basin landscaping, and riparian reforestration. Site limitations include easily being clogged with sediment or being inundated with high flows.
RETENTION (Infiltration)	Infiltration permits pollutant removal as runoff percolates through a medium (e.g., clean sand, compost, soil, etc.). Use is restricted by poor site conditions: high water table, compacted soils, and the presence of shallow bedrock. Common examples are: infiltration basins, trenches and dry wells, and porous/modular pavement. Site limitation include: extremely high/low soil permeability, locally high water tables, and a shallow buffer between the surface and underlying drinking water aquifer.
DETENTION	Detention basins act as temporary holding facilities for runoff, allowing suspended solids and associated pollutants to settle out, and delays the release of runoff directly to water bodies. Detention basins effectively reduce suspended solids and particles; they also function in reducing flood impact and streambank erosion, lessening stress on habitats. Common examples are: dry ponds, wet ponds, and constructed wetlands. Site limitations include: difficulty with vegetative stabilization, frequent clogging, and excessive sediment build up.

Source control BMPs are designed to prevent pollutants from affecting storm water by eliminating the source of pollution or preventing contact of pollutants with rainfall and runoff. Source control BMPs are either specific to the type of land use being proposed for development or are intended to control a specific type of pollution problem existing within a watershed, such as excessive nutrients that may contribute to high algae concentrations. Examples of source control BMPs include: limiting fertilizer concentration/application, covering areas used to store stockpiled soil, street sweeping during dry weather conditions, reducing impervious areas, preserving open space, and natural resource planning. Source control BMPs are generally nonstructural in nature and often considered as preventative and planning oriented.

The identification and application of BMPs is broadly based on the goal(s) of the user. Some BMPs are more applicable to planners or community leaders, whereas others are more applicable to engineers, private property owners, or contractors. At the watershed level, storm water management requires a more systematic approach based on the prevailing land use activities and conditions, the water quality goals, and the community resources available for implementation of BMPs. Structural BMPs installed randomly throughout a watershed may provide local treatment, but may contribute to the transfer of pollution from surface to ground water or vice versa (e.g., dry well injection to an aquifer). This transfer can ultimately lead to further nonpoint source pollution.

Community nonpoint source pollution is largely the result of land use activities, yet there are few approaches that truly address their management through nonstructural measures such as land-use planning and performance criteria. Often there is an overwhelming reliance on conventional strategies, such as treatment control BMPs and large lot zoning. However, treatment BMPs, which range in design for controlling runoff, should be considered the "tail end" of any storm water management strategy. For this reason, treatment control BMPs are discussed separately in a *Catalog of Stormwater Best Management Practices (BMPs) for Idaho Cities and Counties*.

MANAGING URBAN STORMWATER RUNOFF

The realm of managing urban stormwater runoff includes existing development, as well as plans for new development. In confronting both the correction of existing and the prevention of future problems, two categories of BMPs are often necessary:

1) Watershed planning source control measures: are used to minimize and/or prevent the source(s) of urban pollutants (e.g., limiting impervious area through clustering development).

DID YOU KNOW?

The City of Boulder, Colorado, Real Estate/ Open Space program estimates that it costs approximately $2,500-$3,000 to provide public services to an acre of developed land. The costs of providing public services to open space are $75 per acre (James Crain, Director RE/OS, City of Boulder, 1988 cited in U.S. EPA, 1995).

2) Site design treatment measures: are designed, constructed, and periodically maintained to interrupt the detachment, transport, and subsequent discharge of pollutants.

Stormwater management plans for identifying and correcting current problems address existing stormwater runoff nonpoint sources. Controlling runoff from developed areas tends to be more expensive compared to that associated with managing runoff from new development. Since there is no opportunity for planning upfront, the approach tends to be more deficit oriented and often relies on targeting storm water control projects that provide the highest ratio of cost benefit. The first step identifies the priority pollutants and their associated source(s); as priority pollutants are identified and incorporated together within a runoff management plan for an area, pollutant reduction opportunities are identified. Restoration and other types of retrofit activities should be based on the greatest ratio between economics and the provided environmental benefit(s).

Stormwater management plans for new development should emphasize sustaining predevelopment runoff volumes through the use of source control BMPs. A local stormwater management plan should focus not only on water quantity, but also *water quality*. Stormwater management plans vary and include design strategies to protect sensitive open space areas, minimizing site disturbances, and using the land's natural treatment functions. The purpose of this manual is to present source control measures in a menu format. The measures can be incorporated into local comprehensive plans, ordinances, or public agency programs for managing stormwater runoff caused by new urban or suburban development projects and construction activities.

Chapter 3

Protecting Sensitive Open Space Areas

The emerging field of urban watershed protection often lacks a unifying theme to guide efforts of its many participants—planners, engineers, landscape architects, scientists, and local officials. The lack of a common theme has often made it difficult to achieve a consistent result at either the individual development site, or cumulatively, at the watershed scale.

— Thomas Schueler, 1995a

Prevention in site and comprehensive planning is much more efficient and cost effective than retrofitting problems as they arise. A community without comprehensive drainage management can create problems with water quality as urbanization progresses. The further that predevelopment hydrological conditions are altered from initial conditions, the more that anticipated problems can accumulate.

Stream quality is not capable of solely being protected based on in-stream practices. There must also be a consideration of the activities that take place on the land. The protection of water-based resources from the effects of impaired runoff water quality during and after construction can be costly and often difficult. Local planning can encourage new development in the least sensitive areas of a watershed. New development can be enhanced by planning residential subdivisions around open space areas and preserving the hydrologic function of natural landscapes and drainageways through natural engineering techniques (i.e., incorporating landscaping components). The concept of sensitive open space areas can serve as the common theme for guiding individual site development, and cumulatively, at the scale of the watershed.

SENSITIVE OPEN SPACE AREAS

Natural resources are generally classified as either water-based or land-based. Water-based resources include those areas that hold or store water for some length of time. Some of the more common areas include rivers, streams, lakes, and aquifers. Land-based resources function as a supportive component of water-based resources and their management is often considered integral in their protection. Typical land-based resources include: riparian vegetation, floodplains, wetlands, groundwater recharge zones, or

collectively, sensitive open space. Other sensitive open space areas are steep slopes and areas of highly erodible soils.

Descriptions of sensitive open space areas that are essential in protecting water-based resources include:

RIPARIAN VEGETATION. Many types of plants grow in the wetted perimeter along streams and rivers. Riparian vegetation stabilizes stream channel perimeters and plays an indispensable role in preventing erosion. Vegetation functions as a filter trap for suspended sediment from upstream locations. Trees and shrubs provide shade and streamside vegetative communities for fish and other wildlife habitat. By using vegetative set-backs or buffers along the edge of stream channels, there is natural reduction in channel erosion and increased trapping of sediment, nutrients, and other pollutants prior to their reaching the water body.

FLOODPLAINS. Property owners within the 100-year floodplain, which is covered by the National Flood Insurance Program can pay lower premiums by preserving this already natural control for nonpoint source pollution. When development is limited in floodplains, streams and rivers are allowed to flow their natural course and provide unseen benefits through the allowance of providing flood storage, runoff infiltration from upgradient developed areas, and erosion protection.

WETLANDS. Areas that are inundated or saturated by surface and ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (as defined by the Environmental Laboratory, Department of Army, 1987). Once considered an area with little economic value, most wetlands today are recognized for their multitude of benefits. Wetlands have been constructed as a practice for managing storm-water runoff of an area. Wetlands generally support diverse vegetation, which filter suspended sediment and dissolved nutrients from local runoff. Wetlands also provide flood control, functioning as temporary storage areas. Wetland maintenance is accomplished through maintaining or reproducing pre-development hydrology and by providing sufficient runoff pre-treatment.

GROUND WATER RECHARGE AREAS. Over ninety percent of Idaho communities rely on ground water as a source of drinking water and for other domestic uses. Since municipal wells draw water toward them as they pump, the aquifer immediately upgradient from a well or well field is particularly vulnerable to nonpoint sources of pollution. Some typical sources of urban non-point source pollution can be traced back to lawn care practices,

animal waste, road salt, accumulated oil and gas spills, and toxic materials.

STEEP SLOPES AND ERODIBLE SOILS. The removal of vegetation along hillsides or steep slopes lessens the ability for sediment to remain in place. If structural and temporary controls are not used, the cumulative effect of erosion from site material can devastate surface water bodies. Fine sediment and soil contributes to the degradation of water bodies and acts as a transport agent for pollutants that typically adsorb to their surfaces.

MULTIPLE INTEGRATION GOAL

Several recent themes in subdivision design, landscape architecture, and transportation have come to the forefront in community planning. Promoting the use of "neo-traditional" residential design is one example; open space subdivision design for growing rural or suburban settings, by Arendt (1996), is another. The use of depressional landscaping also fits well. The more that comprehensive design principles can be blended together or integrated, the better the maximization of development economics and environmental benefits. Components of these themes converge toward further use of impervious area as a land development unit. Taken as a whole, the themes serve as complementary initiatives for local planners and land use decision makers in encouraging the protection of sensitive open space areas, while reducing impervious area and minimizing soil loss during construction activities concurrently.

There is an obvious cost benefit when several complementary initiatives can be integrated together to form a common goal. This combination results in a *multiple integration goal*. Using environmental planning to protect sensitive open space serves a multifunctional role, serving many other interests within a community. Some of those simultaneous benefits can include improving community character and quality of life, neighborhood livability, air quality, and residential road safety, among others. Five planning approaches are discussed in chapters 4 and 5, which introduce tools and techniques for protecting sensitive open space. The link between local land use and water quality is achieved through environmental planning that integrates development initiatives around protecting sensitive open space.

COST BENEFIT CASE STUDY

In Prince George's County, Maryland, "rain gardens" were used to filter stormwater runoff as opposed to conventional detention pond facilities. The cost savings was $300,000; the "rain gardens" were $100,000 versus $400,000 for the detention facilities.

Chapter 4

Environmental Planning Tools and Techniques

Some of the most noteworthy and innovative strategies, greenway and historic preservation, for example, succeed in part because, when combined in various ways, they result in a synergy that effectively addresses several concerns simultaneously.

— Henry Diamond and Patrick Noonan, **1996**

The economics of protection have demonstrated over and over that it is much cheaper and easier to prevent water pollution, than it is to clean up pollution and reverse its subsequent cumulative impact. The protection of water quality for lakes, streams, rivers, and aquifers is often dependent upon the protection of sensitive open space areas. Encouraging a multiple integrative goal of protecting sensitive open space and thus, the quality of local water resources, provides communities a much greater cost benefit. A compelling argument can be made that simultaneous benefits to a community are also seen with respect to enhancing quality of life, neighborhood livability, and recreational opportunities, among others.

There are several planning tools and techniques that can be encouraged on a county-wide or watershed scale for reducing impervious area and soil loss due to erosion and hence, protecting sensitive open space associated with site development. Four specific environmental planning approaches: comprehensive planning, local integrative ordinances, preserving open space, and minimizing land disturbance, provide a wide variety of innovative alternatives to traditional forms of costly treatment mitigation. The chosen tool and/or technique will differ greatly among communities based on given, various circumstances (Table 5). Drawing from a menu of alternatives based on specific local conditions should encourage greater flexibility for site design and development.

COMPREHENSIVE PLANNING

The Local Planning Act [Idaho Code Title 67, Chapter 65] is the State's enabling legislation for comprehensive planning. A comprehensive plan is a document that guides future development based on city or county long-term goals and objectives. Comprehensive planning provides an effective tool that communities can use in managing and/or protecting natural resources. Careful planning minimizes the chance for unforeseen or unintended problems in the future. The plan results from public input, study, and analysis of existing and forecasted conditions. Once adopted,

the plan serves as a guide for managing land use activities, the preparation of legally binding ordinances, and the preparation of capital improvement programs.

In developing a comprehensive plan and any peripheral local regulation, communities need to screen the menu of various types of tools and techniques that are available to them. Some of the more common tools that can be integrated within a comprehensive plan are greenway or open space preservation initiatives, the promotion of cluster development, and raising the awareness of and promoting the use of impervious area as an environmental indicator. **Ultimately, the screening process should be based on specific criteria related to watershed conditions and the priorities of each community**. Typical screening criteria include:

- technical and economic feasibility, some site treatment control BMP review which requires additional technical support, staff expertise, and financial resources;
- the existing government framework, ensuring identification of the involved government entities and their role(s) for wide implementation of BMPs;
- properly delegated responsibility, to assure continued operation, maintenance, and implementation; and
- identification of the targeted pollutant type(s).

INTEGRATIVE NATURAL RESOURCE PLANNING. Watersheds compose individual "puzzle pieces" of the natural landscape. Each watershed is unique and possesses a different set of land uses, physical conditions, climatic setting, government jurisdictions, and demographics. Land use activities related to urbanization, such as clearing, grading, paving, and building construction, permanently alter the water environment within urban and urbanizing landscapes. As urbanization continues or increases within rural and urban settings, the water quality of runoff is ultimately impacted without sufficient planning and control measures in place.

Changing physical conditions (i.e., soil types, depth to water table, vegetation removal, etc.) caused by land development and the shifting interface between the many types of land use activities creates the need for solving community stormwater runoff issues at a local level. Human activity may not generate local or cumulative impacts in one location, but the same activity at another more sensitive location could have a cumulative effect throughout the community and the entire watershed.

Natural resource planning is one of several other required elements of local comprehensive plans that can serve as complementary initiatives for water quality protection. Some other elements

TABLE 5. SUMMARY OF ENVIRONMENTAL PLANNING TOOLS AND TECHNIQUES.

Environmental Planning Tools and Techniques	Applicability to Local Storm Water Management	Land Use Practice	Legal Considerations	Administrative Considerations
COMPREHENSIVE PLANNING				
Integrative Natural Resource Planning	Concept used to incorporate other elements of a local comprehensive plan. Used in conjunction with other tools that follow.	Other land use elements that "mesh" well are community design, transportation, hazardous areas, & land use.	Well accepted option for communities facing development pressures.	Requires raising public awareness through local meetings and educational workshops.
An Integrative Resource Map	Used in conjunction with the technique "risk factor assessment."	Community uses tool to visually display locations of sensitive open space.	Well-accepted tool for general identification purposes.	Some initial work to develop or revise the map.
Areawide Map of Development and Sensitive Open Space	Used to show encouraged areas of development versus conservation within a community.	Community identifies sensitive open space areas.	Used in conjunction with zoning ordinance as an advisory tool.	Same as above.
Riparian Buffers and Networks	Used to protect the quality of a water body, to lend in diverse ways to the character of a community.	Community initiative that is supported through the comprehensive plan and/or local ordinances.	Well-accepted technique for fulfilling several complementary needs of the community.	May involve additional staff or a private-public partnership between a community and a local nonprofit organization.

Environmental Planning Tools and Techniques	Applicability to Local Storm Water Management	Land Use Practice	Legal Considerations	Administrative Considerations
LOCAL INTEGRATIVE ORDINANCES				
Cluster/PRD Design	Used to plan and design around sensitive open space areas. This option is encouraged for use in designated areas adjacent or within sensitive landscapes.	Community offers technique as an option to developers within comprehensive plan and subdivision ordinance.	Well-accepted option for residential land development, especially in rapidly growing rural or suburban settings. Is a density neutral technique.	Enforcement and inspection requirements are similar to conventional "grid" subdivision.
Protective Overlay Zoning	Used to identify sensitive areas on local maps for protection and to limit land uses that pose potential impacts.	Community identifies sensitive protective areas on practical base or zoning map. Often used in conjunction with other tools such as prohibition of designated land uses, special permitting, large lot zoning, etc.	Well-accepted method of identifying sensitive areas. May face legal challenges if boundaries are based solely on abitrary delineations. Often requires local decision making and consensus to work effectively.	Requires staff to develop overlay map. Inherent nature of zoning provides the ability for "grandfathering" of pre-existing uses and structures.
Streamside Protection Zones	Used to create a setback or buffer between development and a previously designated sensitive area.	Prior designation of protective zones is based on community practical base or zoning map.	Same as above.	Same as above.
Multi-Functional Landscaping	Innovative conceptual tool for linking landscaping design, runoff control, and preserving the integrity of natural processes and functions of the environment.	Community can provide as an option or provide incentive for protecting sensitive areas.	Adoption of specific landscaping standards requires sound technical support for reviews.	Can be simplified for a community in having the design professional propose, document, and properly construct.
Impervious Area Ratios	Is designed to protect sensitive areas within a designated subwatershed that has been previously identified as a major contributor of pollutants.	Performance-oriented measure that is adopted as part of a community zoning ordinance.	An option for a select portion of the community that has agreed to the designation through consensus.	Will require staff to monitor the amount of imperviousness as a function of pre-existing and future land development.

Environmental Planning Tools and Techniques	Applicability to Local Storm Water Management	Land Use Practice	Legal Considerations	Administrative Considerations
PRESERVING SENSITIVE OPEN SPACE				
Development Easements	Through design, will limit development on designated parcels of land; often works well with protecting sensitive open space areas.	Similar to purchase program; easements are generally obtained with the assistance of nonprofit land conservation organizations.	Used in an advisory role, can provide an additional technique that benefits the public. There are some legal consequences of accepting land for donation or sale from the private sector, involving liability.	Administrative requirements for maintenance of accepted land is often critical, particularly if a community does not have a program for open space maintenance.
Transfer of Development Rights	Used to transfer development rights from areas of high sensitivity to locations that are less sensitive.	Community offers transfer as an option linked to compre-hensive plan and zoning ordinance. Community must identify areas for "sending" and "receiving."	An accepted land-use planning tool.	Cumbersome administrative requirements. Not well suited for small communities without significant administrative resources.
Purchase Program	Land that is acquired through purchase or donation is often held in trust by local nonprofit organizations or the community for protection purposes.	Used as a nonregulatory technique, communities generally work in partnership with nonprofit land trust organizations to set aside sensitive areas.	Used in an advisory role, can provide an additional method that benefits the public. There are some legal consequences of accepting land for donation or sale from the private sector involving liability.	Administrative requirements for maintenance of accepted land is often critical, particularly if a community does not have a program for open space maintenance.

Environmental Planning Tools and Techniques	Applicability to Local Storm Water Management	Land Use Practice	Legal Considerations	Administrative Considerations
PERFORMANCE CRITERIA				
Fingerprinting Development	Delineating the limit of ground disturbance or restricting disturbance to the locations of the building pad, roadway, and utilities.	Alternative technique that enables preservation of native vegetation and minimizes the effects of erosion during clearing and grading.	An accepted method for limiting the disturbance associated with building construction.	Enforcement and inspection is similar to conventional practices.
Risk Factor Assessment	Technique for incorporating a risk-oriented strategy into local erosion control and/or drainage ordinance(s). Used in conjunction with the other tools above.	Used to establish a process for identifying the level of risk, a site development project poses to protected sensitive areas.	Used in conjunction with local decision making and consensus associated with ordinance development.	Serves as a screening tool for reviewing agencies; providing basis for focusing time and resources on land development projects that pose the greatest concern to sensitive areas and water bodies.

that integrate or 'mesh' well with natural resource planning are: hazardous areas, land use, transportation and community design.

AN INTEGRATIVE RESOURCE MAP. An "integrative resource map" is a tool that can be used by public review agencies, the development community, local/county planners, and local land use decision makers to visually display locations of sensitive open space. This is a tool that can serve several complementary initiatives when integrated with a comprehensive plan, local ordinance, and public land preservation initiatives. Some of the more common areas that can be displayed are steep slopes, expected drainage patterns, the location of highly erodible soils, the location of high water table, stream buffers, parks and open space, domestic wellheads and/or well fields, existing development, future zoning, catchment and/or storm drains, floodplains and floodways, wetlands, and strategic monitoring stations.

The scaling of integrative resource maps is often one inch equalling 2000 feet. For instances where the typical resolution is not available, 7.5-minute topographic quadrangles (i.e., scale of 1:24,000) can be used instead. The lack of resolution is accounted for through site or "risk factor assessment." Factors identified by a community can be designated under the "risk factor assessment" technique, for evaluating site specific conditions to identify potential areas of sensitivity during development project applications.

AREAWIDE MAP OF DEVELOPMENT AND SENSITIVE OPEN SPACE. An areawide map (identifying sensitive open space areas that are considered common to the community or essential in protecting designated beneficial uses) is a step beyond typical county zoning maps. Thus, a map showing intended development versus sensitive open space areas could serve an advisory or regulatory role, when linked to a given municipal comprehensive plan. The map provides guidance on where to encourage development. Landowners would either be encouraged or required, under local zoning or building permitting to incorporate environmental planning technique(s) within a designated zone or corridor. This technique is an excellent tool for promoting riparian buffers or greenway initiatives.

RIPARIAN BUFFERS AND NETWORKS. When designed and planned properly, riparian buffer areas (zones or a network) protect the quality of a stream and lend in diverse ways to the character of the surrounding community (Table 6). Forested or riparian buffers can be linked together to form a network of natural stormwater quality and flood control devices. Once integrated along a stretch of a stream or river, a riparian buffer network or more commonly called a greenway, provides a cost effective and practical technique for protecting and maintaining water quality. Nation-

Did You Know?

Johnson County, Kansas, expected to spend $120 million on stormwater control projects but voters passed a $600,000 tax levy to develop a county-wide streamway park system. The park addresses flood concerns while providing the community with a valuable recreation resource (National Park Service, 1992).

wide studies consistently show that buffers linked within a greenway increase property values of adjacent homeowners (Appendix A). Greenways also serve neighborhoods and the community as a whole through providing an enhanced natural amenity.

A properly placed buffer network can also distance impervious area from the stream or local water body; the greater the distance, the better the chance that soils and vegetation can act as natural filters in removing suspended solids, harmful bacteria and nutrients. The potential pollutant removing mechanism is improved when buffers are designed with other cost-effective treatment control BMPs to mitigate concentrated flow. Once stormwater runoff concentrates and follows a temporary channel, the removal mechanism by the soils, roots, and microbes is short circuited. The aim is to reproduce predevelopment hydrology and slow concentrated flow to sheet flow and shallow ground water infiltration.

Table 6. *Some benefits of a community stream buffer.*

Increased pollutant removal. If they are properly designed, buffers can provide effective pollutant removal for a development located within 150 feet of the buffer boundary.

Provides space for storm water ponds. When properly placed, structural BMPs within the buffer can be an ideal location for removing pollutants and controlling flows from communities.

Increases property values. Homebuyers perceive buffers as attractive amenities to the community; 90% of buffer administrators feel buffers have a neutral or positive impact on property values.

Protection from streambank erosion. Tree roots consolidate the soils of floodplain and stream banks, which reduces the potential for severe bank erosion.

Prevent disturbance to steep slopes. Removing construction activity from these sensitive areas is the best way to prevent severe rates of soil erosion.

Places distance between areas of impervious area and the water body. More room is made available for placement of BMPs and septic system, which improves performance.

Provides food and habitat structure for fish and wildlife. Leaf litter is the base food source for many stream ecosystems; riparian cover mitigates stream warming through shading, and trees provide woody debris cover and habitat structure for aquatic insects and fish.

Reduces watershed imperviousness by 5%. An average buffer width of 100 feet protects up to 5% of watershed area from future development.

Foundation for present or future greenways. The linear nature of the buffer provides for connected open space, allowing pedestrians and bikes to move more efficiently through a community.

Prevents stream warming. Shading by forest canopy prevents further stream warming in urban watersheds.

(Based on Schueler, 1995b)

LOCAL INTEGRATIVE ORDINANCES

Land use planning and zoning practices are effective ways to balance the need for development with the needs of protecting watershed resources. Communities can choose to prioritize buildable land and direct development to the less sensitive areas of the landscape. This approach ensures long-term viability and the protection of natural resources, especially those that are designated as sensitive open space areas by the community's comprehensive plan.

CLUSTER DEVELOPMENT. Cluster development can guide development to the least sensitive areas of a subdivided parcel. It also serves as an effective tool for protecting those same sensitive resource areas as open space. In designing residential development around preserved open space, attractive neighborhood amenities are created. Clustering is an effective way to significantly reduce stormwater runoff and the contributed pollution from an area since the percentage of imperviousness can be considerably reduced (as much as 10% to 50% based on the lot size and layout). Open space subdivision design and "neo-traditional" development are two alternatives to conventional layout designs (Table 7).

Open space (or conservation) subdivision design offers a unique residential design with significant open space amenities that are attractive to potential homebuyers, similar to those provided by golf course developments. Golf course developments are essentially specialized "planned residential developments" (PRDs) [also known as planned unit developments]. PRDs were highly touted over 30 years ago by professional planners throughout the nation as an improved alternative to conventional subdivisions. The lasting contribution of PRDs to planning was greater design flexibility which allowed reduced standards for lot width and area. However, the lack of comprehensive vision for maximizing the use of open space led to many proposed and approved designs with little proven effect.

Open space subdivision design is an attractive alternative to conventional subdivision design in rapidly growing rural settings and within suburban fringes of growing communities (Table 8). Residential neighborhoods that are designed as land-conserving subdivisions are more compact with smaller lots for narrower single-family homes. The designs reflect traditional village layouts developed in smaller towns across the United States during the turn of the century. The approach distinguishes open space first; allowing the size and location of the open space to drive the subdivision design. The houses, street alignments, and lot lines are drawn in subsequently.

Conventional zoning regulations establish a "one size fits all" approach for subdivision designs (Figure 3) which generally result in checkerboard layouts of nearly identical lots covering the entire parcel

DID YOU KNOW?

A study of property values near greenbelts in Boulder, Colorado, noted that housing prices declined an average of $4.20 for each foot of distance from a greenbelt up to 3,200 feet. In one neighborhood, this figure was $10.20 for each foot of distance. The same study determined that, other variables being equal, the average value of property adjacent to the greenbelt would be 32 percent higher than those 3,200 feet away.

of land. In comparing the conventional layout "yield plan" to that of the open space design methodology, it is evident that any special and sensitive features in the landscape are also subdivided concurrently.

Other benefits offered by open space subdivision design, according to Arendt, 1996a:

1) *Smoother review time*: the expected land and/or water body protection that is achieved through this design should streamline local review and approval processes;

2) *Lower costs*: reducing infrastructure engineering and construction costs is possible through narrowing single-family houselots, shortening roads and utility runs, reducing street pavement that results from more compact or village-like layouts;

3) *User friendliness*: the design approach mimics the basic steps involved in golf course developments and can be applied to any residential subdivision situation, regardless of scale, location, housing type, or market value;

4) *Protects natural resources*: through shedding less stormwater runoff since they provide greater natural vegetation and thus, a natural filtering mechanism which acts to buffer nearby lakes, streams, or rivers.

Open space subdivision design is a *density-neutral* approach which respects property rights. The approach essentially advocates the conservation of natural areas by rearranging density on each development parcel during planning design. As much as half of the buildable land is designated as undivided, permanent open space. However, the overall number of dwellings allowed is the same as that permitted by conventional layouts. Designated open space amenities remain under *private* ownership and control. No land is dedicated for public access or use and thus, it avoids the legal issue surrounding the "takings" doctrine. The concept behind open space subdivisions assures full density while limiting only the pattern of new development.

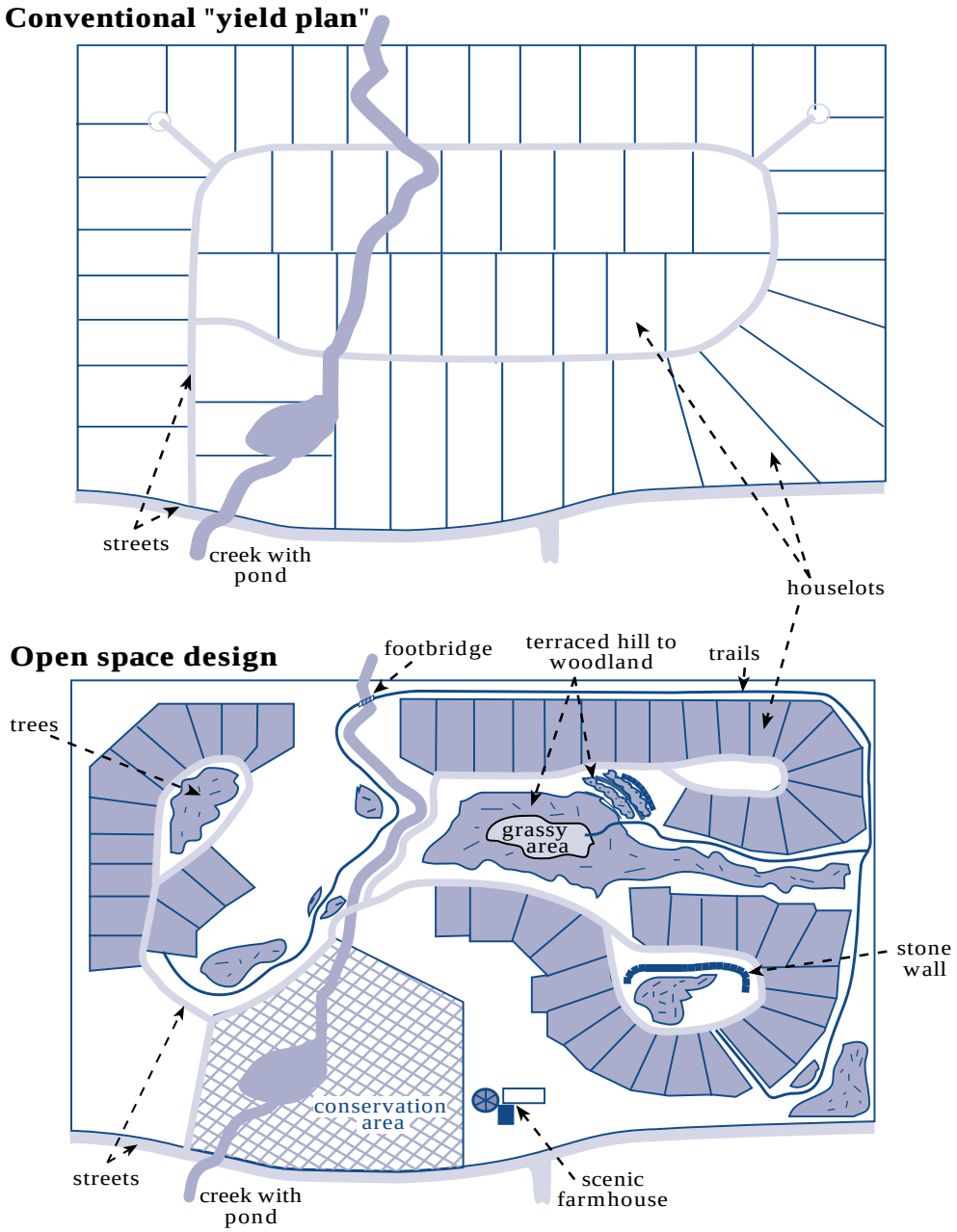
Table 7. *Comparisons between two alternative approaches to conventional urban and suburban development: "Open Space Subdivision Design" and "Neo-traditional."*

Open Space Subdivision Design	"Neo-traditional"
A *clustering* technique which targets the rural setting experiencing growth pressures and the growing fringes of a community. The *central theme* of this technique revolves around allowing the size and location of the open space to drive the subdivision design. The approach is *density-neutral*, which respects private property rights. The approach is adaptable to situations where central water and sewer are not available. The approach is adaptable to areas previously zoned as low-density residential.	An *in-filling* concept that targets urbanized corridor locations. Also known as a "New Urbanism" design concept. The fundamental organizing components are the neighborhood, district, and corridors. Uses the traditional assembly of streets, blocks, and buildings within a grid setup. Revives the principles about building residential subdivision with pedestrian friendly public spaces such as streets, squares and parks as the setting for conducting daily life.

Table 8. *Ten benefits of clustering (from Schueler, 1994a).*

Concentrates runoff where it can be naturally and cost-effectively treated.	Reduces capital cost of development by 10% to 33%.
Reduces stormwater runoff and pollutant loads.	Supports other community planning goals,such as, preservation of farmland or rural landscapes, affordable housing, architectural diversity, and reduces pressure to encroach on resources and buffer areas.
Reduces the size of storm water control structuring.	Provides developer total compensation through a density-neutral approach, with the same overall number of dwellings.
Can increase property values.	Creates more attractive and pleasing neighborhoods that sell more easily and appreciate quicker than conventional developments.
Reduces the cost of future public services needed in the community.	
Increases sense of community and makes development more pedestrian friendly.	

Figure 3. *The comparison between (a) a conventional "yield plan" and the simple (b) open space design methodology for the same parcel of land (after Arendt, 1996a). Note that both plans have the same density yield of 54 houses.*



Common open space within a conservation subdivision is owned, administered, and maintained by a single method or combination of methods. The method should be the decision of a township. Various types of land designated oversight functions can be administered through or by offers of dedication, homeowners' associations, condominiums, dedication of easements, or the transfer of easements to a private conservation organization (see Appendix B). Individually or

in combination, the administrative oversight of the open space is based on specified criteria within a contract or other legal agreement.

PROTECTIVE OVERLAY ZONING. An overlay zone can provide protection for an impaired water body when superimposed over an existing lake shore zone, stream or river corridor (e.g., "river corridor overlay zone"). A protective overlay zone adds specific restrictions or regulates known activities that are sources of pollution. It does not change the preexisting regulatory requirements (if any) of the underlying zone. An overlay zone generally introduces a new and additional set of local regulatory controls that are educational focused. One approach would be to apply set-back conditions for an area that must be met prior to receiving an approved building permit (e.g., Streamside Protection Zones—Reserved). Another approach may encourage clustering through allowed density within zones with a designated setback distance from the protected water body. Special or conditional use permits may be required for specific types of land use that is not encouraged in the zone.

STREAMSIDE PROTECTION ZONES
[Reserved]

MULTI-FUNCTIONAL LANDSCAPING. Storm water retention basins can serve a multi-functional role as flood control devices, stormwater runoff treatment facilities, and community parks. When properly maintained by either a homeowners' association or municipal public works department, this type of community park provides recreational opportunities, easy access, and increased property value to the surrounding neighborhood. Retention basins also serve an essential role in providing flood control and stormwater treatment through the natural effects of gravity settling and vegetative filtering of common urban pollutants. When designed into a residential subdivision or commercial development, the same type of retention basin area can provide an appealing, landscaped open-space amenity.

The use of vegetated swales for conveying residential runoff, as opposed to the use of storm sewers, reduces impervious area as well as infrastructure cost. For small areas such as paved parking areas, the use of depressional landscaping can provide additional runoff storage and infiltration capacity. For larger impervious areas that require curbing, such as shopping mall parking lots, placing storm sewer inlets within vegetated swales may be practical. For example, landscaped areas or islands arranged around the perimeter of the parking area can serve as vegetated swales. Regularly spaced curb openings or cuts function as discrete conveyance routes from the parking lot to the landscaped island. The storm sewer can be raised approximately six inches to account for overflow capacity, which is conveyed directly to a single detention basin for the entire site.

Cost Benefit Case Study

Hunters Brook (Yorktown Heights, New York), a cluster development of 142 townhouse-style condominium units ranging in price from $170,000 to $260,000 was designed to capitalize on the amount of open space in the development. The homes were clustered on 30 acres, preserving 97 acres of natural sloping woods, including a dense pine forest. Care had been taken to retain local wildlife, thus adding to the rural setting. One of the developers commented, "It may not be the woods that bring (buyers) to us initially, but it seems to make all the difference when they see what it's like."

IMPERVIOUS AREA RATIOS. Impervious Area Ratios (IARs) are a performance-oriented measure that can be adopted as part of a community zoning ordinance. The ratios are set as a maximum percentage of imperviousness allowed for sites within a designated subwatershed or catchment. An IAR such as 0.30 in a commercial district would allow 30% of a site to be covered by impervious features (i.e., parking lot, driveways, roofs of buildings, etc.).

This planning technique is not a viable solution for most communities, but it does provide a practical solution for controlling runoff in areas situated near sensitive aquifer recharge areas or streams, rivers, and lakes. This may also be a viable solution for a subwatershed that has been identified as a main contributor of polluted storm water.

BMP: Water Quality Ponds

PROBLEM:

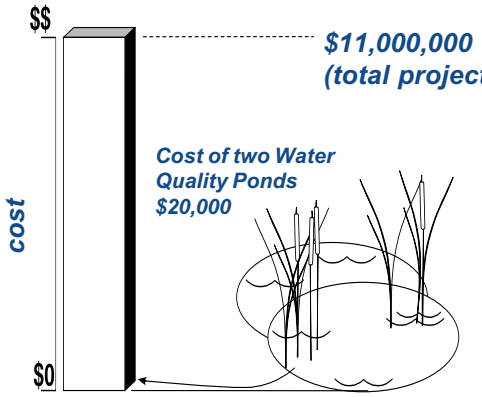
PREVENT WATER QUALITY DEGRADATION FROM SEDIMENT AND POLLUTANTS IN STORMWATER RUNOFF FROM A LARGE COMMERCIAL DEVELOPMENT PROJECT.

SOLUTION:

PROVIDE TWO STORMWATER PONDS: ONE TO SLOW RUNOFF AND ANOTHER FOR WATER QUALITY TREATMENT.

DESIGN THE WATER QUALITY POND TO TREAT THE "FIRST FLUSH".

SITE THE TWO PONDS FOR MERGING TO TREAT INCREASED STORMWATER RUNOFF FROM FUTURE EXPANSION.



COST-EFFECTIVENESS:

$20,000 for water quality ponds = 0.2% of total project construction cost.

$11,000,000 = total project construction cost (site work, pavement, utilities, and buildings).

Adapted from: Casco Bay Estuary Project, 1995.

PRESERVING SENSITIVE OPEN SPACE

Open space preservation can serve as one of the most effective planning techniques in protecting land and water-based resource areas. The approach is relatively simple and straight forward. Sensitive open space that is preserved through set-aside or pur-

posely limited with respect to types of development can effectively protect the quality of water resources. There are several techniques for preserving or limiting types of development for selected open space areas including: development easements, transfer of development rights, and purchase programs.

Open space can increase real property values and increase the marketability of property that is adjacent to it. An excerpt from *Economic Impacts of Protecting Rivers, Trails, and Greenway Corridors* (Appendix A**)** presents quantified and surveyed, documented cases of increased property value associated with open space preservation.

Land trusts are the most common entities nationwide that operate as non-profit organizations to administer the preservation of natural resource areas, prime agricultural lands, and cultural/historical sites. Land trusts are more commonly serving as a neutral administrator, on behalf of local or county governments that are overburdened by the lack of resources or revenue.

DEVELOPMENT EASEMENTS. A development easement is a legally enforceable agreement that gives the easement holder the ability to take action in preventing alterations to a designated area. The easement also requires an incursion to be removed and the pre-existing conditions of the land restored. Easements of this nature are generally tied to the title and recorded through the county's Register of Deeds.

A development easement can be purchased for less than the full value for certain rights from an owner, such as access for public rights to fish, hike, or recreate, or for restrictive rights for dedication purposes. Some more innovative dedication purposes can serve riparian buffer network projects (e.g., greenway and trail initiatives) and retaining sensitive open space that present hazards to local water bodies when disturbed such as: riparian vegetation, ponds, selective floodplain areas, wetlands or marshes, ground water recharge areas, steep slope areas, and areas of highly erodible soils.

Conservation organizations such as land trusts and conservancies, homeowners' associations, and government agencies generally hold easements. The holding of an easement does not result in ownership, liability, or maintenance upkeep. The organization or agency is ultimately responsible for prohibiting further development or any other changes that would impact the preservation goals as outlined in the easement. The holding of the easement also obligates the organization or agency to annually monitor the land through a visit. Annual monitoring costs can generally be paid through the interest generated by endowment contributions from developers.

Cost Benefit Case Study

A land developer from Front Royal, Virginia, donated a 50-foot wide, seven-mile easement for the Big Blue Trail in northern Virginia after volunteers from the Potomac Appalachian Club approached him to provide a critical trail link along the perimeter of his second-home subdivision. The developer recognized the amenity value of the trail and advertised that the trail would cross approximately 50 parcels. All tracts were sold within four months.

Cost Benefit Case Study

A study in Maine sponsored by the city of South Portland and the South Portland Chamber of Commerce conducted a two-year Tax Impact Analysis to address the cumulative cost benefit of development. Their focus was on determining the effects of rising property taxes and increasing infrastructure costs. The study found that while the commercial/ industrial sector generated more in revenue than it demands in services, the disparity of surplus is surprisingly low: the commercial/ industrial sector demanded $1.00 worth of services for every $1.06 of generated revenue. The surplus for residential growth had an even higher overall deficit: for every $1.00 worth of demanded services, there was a corresponding $0.77 of revenue generated.

Land Trust Alliance, 1994

TRANSFER OF DEVELOPMENT RIGHTS. The transfer of development rights (TDRs) is another technique that a community can use to preserve open space. A TDR program functions to coordinate the exchange between designated "sending" and "receiving" zones within a given community. The sending zones are the areas designated for open space preservation or natural resource protection; the receiving zone is designated as the expected growth and development area.

TDR programs have most often been adopted by communities in order to preserve prime farmland or other open space areas. Successful TDR programs must be designed to give the participating developer(s) the ability to profit from the purchase and transfer of the development. The necessary conditions for success may require a more streamlined municipal process for transferring rights, density incentives for the participating developer(s), and sufficient services from the public agency to assure development in the receiving zone.

An illustration of how a TDR program operates in preserving sensitive open space or prime agricultural land may be useful. The example revolves around a landowner who lives in an area where the county government wishes to protect and encourage agriculture. If the farmer wants liquid asset and prefers to continue to farm, individual development rights can be transferred from the farmed parcel to an area where the county has the infrastructure already in place and is encouraging development. The developer desires to develop an area already zoned residential, one unit per two acres, at a greater density. The developer would have interest in the landowner's development rights, which are based on zoning that allows one residential unit per 10 acres. Since the landowner's parcel is 200 acres, the landowner has 19 rights (not including his own residence). He may sell 16 of the rights to the developer, while reserving 1 right for his current residence and 3 rights for his children. The developer is able to add the 16 rights to his 19 rights on 38 acres to develop 35 lots.

The TDR technique differs from a Purchase of Development Rights by not only retiring development rights, but transferring those rights to another area of the community that can better accommodate development (i.e., sewage and water infrastructure in place, an area that is less environmentally sensitive). A parcel of land is often subdivided into fewer, larger standard development lots (often ranging between 10 to 30 acres). These larger lots are often higher priced as compensation to the developer for selling development rights, but they include permanent conservation restrictions for areas that are designated outside of a "building envelope" on each lot. This type is most applicable for scenic landscapes which are typically found in upscale suburbs or in resort/vacation areas.

PURCHASE PROGRAMS. Purchase programs vary from the purchase of entire parcels of land to purchasing development rights to the land. Some of the more common purchase rights are related to scenic views, historic, conservation or access easement, or development rights. The purchase of development rights is often expensive, but it is viewed as a permanent solution for a community with economic reasoning. The purchase expense of development rights should be weighed against the cost of development to the community, the costs related to infrastructure outlay and the provided services, and the expected tax revenue generated by the type of development.

BMP: Level Lip Spreader

PROBLEM:

CONCENTRATED STORM WATER RUNOFF CARRIED EXCESSIVE SOIL AND PHOSPHORUS INTO A LOCAL POND.

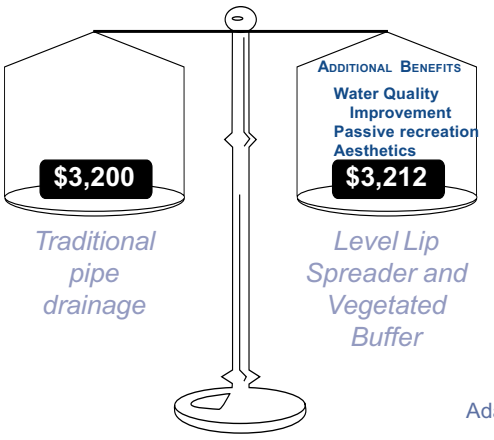
SOLUTION:

COLLECT STORM WATER BY CATCH BASINS IN A ROADWAY (INTERCEPTS THE FLOW BEFORE IT CONCENTRATES AND BECOMES EROSIVE).

PIPE THE RUNOFF TO A STABILIZED OUTLET (DIRECTS THE FLOW WHERE YOU WANT IT TO GO).

DISCHARGE STORMWATER THROUGH A LEVEL LIP SPREADER TO CREATE SHEET FLOW TO A VEGETATED (WILDFLOWER) BUFFER. SHEET FLOW IS LESS EROSIVE, AND A VEGETATED BUFFER REDUCES POLLUTION ENTERING THE LOCAL POND OR LAKE.

Cost Analysis



Traditional pipe drainage

Level Lip Spreader and Vegetated Buffer

COST-EFFECTIVENESS:

The costs for the two solutions were essentially the same. Each included the cost of catch basins, storm drain pipe and a stone outlet. The level lip spreader required no additional labor and materials. However, the spreader in combination with the buffer inproves stormwater quality.

Adapted from: Casco Bay Estuary Project, 1995.

MINIMIZING LAND DISTURBANCE

Construction activities such as clearing and grading are considered one of the more common sources of nonpoint source pollution in the U.S. On a national basis, individual construction site activities annu-

ally produce 10 to 20 times more concentrated sediment loads than commonly associated with a corresponding agricultural area (Corish, 1995). The removal of site vegetation during construction exposes subsoil to precipitation. When inadequate erosion prevention and sediment control is not in place, large volumes of sediment can be transported off-site by stormwater runoff during precipitation events.

Clearing and grading activities can affect the health of a watershed on many levels. Initial effects include excessive sediment loads, greater flow velocities and volumes during rainfall events, and the loss of riparian vegetation and other forms of stabilizing vegetation. In turn, there is a tendency for the effect to lower base flows and water levels during the dryer periods of the year. Excessive amounts of suspended solids, washed into a stream or lake, can damage and ultimately destroy fish and wildlife habitat by smothering and filling stream and lake bottoms. The net instream impact is not only fishery habitat loss and reductions in food sources, but affects on reproduction rates.

Five factors are generally considered the most significant for determining the erosion potential of a construction site: soil erodibility, vegetative cover, topography, climate, and season. Nonstructural erosion prevention and control concepts such as preservation, minimum disturbance, and proper site management recognize the sensitivity of these five factors. Most manuals often only present detailed specifications for designing structural BMPs and other revegetation methods. See Chapter 5, section 3 for "Erosion Prevention" performance criteria.

Construction site erosion prevention and sediment control are important in protecting the quality of existing and preventing future impacts to water resources. In general, construction sites adjacent to water bodies have a greater potential for impacting water quality. Erosion prevention should be the first choice. Maintaining natural vegetation and stabilizing exposed soil surfaces helps to prevent erosion. However, this is not always possible at each construction site. Under circumstances where construction cannot be postponed until the dry season, sediment control measures are the preferred alternative for trapping sediment on-site.

In circumstances where the construction site is near a water-based resource area or a sensitive open space area such as a groundwater recharge area, along a steep slope (e.g., greater than 25%), or within an area with porous soil and a high water table, additional site planning may be necessary to assure the protection of water quality. Local ordinances can require the preparation of an erosion and sediment control plan (ESC plan) prior to development if site conditions warrant more attention (Table 9). An ESC plan outlines each activity

Cost Benefit Case Study

In a 1970 study of a 760 square mile area in Maryland, noted planner Ian McHarg projected that uncontrolled development would yield $33.5 million in land sales and development profits by 1980. Profits resulting from development plans designed to accommodate the same population level, while preserving desirable open spaces, would exceed $40.5 million. The resulting additional $7 million translated into an increase in value of $2,300 per acre for the planned 3,000 acres of open space.

during construction beforehand and accounts for unforeseen impacts to sensitive open space and/or local water resources.

Under circumstances of a larger urban community, an ESC plan can be done in conjunction with a storm water pollution prevention plan (SW3P). SW3Ps address an expected runoff contribution from the site during post development. Both permanent and temporary BMPs can be employed during construction to prevent erosion. Temporary practices control pollutants for days, and sometimes months, and usually do not require engineering design. More permanent practices may remain in place for years and require engineering design. See the *Catalog for Stormwater Best Management Practices for Idaho Cities and Counties* for descriptions of these types of site design BMPs.

Table 9. *Conditions that increase erosion and sediment transport (Hale, 1996).*

Bare soils left exposed after construction
Site location in floodplain or adjacent to a stream or lake
Disturbed runoff patterns due to roads, grading, barriers, etc.
Little to no native vegetation adjacent to streams and draws
The occurrence of clay-rich soil, which produces high runoff
The occurrence of organic-rich soil, with organic content less than 2%
Exposure of fill material to runoff (i.e., piles of dirt not covered)
Water flowing freely down road surfaces
Perched water table intercepted by ditches
Volcanic ash soils < 7′ and slopes > 35%
Any slope greater than 60%
Runoff peak discharge and volume that is greater than natural levels
Recognized erodible subsoils that may be cut and left exposed
Straight on concave slopes
Long, smooth slope lengths

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Chapter 5

Performance Criteria

Communities can choose a set of specific performance criteria to address their local concerns during site development and avoid the inflexibility generated by the traditional "one size fits all" engineering approach.

Performance criteria establish *general goals that are expected to be met at a site*. They are adopted by communities who have come to a consensus and have decided to establish the general goals as a form of prevention, reduction, or protection. Essentially, performance criteria provide flexibility for both the landowner (contractor) and the site plan reviewer in devising and implementing an appropriate stormwater design system for the conditions of the site. For most communities, general performance criteria can be accompanied with more detailed development guidelines.

The general nature of performance criteria make them multi-functional. Simple and clearly stated performance criteria offer communities more options. No set of development standards can encompass all of the unique conditions encountered at a development site. Communities can choose a set of specific performance criteria to address their local concerns during site development and avoid the inflexibility generated by the traditional "*one size fits all*" engineering approach. Communities can also plan and use performance criteria to initiate public projects, such as developing greenways or reducing impervious area.

Performance criteria are subdivided into the following three categories for discussion:

- Protecting Sensitive Open Spaces;
- Site Design for Water Quality Protection;
- Erosion Prevention.

PROTECTING SENSITIVE OPEN SPACES

Performance criteria can be established to protect sensitive open space areas as the common theme. Some common areas presented in this section include streams, wetlands, floodplains, steep slopes, lakes, and ground water. These areas should be identified and marked on a common map at the same scale of development during the pre-consultation visit. In some extreme cases, buffers may be required to

protect areas either during construction or thereafter. This protection can be planned locally through comprehensive planning and then ultimately, through the development and enforcement of a local stream protection ordinance. Performance criteria can function as goals in outlining the types of activities that are expected to take place within the sensitive open space area or adjacent to the water resource.

STREAM BUFFERS AND PROTECTION ZONES. Stream channels can be protected through the use of a vegetated buffer area that consists of three parts: an inner core buffer, a middle zone, and an outer buffer zone. Stream buffers are more appropriate for urban and urbanizing stretches of a stream or river. Stream protection zones are more appropriate for stretches that are zoned for development, but have not yet been effected. Stream protection zones can also serve as a basis for the *riparian protection ordinance*.

The ***inner core*** of the stream buffer should extend 25 feet on each side of the stream centerline (first and second order streams) and 50 feet from each streambank (third and fourth order streams). Figure 4 shows the basic structure of a stream buffer.

The ***inner core*** buffer area should be maintained in a natural condition (when possible), and no disturbance of the core buffer should be permitted during or after construction unless a special permit is obtained (either city or county jurisdiction). For any type of stream alteration, contact the nearest Regional Office of the Idaho Department of Water Resources.

The width of the ***inner core*** of the stream buffer can be increased under the following circumstances:

- an additional 25 feet on each side for fourth and higher order streams;
- expanded area to include any adjacent wetlands or steep slopes within 25 feet of the inner core; and
- an additional four feet of width for each 1% increase in slope (5 to 20%) on either side of the stream.

The ***middle zone*** of the stream buffer should consist of an additional 25 feet measured from either side of the inner core. The stream protection ordinance should specify the allowable uses and activities within the middle zone. The middle zone is to be generally managed as a forest zone, but certain recreational activities may be allowed.

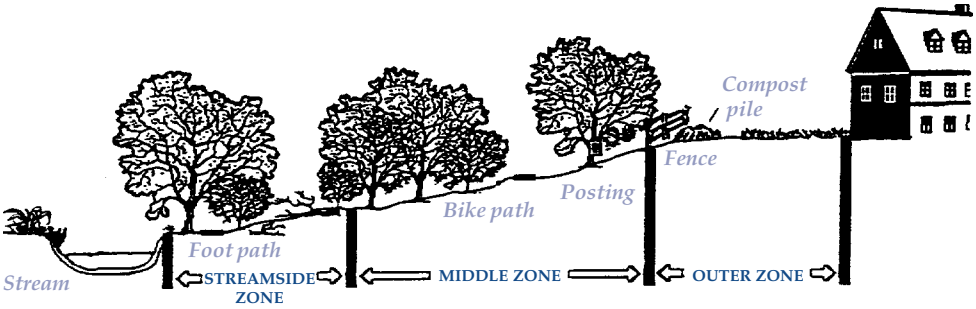
The ***outer zone*** of the stream buffer should consist of an additional 15 to 25 foot setback to structures. No specific vegetation management or use restrictions are in effect in the outer zone.

DID YOU KNOW?

A property value study found that those residential landowners surrounding four parks in Worcester, Massachusetts, appreciated with proximity to the parks, unless the properties were adjacent to recreational facilities. Homes that were 20 feet from a park had property values that were approximately $2,675.00 more than similar homes 2,000 feet away from a park location.

Land Trust Alliance, 1994

All new property owners should be made aware of the limits and use restrictions that are represented through a conservation easement or deed restriction. Additionally, clearing, grading, and stockpiling materials in the inner core and middle zone should be limited.



Characteristics	Streamside Zone	Middle Zone	Outer Zone
Function	Protect the physical integrity of the stream ecosystem	Provide distance between upland development and streamside zone	Prevent encroachment and filter backyard runoff
Width	Minimum 25 feet, plus wetlands and critical habitats	50 to 100 feet, depending on stream order, slope and 100 year floodplain	25 foot minimum setback to to structures
Vegetative Target	Undisturbed mature forest. Reforest if grass	Managed forest, some clearing allowable	Forest encouraged but usually turfgrass
Allowable Uses	Very restricted e.g. flood control, utility right-of-ways, footpaths, etc.	Restricted e.g. some recreational use, stormwater BMPs, bike paths, tree removal by permit	Unrestricted e.g. residential uses including lawn garden, compost, yard wastes, most stormwater BMPs

***Figure 4**. Position of each lateral zone with varying width, function, management, and vegetative target (Schueler, 1995a).*

The buffer system should be marked on all clearing and grading plans. It is also suggested to have the limits of the buffer system posted during the pre-construction walk through, in order to match the plans on ground and visually demonstrate the expected area of disturbance; in cases where the buffer zone is forested, the limits of disturbance may need to be extended to include the drip-line of the trees. Appropriate tree protection measures may be installed in some cases to protect against heavy equipment.

FLOODPLAIN
[Reserved]

AREAS WITH STEEP SLOPES. Concern for development along steep slopes is often warranted and in some cases restricted to prevent soil erosion and slope failure. Development on steep slopes will also protect stream corridors and their associated habitat areas. Communities may choose to restrict clearing and grading on the slope in excess of 20%.

Slopes are calculated from contours derived from 1:200 (1 inch equals 200 feet) scale maps based on transects taken perpendicular to the stream bank (for hydraulically connected slopes). Steep slopes should be clearly displayed on conceptual plans and in the field prior to the preconsultation visit.

WETLANDS
[Reserved]

LAKE PROTECTION. Some communities may choose to enhance their development standards to provide a greater degree of lake protection. In most cases, the predominant concern is managing the nutrient export, which contributes to eutrophication, to the downstream lake near or within the community. Other reasons may be related to concerns of losing storage capacity due to a buildup of sediment from the surrounding landscape.

Where lakes require additional protection, the community may want to work together to supplement a stream protection ordinance with a specific phosphorus or sediment load reduction target. The target specifies that either (a) the post-development phosphorus load from the site can be increased by no more than 10% of the pre-development load as computed by the Simple Method (Hale, 1996), or (b) a storm water BMP system should be installed and maintained at the site with a minimum phosphorus reduction efficiency of 60% (Schueler, 1988). Sediment load BMP reduction efficiency for residential, subdivision, and commercial development should target 90% removal.

Additionally, a scenic buffer around the perimeter of a lake or particular stretches may be necessary. The buffer should lie between the lake's shoreline and the closest structure (often 100 feet, in a forest condition). Water reliant facilities such as docks, water access, or marina facilities may be exceptions.

GROUND WATER
[Reserved]

SITE DESIGN FOR WATER QUALITY PROTECTION

Communities that continue to grow without comprehensive drainage management increase the potential for impacts on water quality. The runoff contribution from individual sites is generally small; but a

greater impervious area correlates to less natural infiltration, more intense land uses that generate pollutants, and direct express routes for discharging runoff directly to receiving water bodies. Since the cumulative effect of individual sites makes the greatest difference on the quality of the watershed as a whole, there is a greater imperative in promoting sound land use planning practices, especially for those site development projects within sensitive open space areas and adjacent to water bodies.

OPEN SPACE SUBDIVISION DESIGN. Open space subdivision design can serve as a new provision within local comprehensive plans and/or a subdivision ordinance. Increased options equates to more flexibility in the land development process. The design methodology consists of four simple steps. The central organizing principle is to design around sensitive open space areas. The four steps in sequence are as follows:

- identify potential sensitive open-space lands, primary conservation areas such as steep slopes, wetlands, stream buffers, ground water recharge areas; then
- locate the house sites at a respectful distance from the sensitive open space lands; then
- align the streets and footpaths; then
- set the lot lines.

Identifying Sensitive Open Space Areas. The first step is the most critical since it involves the delineation of open space that is worthy of being set aside to enhance the development. Primary conservation areas consist of land within a designated floodplain zone, regulatory wetlands, locally designated stream buffer zones, and delineated wellhead protection zones (i.e., a groundwater recharge area designated by a municipality). The identification of secondary conservation areas should also be considered. Secondary conservation areas are those areas that may be non-essential based on local circumstances; they are typically prime agricultural soils, optimal soils for individual or cluster (community) septic system(s), historical/cultural features, or woodlands.

The act of delineating characteristic open space for preservation also defines the potential development area. This step virtually assures the protection of sensitive open spaces, but also serves as a basis for identifying local amenities, which enhances the marketability and value of the property, provides recreational opportunities, maintains fish/wildlife habitat, and overall improves the quality of life. A septic system site evaluation should be done during this early stage to determine the location for optimal septic disposal. A community septic system could be worked into an area set aside as a primary conservation area (i.e., open field, meadow, etc.).

Did You Know?

In a project conducted by the Center for Rural Massachusetts, homes within a clustered development were found to appreciate 12.7 percent faster over 21 years, compared to those similar types of homes in subdivisions without open space.

Land Trust Alliance, 1994

Did You Know?

In Yardley, Pennsylvania, a project determined that clustering development using the Open Space methodology, netted the fastest growing development in Bucks County by price range. The identified multiple benefits were natural filtration, habitat preservation, and aesthetics.

Locating Housing Sites. The second step consists of locating the approximate sites for individual houses. Respectful buffers between the delineated open space area will encourage long views across open fields or meadows, and a wider natural viewshed for more individual house sites.

Aligning Streets and Neighborhood Trails. This third step consists of tracing an alignment for local streets to access the individual housing sites. Informal footpaths for connecting the clustered neighborhood to the open space area are also traced.

Drawing the Lot Lines. The fourth step is a matter of drawing in the lot lines.

The introduction of a two-phase preliminary plan is of critical importance in modifying the local development review process. The rationale is to prevent the occurrence of being locked into a poorly proposed layout that has substantial invested engineering and consulting costs. The local ordinance should be modified to allow the typical (e.g., 90-day) review time frame for preliminary plans into a time frame for reviewing a *conceptual* preliminary plan (e.g., 30 days). The conceptual preliminary plan should not include engineered components and should be relatively inexpensive. A *detailed* preliminary plan is then prepared with the engineering design accomplished within the remaining window of time for review. An example of a model *open subdivision design* ordinance is contained in Appendix B.

FINGERPRINTING SMALLER DEVELOPMENT. Site "fingerprinting" is increasingly becoming recognized as an alternative to preserving native vegetation and minimizing erosion during clearing and grading. The term refers to delineating the limit of ground disturbance or restricting disturbance to the locations of the building pad, roadway, and utilities (Figure 5).

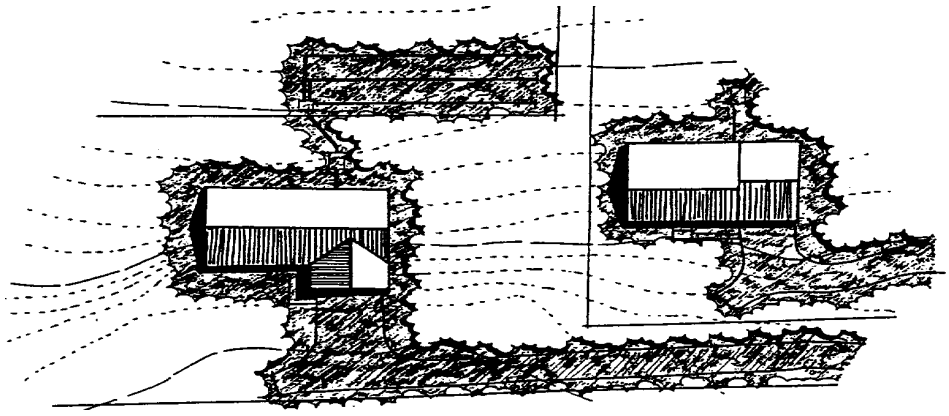


***Figure 5**. Traditional site fingerprinting depicting areas that were cleared and graded in shading (Corish, 1995).*

ADOPTING IMPERVIOUS AREA RATIOS. Urban and urbanizing areas can be delineated as stormwater planning areas and distinguished for their management need within designated subwatersheds. Each protection class can be incorporated into a comprehensive stormwater master plan. This concept is also a form of an overlay zoning process. The following sections outline protection goals for each class.

(1) Class A—Urban Storm Water Planning Areas. This is the most environmentally sensitive natural protection area. The primary goal of this class is to maintain pre-development wetland and stream quality. Wetlands and streams in this class are expected to have relatively stable hydrology with minimal water level fluctuation, stable channel banks, relatively good water quality, and an excellent biodiversity (i.e., aquatic plants, insects, fishes).

Protection strategies for Class A Urban Storm Water Planning Areas are based on the ratio between site-specific and delineated watershed-wide limits of impervious area. Protection consists of a combination of land use planning techniques and structural BMPs.

(2) Class B—Urban Storm Water Planning Areas. Moderate

(3) Class C—Urban Storm Water Planning Areas. This is the least sensitive storm water planning area. The watershed is composed of several small streams or wetlands in comparison to others in the region.

Protection goals in this class are to improve ecosystem health by removing pollutants, protecting downstream waters, identifying/implementing stormwater retrofits, and using wetland and stream restoration practices where feasible.

EROSION PREVENTION

Several guidances and references are currently recognized by the IDEQ. This guidance is a companion to the *Catalog of Storm Water Best Management Practices (BMPs) for Idaho Cities and Counties*. This Catalog provides a technical overview on short and long-term practices for erosion/sediment and treatment control BMPs during new construction projects and post-development. Idaho specifications in the guidance can be adopted by any local entity through ordinance reference. The Catalog will be updated periodically to account for improved practices and new technologies. Other stormwater BMP guidances are: *Catalog of Storm Water Best Management Practices (BMPs) for Highway Construction and Maintenance* by the Idaho Transportation Department; and the *Best Management Practices for Road Activities, Volume I and II*, by Idaho Department of Health and Welfare.

A comprehensive plan can institute the need for erosion prevention through programmatic initiative and public awareness. If deemed necessary, a local ordinance can establish requirements that are only intended to minimize soil erosion, contain on-site sediment, and minimize contamination of stormwater runoff related to site disturbance activities. An ordinance can also establish administrative procedures for the issuance of permits or enforcement of local regulations and provisions that approve of the conditions which require the completion of an erosion and sediment control plan by a certified professional.

RISK FACTOR ASSESSMENT. An *integrative resource map* provides the basis for incorporating a risk-oriented basis for local erosion and/or drainage ordinances. Risk factor assessment is a procedure to identify the level of risk a site has for contributing pollutants to off-site water bodies. The combination resource map and assessment approach provides greater flexibility to both agency reviewers and land developers in designing stormwater control systems. Several factors such as distance to surface water, degree of slope, and area of disturbance are scored based on site specific conditions. The assessment classifies the scored site into three risk categories: high, moderate, and low.

Each risk category denotes different requirements for a building permit. In cases of an identified low risk site, there may be no further requirements. Some short-term erosion control measures may be recommended for moderate scored sites based on the site's physical suitability. High risk site designation requires that a certified professional or design team (depending on the size and type of development) be involved upfront and throughout a site development project. An erosion and drainage control ordinance can be crafted from local consensus (see **Appendix C** for an example). Performance criteria and standards provide greater flexibility to the site developer in choosing BMPs that are most appropriate based on site specific conditions.

MINIMUM ELEMENTS OF EROSION PREVENTION. When possible, native topsoil should be preserved and stockpiled on site to provide a better source for revegetation. Native topsoil is an excellent source for reestablishing permanent vegetation since it has a high organic and native seed content. In cases where non-native soil is used for revegetation, there is a higher potential for die out when fertilizers are not applied to maintain the grass cover.

Sequencing and (within larger projects) phasing construction activities are practical site management techniques for reducing erosion potential. Sequencing generally refers to performing several operations before clearing and grading individual lots. Those

initial operations are installing erosion and sediment control, drainage system, and temporary roads. Road stabilization can also involve temporary stabilization through paving. In phasing construction, the developer completes a sequence of operation in one location of the site prior to initiating grading on the next portion of the site. Phasing is often more appropriate for large sites greater than 5 acres during the wet period of the year.

Minimum elements of erosion prevention provide direction to developers and can serve as a basis for minimum standards in a community. These minimum elements for new development and redevelopment should encourage:

- construction and site stabilization completed during the dry season,
- construction activities for larger sites should be worked in phases,
- retention of native vegetation,
- delineation of disturbance areas prior to the initial site construction activity,
- use of sediment control techniques near streams or lakes designated as critical,
- prevention of erosion on stockpiled materials, and
- short-term, inexpensive practices to prevent erosion or control sediment.

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Conclusion

The balance of maximizing growth and development economics and minimizing environmental impacts results in maintaining and even enhancing a quality of life that is familiar to most Idahoans.

Many communities have been dealing with the challenges of balancing the need to protect the environment and quality of life with economic growth and development. In some areas of the state, more intense land development activities have made it necessary to consider alternative ways to promote the protection of natural treatment functions, surface flow pathways and absorbing capacities of the environment. The two key concepts underlying the planning tools and techniques presented in this publication revolve around promoting the reduction of imperviousness and minimizing necessary disturbances associated with land development.

By linking land use and water quality together through comprehensive and integrated local planning, communities can create opportunity for balancing the "best of both worlds." Environmental planning at both the watershed and site scale provides a way to integrate local development initiatives with the protection of sensitive open spaces and the other multiple benefits provided to communities by this common theme.

This publication promotes a four-tiered strategy for protecting water quality through locally-based decision making. Each tier builds upon the previous and taken together, are often integrated through local volunteer initiatives and/or regulation.

- Protection of critical watershed resources through identifying, inventorying and prioritizing them based on local consensus;
- Source control and sound environmental site designs at the watershed scale;
- Source treatment based on the site specific conditions;
- Integrative local volunteer initiatives and/or ordinances.

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GLOSSARY

Aquifer—A geological formation of permeable saturated material, such as rock, sand, gravel, etc., capable of yielding economically significant quantities of water to wells and springs.

Beneficial uses—Various current or future uses of ground water and surface water in Idaho including, but not limited to, domestic water supplies, industrial water supplies, agricultural water supplies, aquacultural water supplies, and mining.

Best management practice—A measures or combination of measures determined to be the most effective and practical means of preventing or reducing contamination to ground water and/or surface water from nonpoint and point sources to achieve water quality goals and protect the beneficial uses of the water.

Contaminant—Any chemical, ion, radionuclide, synthetic organic compound, microorganism, waste or other substance which does not occur naturally in ground water or which naturally occurs at a lower concentration.

Impervious area—Any surface in the urban or suburban landscape that cannot effectively absorb or infiltrate rainfall into the soil, which may include roads, streets, parking lots, rooftops, sidewalks, etc.

Imperviousness—The percentage of impervious area within a development site or developed watershed.

Morphology—Term used to describe form and structure of landscape and water features.

Neo-traditional—A traditional neighborhood, where a mix of different types of residential and commercial developments form a tightly knit unit. Residents can walk or bike to more the places they need to go and municipal services costs are lower due to the close proximity of residences. A more compact development also reduces the amount of rural land that must be converted to serve urban needs.

New Urbanism—A term used to describe development which focuses on the restoration of urban centers and towns within coherent metropolitan regions, the reconfiguration of sprawling suburbs into communities of neighborhoods and diverse districts, the conservation of natural environments, and the preservation of society's built legacy.

Nonpoint source pollution—Water pollution caused by rainfall and snowmelt moving both over and through the ground and carrying with it a variety of pollutants associated with human land uses and activities.

Point source—A potential source of ground water contamination or surface water pollution which is individually identifiable in terms of point of release into a surface water body and/or zone of impact in an aquifer.

Pollutant—Municipal, industrial and agricultural waste; entrained gases in water; or dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical waste, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, silt, or cellar dirt; or other materials, when discharged to water in excessive quantities, cause or contribute to water pollution.

Recharge area—An area in which water infiltrates into the soil or geological formation from precipitation, irrigation practices and seepage from creeks, streams, rivers, lakes, etc. and percolates to one or more aquifers.

Receiving waters—Those waters which receive pollutants from point and nonpoint sources.

Riparian area—Vegetated ecosystems along a waterbody through which energy, materials, and water pass. Riparian areas characteristically have a high water table and are subject to periodic flooding.

Storm water—The existing and future point source contribution from precipitation.

Stormwater runoff—The existing and future nonpoint source contribution from precipitation, which may or may not include natural background materials.

Urbanization—Changing land use from rural characteristics to urban (city-like) characteristics.

Appendix A

ECONOMIC BENEFITS OF OPEN SPACE UPON REAL ESTATE

REAL PROPERTY VALUES

Greenway corridors provide a variety of amenities, such as attractive views, open space preservation, and convenient recreation opportunities. People value these amenities. This can be reflected in increased real property values and increased marketability for property located near open space. Developers also recognize these values and incorporate open space into planning, design, and marketing new and redeveloped properties.

INCREASED PROPERTY VALUES—QUANTIFIED

The effect on property values of a location near a park or open space has been the subject of several studies. Statistical analyses have been a common method of attempting to measure this effect. These analyses attempt to isolate the effect of open space from other variables which can affect property values such as age, square footage, and condition of homes. Isolating the effect of open space can be difficult and results have been varied. Nevertheless, many studies have revealed increases in property values in instances where the property is located near or adjacent to open spaces. Most studies have addressed traditional parks or greenbelts (large open space acres), though a few studies are available for greenways.

- A study of property values near greenbelts in Boulder, Colorado, noted that housing prices declined an average of $4.20 for each foot of distance from a greenbelt up to 3,200 feet. In one neighborhood, this figure was $10.20 for each foot of distance. The same study determined that, other variables being equal, the average value of property adjacent to the greenbelt would be 32 percent higher than those 3,200 feet away (Correll, Lillydahl, and Singell, 1978).
- The amenity influence of greenbelt land on property values also applies to privately held greenbelt land, according to a study of the Salem metropolitan area in Oregon. In this case, the greenbelt was comprised of rural farmland. Greenbelt zoning had been applied to this prime farmland beginning in 1974 in an effort to contain urban sprawl and preserve farmland. The study found that urban land adjacent to the greenbelt was worth approximately $1,200 more per acre than urban land 1,000 feet away from the greenbelt boundary, all other things being equal. However, rural land values within the restrictive zoning actually decreased in value by $1,700 per acre (Nelson, 1986).
- A recent study of market appreciation for clustered housing with permanently protected open space in Amherst and Concord, Massachusetts, found that clustered housing with open space appreciated at a higher rate than conventionally designed subdivisions. Appreciation was measured as the percent increase in open-market sales price. The study compared one clustered development and one conventional subdivision in each community. The clustered homes studied in Amherst appreciated at an average annual rate of 22%, as compared to an increase of 19.5% for the more conventional subdivision. This translated into a difference in average selling price of $17,000 in 1989 between the two developments. In both Amherst and Concord, the homes in the clustered developments yielded owners a higher rate of return, even though the conventional subdivisions had considerably larger lot size (Lacy, 1991).

Excerpted from Economic Impacts of Protecting Rivers, Trails, and Greenway Corridors, *National Park Service (Rivers, Trails and Conservation Assistance Section), 1993. Note that references cited in this excerpt do not appear in this handbook. The interested reader should refer to the original publication for reference listings.*

- An analysis of property surrounding four parks in Worcester, Massachusetts, showed a house located 20 feet from a park sold for $2,675 (1982 dollars) more than a similar house located 2,000 feet away (More, Stevens, and Allen, 1982).
- In the neighborhood of Cox Arboretum, in Dayton, Ohio, the proximity of the park and arboretum accounted for an estimated 5 percent of the average residential selling price. In the Whetstone Park area of Columbus, Ohio, the nearby park and river were estimated to account for 7.35 percent of selling prices (Kimmel, 1985).
- In the vicinity of Philadelphia's 1,300 acre Pennypack Park, property values correlate significantly with proximity to the park. In 1974, the park accounted for 33 percent of the value of a plot of land (when the land was located 40 feet away from the park), nine percent when located 1,000 feet away, and 4.2 percent at a distance of 2,500 feet (Hammer, Coughlin and Horn, 1974).

  The effects of proximity to open space may not be as simply quantified as in the above studies. Many studies (Brown and Connelly; Colwell, 1986) have found the potential for an increase in property value depends upon the characteristics of the open space and the orientation of surrounding properties. Property value increases are likely to be highest near those greenways which:

  — highlight open space rather than highly developed facilities

  — have limited vehicular access, but some recreational access

  — have effective maintenance and security.
- Similar residential properties near a park in Columbus, Ohio, were compared to determine if proximity to the park affected property values. Conclusions showed properties where the homes that faced the park sold for between seven to 23 percent more than homes one block from the park. Those homes that backed up onto the park sold at values similar to properties one block away (Weicher and Zerbst, 1973).

  One implication of these studies might be that increases in nearby property values depend upon the ability of developers, planners, and greenway proponents to successfully integrate neighborhood development and open space. Designing greenways to minimize potential homeowner-park user conflicts and maximize the access and views of the greenway can help to avoid a decrease in property values of immediately adjacent properties.

INCREASED PROPERTY VALUES — SURVEYED

Survey methodology has also been used to document perceived increases in property values. Surveys can be less time-consuming, less expensive, and generally require less specialized expertise than detailed statistical analyses. The following findings are based upon surveys of property owners and real estate professionals.

- In a recent study, *The Impacts of Rail-Trails,* landowners along three rail-trails reported that their proximity to the trails had not adversely affected the desirability or values of their properties. Along the suburban Lafayette/Moraga Trail in California, the majority of the owners felt that the trail would make their properties sell more easily and at increased values. The other two trails studied include the Heritage Trail in eastern Iowa and the St. Marks Trail in Florida (National Park Service and Pennsylvania State University, 1992).
- A study completed by the Office of Planning in Seattle, Washington, for the 12 mile Burke-Gilman trail was based upon surveys of homeowners and real estate agents. The survey of real estate agents revealed that property near, but not immediately adjacent to the trail, sells for an average of 6 percent more. The survey of homeowners indicated that approximately 60% of those interviewed believed that being adjacent to the trail would make their home sell for more of have no effect on the selling price (Seattle Office of Planning, 1987).

- In a survey of adjacent landowners along the Luce Line rail-trail in Minnesota, the majority of owners (87 percent) believed the trail increased or had no effect on the value of their property. Fifty-six percent of farmland residents though the trail had no effect on their land values. However, 61 percent of the suburban residential owners noted an increase in their property value as a result of the trail. New owners felt the trail had a more positive effect on adjacent property values than did continuing owners. Appraisers and real estate agents claimed that trails were a positive selling point for suburban residential property, hobby farms, farmland proposed for development, and some types of small town commercial property (Mazour, 1988).

INCREASED PROPERTY TAX REVENUES

An increase in property values generally results in increased property tax revenues for local governments. Many arguments made for park and open space investment claim these acquisitions pay for themselves in a short period of time, due in part to increased property tax revenues from higher values of nearby property. A point to remember, however, is that in many jurisdictions, assessments of property values often lag behind market value. Furthermore, in those states which have passed legislation limiting real estate tax increases, such as California's Proposition 13, property tax revenues also lag behind increases in market value.

- California's Secretary for The Resources Agency anticipated that $100 million would be returned to local economies each year from an initial park bond investment of $330 million. The returns were to be in the form of increased value of nearby properties and stimulated business (Gilliam, 1980).
- A study of the impacts of greenbelts on neighborhood property values in Boulder, Colorado, revealed the aggregate property value for one neighborhood was approximately $5.4 million greater than if there had been no greenbelt. This results in approximately $500,000 additional potential property tax revenue annually. The purchase price of the greenbelt was approximately $1.5 million. Thus, the potential increase in property tax alone could recover the initial cost in only three years. In the study, the authors did note that this potential increase is overstated in part because actual assessments may not fully capture greenbelt benefits (Correll, Lillydahl, and Singell, 1978).

CONSTRUCTION/DEVELOPMENT PERSPECTIVES

Proximity to greenways, rivers, and trails can increase sales price, increase the marketability of adjacent properties, and promote faster sales. Clustering the residential development to allow for establishment of a greenway might also decrease overall development costs and result in greater profits for the developer.

- A land developer from Front Royal, Virginia, donated a 50-foot wide, seven-mile easement for the Big Blue Trail in northern Virginia after volunteers from the Potomac Appalachian Club approached him to provide a critical trail link along the perimeter of his second-home subdivision. The developer recognized the amenity value of the trail and advertised that the trail would cross approximately 50 parcels. All tracts were sold within four months (American Hiking Society, 1990).
- Thirty-five acres were set aside as a protected corridor through a 71-lot subdivision for approximately one-half mile of the Ice Age Trail in Wisconsin. The Ice Age Trail Foundation had purchased the parcel when the land became available for sale and was being considered for development. Later the Foundation sold the parcel to a subdivision developer, after placing an easement on the trail corridor. The developer now touts the easy access to the Ice Age Trail in promotional subdivision brochures (Pathways Across America, Winter 1991).

- Hunters Brook (Yorktown Heights, New York), a cluster development of 142 townhouse-style condominium units ranging in price from $170,000 to $260,000 was designed to capitalize on the amount of open space in the development. The homes were clustered on 30 acres, preserving 97 acres of natural sloping woods, including a dense pine forest. Care had been taken to retain local wildlife, thus adding to the rural setting. One of the developers commented, "It may not be the woods that bring (buyers) to us initially, but it seems to make all the difference when they see what it's like" (Brooks, 1987).
- In a 1970 study of a 760 square mile area in Maryland, noted planner Ian McHarg projected that uncontrolled development would yield $33.5 million in land sales and development profits by 1980. Profits resulting from development plans designed to accommodate the same population level, while preserving desirable open spaces, would exceed $40.5 million. The resulting additional $7 million translated into an increase in value of $2,300 per acre for the planned 3,000 acres of open space (Caputo, 1979).

APPENDIX B

Model Ordinance Provisions for Open Space Subdivision Design

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     2. To Encourage Public Access
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   - C. Minimum Percentage of Open Space
   - D. Location of Open Space
     1. Primary Conservation Areas
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     2. Existing Features (Site Analysis) Plan
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Excerpted from Conservation Subdivision for Design: A Practical Guide to Creating Open Space Networks, Island Press, 1996. The interested reader should refer to the original publication for further descriptions.

I. STANDARDS FOR "CONSERVATION SUBDIVISION DESIGN"

A. Determining Density or "Yield"

Applicants shall have the option of estimating the legally permitted density on the basis of mathematical percentages and formulas contained in this ordinance, or on the basis of a "yield plan." Such "yield plans" consist of conventional lot and street layouts and must conform to the township's regulations governing lot dimensions, land suitable for development (for example, not including wetlands), street design, and parking. Although such plans shall be conceptual in nature, and are not intended to involve significant engineering costs, they must be realistic and must not show potential house sites or streets in areas that would not ordinarily be legally permitted in a conventional layout.

In order to prepare a realistic "yield plan", applicants generally need to first map the Primary Conservation Areas on their site. Typical "yield plans" would include, at minimum, basic topography, location of wetlands, 100-year floodplains, slopes exceeding 25%, and soils subject to slumping, as indicated on the medium-intensity maps contained in the country soil survey published by the USDA Natural Resources Conservation Service.

On sites not served by public sewerage or a centralized private sewage treatment facility, soil suitability for individual septic systems shall be demonstrated. The Planning Commission shall select a small percentage of lots (10 to 15%) to be tested, in areas considered to be marginal. If tests on the sample lots pass the percolation test, the applicant's other lots shall also be deemed suitable for septic systems, for the purpose of calculating total lot yield. However, if any of the sample lots fail, several others (of the township's choosing) shall be tested, until all the lots in a given sample pass.

B. Density Incentives

1. **To Endow Maintenance Fund.** The township may allow a density bonus to generate additional income to the applicant for the express and sole purpose of endowing a permanent fund to offset continuing open space maintenance costs. Spending from this fund should be restricted to expenditure of interest, in order that the principal may be preserved. Assuming an annual average interest rate of 5%, the amount designated for the Endowment Fund should be twenty (20) times the amount estimated to be required on a yearly basis to maintain the open space. On the assumption that additional dwellings, over and above the maximum that would ordinarily be permitted on the site, are net of development costs and represent true profit, 75% of the net selling price of the lots shall be donated to the Open Space Endowment Fund for the preserved lands within the subdivision. Such estimates shall be prepared by an agency or organization with experience in open space management acceptable to the Planning commission. This fund shall be transferred by the developer to the designated entity with ownership and maintenance responsibilities (such as a homeowners' association, a land trust, or the township).

2. **To Encourage Public Access**. Dedication of land for public use, including trails, active recreation, municipal spray irrigation fields, etc., in addition to the 10% public land dedication required under other provisions of this ordinance, may be encouraged by the supervisors who are authorized to offer a density bonus for this express purpose. The density bonus for open space that would be in addition to the 10% public land dedication that may also be required shall be computed on the basis of a maximum of one dwelling unit per five acres of publicly accessibly open space. The decision whether to accept an applicant's offer to dedicate open space for public access shall be at the discretion of the board of supervisors, who shall be guided by the recommendations contained in the township's *Open Space Recreation, and Environmental Resources Plan*, particularly those sections dealing with trail networks and/or

recreational facilities.

3. **To Encourage Affordable Housing**. A density increase is permitted where the conservation subdivision proposal provides on-site or off-site housing opportunities for low or moderate income families. The amount of the density increase shall be based on the following standard: *For each affordable housing unit provided under this section, one additional building lot or dwelling unit shall be permitted, up to a maximum 15% increase in dwelling units. Affordable housing is herein defined as units to be sold or rented to families earning 70 to 120 percent of the county median income, adjusted for family size, as determined by the U.S. Department of Housing and Urban Development.*

C. Minimum Percentage of Open Space

The minimum percentage of land that shall be designated as permanent open space, not to be further subdivided, and protected through a conservation easement held by the township or by a recognized land trust or conservancy, shall be as specified below:

1. A minimum of fifty percent (50%) of the total tract area, after deducting the following kinds of unbuildable land (which are also required to be deducted when calculating net permitted density for conventional subdivisions as well):
   - wetlands (both tidal and fresh) and land that is generally inundated (land under ponds, lakes, creeks, etc),
   - all of the floodway and floodway fringe within the 100-year floodplain, as shown on official FEMA maps,
   - land with slopes exceeding 25%, or soils subject to slumping,
   - land required for street rights-of-way (10% of the net tract area),
   - land under permanent easement prohibiting future development (including easements for drainage, access, and utilities).

   The above areas shall generally be designated as *undivided open space*, to facilitate easement monitoring and enforcement, and to promote appropriate management by a single entity according to approved land management standards. [However, in subdivisions where the gross density is one dwelling per ten acres (or lower), the required open space may be included within individual lots]
2. All undivided open space and any lot capable of further subdivision shall be restricted from further subdivision through a permanent conservation easement, in a form acceptable to the township and duly recorded in the county Register of Deeds Office.
3. At least twenty-five percent (25%) of the minimum required open space shall be suitable for active recreation purposes, but no more than fifty percent (50%) shall be utilized for that purpose, in order to preserve a reasonable proportion of natural areas on the site. The purposes for which open space areas are proposed shall be documented by the applicant.
4. The required open space may be used, without restriction, for underground drainage fields for individual or community septic systems, and for "spray fields" for spray irrigation purposes in a "land treatment" sewage disposal system. However, "mount" systems protruding above grade and aerated sewage treatment ponds shall be limited to no more than ten percent of the required minimum open space.
5. Stormwater management ponds or basins may be included as part of the minimum required open space, as may land within the rights-of-way for underground pipelines. However, land within the rights-of-way of high-tension power lines shall not be included as comprising part of the minimum required open space.

D. Location of Open Space

The location of open space conserved through compact residential development shall be consistent with the policies contained in the Open Space, Recreation, and Environmental Resources Element of the township's comprehensive plan, and with the recommendations contained in this section and the following section ("Evaluation Criteria").

Open space shall be comprised of two types of land: "Primary Conservation Areas" and "Secondary Conservation Areas." All lands within both Primary and Secondary Conservation Areas are required to be protected by a permanent conservation easement, prohibiting further development, and setting other standards safeguarding the site's special resources from negative changes.

1. **Primary Conservation Areas**. This category consists of wetlands, lands that are generally inundated (under ponds, lakes, creeks, etc.), land within the 100-year floodplain, slopes exceeding 25%, and soils subject to slumping. These sensitive lands are deducted from the total parcel acreage to produce the "Adjusted Tract Acreage," on which density shall be based (for both conventional and conservation subdivisions).

2. **Secondary Conservation Areas**. In addition to the Primary Conservation Areas, at least fifty percent (50%) of the remaining land shall be designated and permanently protected. *Full density credit shall be allowed for land in this category that would otherwise be buildable under local, state and federal regulations, so that their development potential is not reduced by this designation.* Such density credit may be applied to other unconstrained parts of the site.

Although the locations of Primary Conservation Areas are predetermined by the locations of floodplains, wetlands, steep slopes, and soils subject to slumping, greater latitude exists in the designation of Secondary Conservation Areas (except that they shall include a 100-foot deep greenway buffer along all waterbodies and watercourses, and a 50-foot greenway buffer alongside wetlands soils classified as "very poorly drained" in the medium-intensity county soil survey of the USDA Natural Resources Conservation Service).

The location of Secondary Conservation Areas shall be guided by the maps and policies contained in the Open Space, Recreation, and Environmental Resources Element of the township's comprehensive plan, and shall typically include all or part of the following kinds of resources: mature woodlands, aquifer recharge areas, areas with highly permeable ("excessively drained") soil, significant wildlife habitat areas, prime farmland, historic, archaeological or cultural features listed (or eligible to be listed) on national, state or county registers or inventories, and scenic views into the property from existing public roads. Secondary Conservation Areas therefore typically consist of upland forest, meadows, pastures, and farm fields, part of the ecologically connected matrix of natural areas significant for wildlife habitat, water quality protection, and other reasons. Although the resource lands listed as potential Secondary Conservation Areas may comprise more than half of the remaining land on a development parcel (after Primary Conservation Areas have been deducted), no applicant shall be required to designate more than 50% of that remaining land as a Secondary Conservation Area.

3. **General Locational Standards**. Subdivisions and planned residential developments (PRDs) shall be designed around both the Primary and Secondary Conservation Areas, which together constitute the total required open space. The design process should therefore commence with the delineation of all potential open space, after which potential house sites are located. Following that, access road alignments are identified, with lot lines being drawn in as the final step. This "four-step" design process is further described in Section II.B.6 below.

Both Primary and Secondary Conservation Areas shall be placed in undivided preserves, which may adjoin housing areas to the largest practicable number of lots within a conservation subdivision. To achieve this, the majority of houselots should abut undivided open space in order to provide direct views and access. Safe and convenient pedestrian access to the open space from all

lots not adjoining the open space shall be provided (except in the case of farmland, or other resource areas vulnerable to trampling damage or human disturbance). Where the undivided open space is designated as separate, noncontiguous parcels, no parcel shall consist of less than three (3) acres in area nor have a length-to width ration in excess of 4:1, except such areas that are specifically designed as village greens, ballfields, upland buffers to wetlands, waterbodies or watercourses, or trail links.

4. **Interconnected Open Space Network**. As these policies are implemented, the protected open spaces in each new subdivision will eventually adjoin each other, ultimately forming an interconnected network of Primary and Secondary Conservation Areas across the township. To avoid the issue of the "taking of land without compensation," the only elements of this network that would necessarily be open to the public are those lands that have been required to be dedicated for public use, never more than 10% of a development parcel's gross acreage, and typically configured in a linear fashion as an element of the township's long-range open space network.

E. Evaluation Criteria

In evaluating the layout of lots and open space, the following criteria will be considered by the Planning Commission as indicating design appropriate to the site's natural, historic, and cultural features, and meeting the purposes of this ordinance. Diversity and originality in lot layout shall be encouraged to achieve the best possible relationship between development and conservation areas. Accordingly, the Planning Commission shall evaluate proposals to determine whether the proposed conceptual preliminary plan:

1. *Protects and serves all floodplains, wetlands, and steep slopes* from clearing, grading, filling, or construction (except as may be approved by the township for essential infrastructure or active or passive recreation amenities).
2. *Preserves and maintains mature woodlands, existing fields, pastures, meadows, and orchards, and creates sufficient buffer areas* to minimize conflicts between residential and agricultural uses. For example, locating houselots and driveways within wooded areas is generally recommended, with two exceptions. The first involves significant wildlife habitat or mature woodlands that raise an equal or greater preservation concern, as described in items #5 and #8 below. The second involves predominantly agricultural areas, where remnant tree groups provide the only natural areas for wildlife habitat.
3. *If development must be located on open fields or pastures because of greater constraints in all other parts of the site,* dwellings should be sited on the least prime agricultural soils, or in locations at the far edge of a field, as seen from existing public roads. Other considerations include whether the development will be visually buffered from existing public roads, such as by a planting screen consisting of a variety of indigenous native trees, shrubs, and wildflowers (specifications for which should be based upon a close examination of the distribution and frequency of those species found in a typical nearby roadside verge or hedgerow).
4. *Maintains or creates an upland buffer* of natural native species vegetation of at least 100 feet in depth *adjacent to wetlands and surface waters*, including creeks, streams, springs, lakes and ponds.
5. *Designs around existing hedgerows and treelines between fields or meadows, and minimizes impacts on large woodlands* (greater than five acres), especially those containing many mature trees or a significant wildlife habitat, or those not degraded by invasive vines. Also, woodlands of any size on highly erodible soils with slopes greater than 10% should be avoided. However, woodlands in poor condition with limited management potential can provide suitable locations for residential development. When any woodland is developed, great care shall be taken to design all disturbed areas (for buildings, roads, yards, septic disposal fields, etc.) In

locations where there are no large trees or obvious wildlife areas, to the fullest extent that is practicable.

6. *Leaves scenic views and vistas unblocked or uninterrupted,* particularly as seen from public thoroughfares. For example, in open agrarian landscapes, a deep "no-build" buffer is recommended along the public thoroughfare where those views or vistas are prominent or locally significant. The concept of "foreground meadows," with homes facing the public thoroughfare across a board grassy expanse (as illustrated in Fig. 5-5 of *Conservation Design for Subdivisions: A Practical Guide to Creating Open Space Networks)* is strongly preferred to mere buffer strips, with or without berms or vegetative screening. In wooded areas where the sense of enclosure is a feature that should be maintained, a deep "no-build, no-cut" buffer should be respected, to preserve existing vegetation.
7. *Avoids* siting new construction on prominent *hilltops or ridges,* by taking advantage of lower topographic features.
8. *Protects wildlife habitat areas* of species listed as endangered, threatened, or of special concern by the U.S. Environmental Protection Agency and/or by the Idaho Fish and Game Department.
9. *Designs around and preserves sites of historic, archaeological, or cultural value,* and their environs, insofar as needed to safeguard the character of the feature, including stone walls, spring houses, barn foundations, cellar holes, earthworks, and burial grounds.
10. *Protects rural roadside character* and improves public safety and vehicular carrying capacity by avoiding development fronting directly onto existing public roads. Establishes buffer zones along the scenic corridor of rural roads with historic buildings, stone walls, hedgerows, and so on.
11. *Landscapes common areas* (such as community greens), cul-de-sac islands, and both sides of new streets with native specie shade trees and flowering shrubs with high wildlife conservation value. Deciduous shade trees shall be planted at forty-foot intervals on both sides of each street, so that the neighborhood will have a stately and traditional appearance when they grow and mature. These trees shall generally be located between the sidewalk or footpath and the edge of the street, within a planting strip not less than five feet in width.
12. *Provides active recreational areas* in suitable locations that offer convenient access by residents and adequate screening from nearby houselots.
13. *Includes a pedestrian circulation system* designed to assure that pedestrians can walk safely and easily on the site, between properties and activities or special features within the neighborhood open space system. All roadside footpaths should connect with off-road trails, which in turn should link with potential open space on adjoining undeveloped parcels (or with existing open space on adjoining developed parcels, where applicable).
14. *Provides open space that is reasonably contiguous,* and whose configuration is in accordance with the guidelines contained in the *Design and Management Handbook for Preservation Areas,* produced by the Natural Lands Trust. For example, fragmentation of open space should be minimized so that these resource areas are not divided into numerous small parcels located in various parts of the development. To the greatest extent practicable, this land shall be designed as a single block with logical, straightforward boundaries. Long thin strips of conservation land shall be avoided, unless the conservation feature is linear or unless such configuration is necessary to connect with other streams or trails. The open space shall generally abut existing or potential open space land on adjacent parcels (such as in other subdivisions, public parks, or properties owned by or eased to private land conservation organizations). Such subdivision open space shall be designed as part of larger contiguous and integrated greenway systems, as per the policies in the Open Space, Recreation, and Environmental Resources Element of the township's *comprehensive plan.*

II. SITE PLANNING PROCEDURES FOR CONSERVATION SUBDIVISIONS

A. General

1. **Process Overview.** The sequence of actions prescribed in this article is as listed below. These steps shall be followed sequentially and may be combined only at the discretion of the Planning Commission:

   a. Pre-application discussion

   b. Existing Features (Site Analysis) Plan (90-day clock starts with the submission of this plan at the on-site walkabout or at a regularly scheduled meeting of the Planning Commission)

   c. On-site walkabout by planning commissioners and applicant

   d. Pre-submission conference

   e. Conceptual Preliminary Plan (*conceptual illustration* of greenway land, potential house sites, street alignments, and tentative lot lines, prepared according to the four-step design process described herein)

   f. Preliminary Plan submission, determination of completeness, review of overall planning concepts, and decision

   g. Preliminary engineering certification

   h. Final Plan submission, determination of completeness, review, and decision

   i. Supervisors' signatures

   j. Recording at County Recorder of Deeds.

B. Elements of the Preliminary Plan Process

1. **Pre-Application Discussion.** A pre-application is strongly encouraged between the applicant, the site designer(s), and the Planning Commission. The purpose of this informal meeting is to introduce the applicant and the site designer(s) to the township's zoning and subdivision regulations and procedures, and to discuss the applicant's objectives in relation to the township's official policies and ordinance requirements. The city may designate a consultant experienced in development design and in the protection of natural features and greenway lands to meet with the applicant and to attend or conduct meetings required under this ordinance. (The cost of these consultant services shall be paid for through subdivision review fees received by the township.)

2. **Existing Features (Site Analysis) Plan.** Plans analyzing each site's special features are required for all proposed subdivisions, as they form the basis of the design process for greenway lands, house locations, street alignments, and lot lines. The applicant or his/her representative shall bring a copy of the Existing Features (Site Analysis) Plan to the on-site walkabout. Detailed requirements for Existing Features (Site Analysis) Plans are contained in another section of this ordinance, but at the minimum must include (1) a contour map based at lease upon topographical maps published by the U.S. Geological Survey; (2) the location of severely constraining elements such as steep slopes (over 25%) wetlands, watercourses, intermittent streams and 100-year floodplains, and all rights-of-way and easements; (3) soil boundaries as shown on USDA Natural Resources Conservation Service medium-intensity maps; and (4) the location of significant features such as woodlands, treelines, open fields or meadows, scenic views into or out from the property, watershed divides and drainage ways. fences or stone walls, rock outcrops, and existing structures, roads, tracks and trails, and any sites listed by the State of Idaho (Department Agencies).

These Existing Features (Site Analysis) Plans shall identify both Primary Conservation Areas (floodplains, wetlands, and steep slopes, as defined in the process for computing "Adjusted Tract Acreage") and Secondary Conservation Areas, as described in Sections I.C.1. and I.D.1 of this ordinance. Together, these Primary and Secondary Conservation Areas comprise the development's proposed open space, the location of which shall be consistent with the locational design criteria listed in the Open Space, Recreation, and Environmental Resources Element of the township's *comprehensive plan.* The Existing Features (Site analysis) Plan shall form the basis for the conceptual Preliminary Plan, which shall show the tentative location of houses, streets, lot lines, and greenway lands in new subdivisions, according to the four-step design process described in Section II.B.6 below.

3. **On-Site Walkabout**. After the Existing Features (Site Analysis) Plan has been prepared, the Planning Commission shall schedule a mutually convenient date to walk the property with the applicant and his/her site designer. The purpose of this visit is to familiarize township officials with the property's special features, and to provide them an informal opportunity to offer guidance (or at least a response) to the applicant regarding the tentative location of the Secondary Conservation Areas and potential house locations and street alignments. If this visit is not scheduled before submission of the sketch plan or the Conceptual Preliminary Plan, it should occur soon thereafter.

4. **Pre-Submission Conference**. Prior to the submission of the sketch plan or a Conceptual Preliminary Plan, the applicant shall meet with the Planning Commission to discuss how the four-step approach to designing subdivisions, described in Section II.B.6 below, could be applied to the subject property. At the discretion of the Planning Commission this conference may be combined with the on-site walkabout.

5. **Conceptual Preliminary Plan**. After the pre-submission conference, a sketch plan or a *Conceptual* Preliminary Plan shall be submitted for all proposed subdivisions. As used in this ordinance, the term "Conceptual Preliminary Plan" refers to a preliminarily engineered sketch plan drawn to illustrate initial thoughts about a conceptual layout for greenway lands, house sites, and street alignments. This is the stage where drawings are *tentatively* illustrated, before heavy engineering costs are incurred in the design of any proposed subdivision layout. These drawings shall be prepared by a team that includes a landscape architect and a civil engineer.

   A Conceptual Preliminary Plan shall be submitted by the applicant to the township zoning officer who will then submit it to the Planning Commission for review for the purpose of securing early agreement on the overall pattern of streets, houselots, Primary and Secondary Conservation Areas, and potential trail linkages (where applicable), prior to any significant expenditure on engineering costs in the design of streets, stormwater management, or the accurate delineation of internal lot boundaries.

   Within thirty days of receiving the Conceptual Preliminary Plan the Planning Commission shall approve it, disapprove it, or approve it with conditions, stating its reasons in writing. The remaining 60 days of the statutory 90-day review period for Preliminary Plans (as provided for in the state enabling legislation) shall therefore remain for the applicant to submit a Detailed Preliminary Plan (which shall contain all the customary engineering dat) and for the Planning Commission to review said plan and to render its decision in writing. Either or both of these time periods may be formally extended if mutually agreeable to the applicant and the Planning Commission.

6. **Four-Step Process**. Each sketch plan or Conceptual Preliminary Plan shall follow a four-step design process, as described below. When the conceptual Preliminary Plan is submitted, applicants shall be prepared to demonstrate to the Planning Commission that these four design steps were followed by their site designers in determining the layout of their pro-

posed streets, houselots, and greenway lands. This process shall be accomplished during the first 30 days of the statutory 90-day review period for Preliminary Plans.

a. *Designating the Open Space*. During the first step, all potential conservation areas (both primary and secondary) are identified, using the Existing Features (Site Analysis) Plan. Primary Conservation Areas shall consist of wetlands, floodplains, slopes over 25% and soils susceptible to slumping. Secondary Conservation Areas shall comprise 50% of the remaining land, and shall include the most sensitive and noteworthy natural, scenic, and cultural resources on that remaining half of the property.

Guidance on which parts of the remaining land to classify as Secondary Conservation Areas shall be based upon:

- the procedures described in *Conservation Design for Subdivisions: A Practical Guide to Creating Open Space Networks,* produced by Natural Lands Trust and published by Island Press,
- on-site visits or "walkabouts,"
- the open space locational criteria contained in Section I.E above,
- the evaluation criteria listed in Section I.E. above,
- information from published data and reports, and
- conversations with existing or recent owners of the property, and members of the township Board of Supervisors and Planning Commission.

b. *Location of House Sites*. During the second step, potential house sites are tentatively located. Because the proposed location of houses within each lot represents a significant decision with potential impacts on the ability of the development to meet the 14 evaluation criteria contained in Section I.E. above, subdivision applicants shall identify tentative house sites on the Conceptual Preliminary Plan and proposed house sites on the detailed Final Plan. House sites should generally be located not closer than 100 feet from Primary Conservation Areas, but may be situated within 50 feet of Secondary Conservation Areas, in order to enjoy views of the latter without negatively impacting the former. The building "footprint" of proposed residences may be changed by more than fifty feet in any direction with majority approval from the members of the Planning Commission. Changes involving less than fifty feet do not require approval.

c. *Street and Lot layout*. The third step consists of aligning proposed streets to provide vehicular access to each house in the most reasonable and economical way. When lots and access streets are laid out, they shall be located in a way that avoids or at least minimizes adverse impacts on both the Primary and Secondary Conservation Areas. To the greatest extend practicable, wetland crossings and streets traversing existing slopes over 15% shall be strongly discouraged. Street connections shall generally be encouraged to minimize the number of new cull-de-sacs to be maintained by the township and to facilitate easy access to and from homes in different parts of the property (and on adjoining parcels). Where cull-de-sacs are necessary, those serving six or fewer homes may be designed with "hammerheads" facilitating three-point turns. Cul-de-sacs serving more than six homes shall generally be designed with a central island containing indigenous trees and shrubs (either conserved on site or planted). The township generally encourages the creation of single-loaded residential access streets, in order that the maximum number of homes in new developments may enjoy views of open space.

***Note**: In situations where more formal, "neo-traditional," or village-type layouts are proposed, Steps Two and Three may be reversed, so that the location of house sites follows the location of streets and squares.*

d. *Lot Lines*. The fourth step is simply to draw in the lot lines (where applicable). These are generally drawn midway between house locations and may include L-shaped "flag-lots" meeting the city's minimum standards for the same.

7. **Preliminary Engineering Certification.** Prior to approval of the Conceptual Preliminary Plan, the applicant shall submit to the Planning Commission a "Preliminary Engineering Certification" that the approximate layout of proposed streets, houselots, and open space lands complies with the city's zoning and subdivision ordinances, particularly those sections governing the design of subdivision streets and stormwater management facilities. This certification requirement is meant to provide the township with assurance that the proposed plan is able to be accomplished within the current regulations of the township. The certification shall also note any waivers needed to implement the plan as drawn.

III. OWNERSHIP AND MAINTENANCE OF OPEN SPACE

A. General

Different ownership and management options apply to the permanently protected open space created through the development process. The open space shall remain undivided and may be owned and managed by a homeowners' association, the township, or a recognized land trust or conservancy. (However, in low-density rural subdivisions with ten or more acres per dwelling, all or part of the required open space may be located within the houselots.) A public land dedication, not exceeding 10% of the total parcel size, may be required by the township, through this open space, to facilitate trail connections. A narrative describing ownership, use and maintenance responsibilities shall be submitted for all common and public improvements, utilities, and open spaces.

B. Ownership Standards

Common open space within a development shall be owned, administered, and maintained by any of the following methods, either individually or in combination, and subject to approval by the township.

1. **Offer of Dedication**. The township shall have the first and last offer of dedication of undivided open space in the event said land is to be conveyed. Dedication shall take the form of a fee simple ownership. The township may, but shall not be required to accept undivided open space provided: (1) such land is accessible to the residents of the township; (2) there is no cost of acquisition other than any costs incidental to the transfer of ownership such as title insurance; and (3) the township agrees to and has access to maintain such lands. Where the township accepts dedication of common open space that contains improvements, the township may require the posting of financial security to ensure structural integrity of said improvements as well as the functioning of said improvements for a term not to exceed eighteen (18) months from the date of acceptance of dedication. The amount of financial security shall not exceed fifteen percent (15%) of the actual cost of installation of said improvements.

2. **Homeowners' Association**: The undivided open space and associated facilities may be held in common ownership by a homeowners' association. The association shall be formed and operated under the following provisions:

   a. The developer shall provide a description of the association, including its bylaws and methods for maintaining the open space.

   b. The association shall be organized by the developer and shall be operated with a financial subsidy from the developer, before the sale of any lots within the development.

   c. Membership in the association is automatic (mandatory) for all purchasers of homes therein and their successors. The conditions and timing of transferring control of the association from developer to homeowners shall be identified.

d. The association shall be responsible for maintenance of insurance and taxes on undivided open space, enforceable by liens placed by the township on the association. The association may place liens on the homes or houselots of its members who fail to pay their association dues in a timely manner. Such liens may require the imposition of penalty interest charges.

e. The members of the association shall share equitably the costs of maintaining and developing such undivided open space. Shares shall be defined within the association bylaws.

f. In the event of a proposed transfer, within the methods here permitted, of undivided open space land by the homeowners' association, or of the assumption of maintenance of undivided open space land by the township, notice of such action shall be given to all property owners within the development.

g. The association shall have or hire adequate staff to administer common facilities and properly and continually maintain the undivided open space.

h. The homeowners' association may lease open space lands to any other qualified person, or corporation, for operation and maintenance of open space lands, but such a lease agreement shall provide:

(1) that the residents of the development shall at all times have access to the open space lands contained therein (except croplands during the growing season);

(2) that the undivided open space to be leased shall be maintained for the purposes set forth in this ordinance; and

(3) that the operation of open space facilities may be for the benefit of the residents only, or may be open to the residents of the township, at the election of the developer and/or homeowners' association, as the case may be.

i. The lease shall be subject to the approval of the board and any transfer or assignment of the lease shall be further subject to the approval of the board. Lease agreements so entered upon shall be recorded with the County Recorder of Deeds within thirty (30) days of their execution and a copy of the recorded lease shall be filed with the township.

3. **Condominiums**. The undivided open space and associated facilities may be controlled through the use of condominium agreements, approved by the township. Such agreements shall be in conformance with the state's uniform condominium act. All undivided open space land shall be held as a "common element."

4. **Dedication of Easements**. The township may, but shall not be required to, accept easements for public use of any portion or portions of undivided open space land, title of which is to remain in ownership by condominium or homeowners' association, provided: (1) such land is accessible to township residents; (2) there is no cost of acquisition other than any costs incidental to the transfer of ownership, such as title insurance; and (3) a satisfactory maintenance agreement is reached between the developer, condominium or homeowners' association, and the township.

5. **Transfer of Easements to a Private Conservation Organization**. With the permission of the township, an owner may transfer easements to a private, nonprofit organization, among whose purposes it is to conserve open space and/or natural resources, provided that:

1. the organization is acceptable to the township, and is a bona fide conservation organization with perpetual existence;

2. the conveyance contains appropriate provisions for proper reverter or retransfer in the event that the organization becomes unwilling or unable to continue carrying out its functions; and

3. a maintenance agreement acceptable to the board is entered into by the developer and the organization.

C. Maintenance Standards

1. The ultimate owner of the open space (typically a homeowners' association) shall be responsible for raising all monies required for operations, maintenance, or physical improvements to the open space through annual dues, special assessments, etc. The homeowners' association shall be authorized under its bylaws to place liens on the property of residents who fall delinquent in payment of such dues, assessments, etc.
2. In the event that the association or any successor organization shall, at any time after establishment of a development containing undivided open space, fail to maintain the undivided open space in reasonable order and condition in accordance with the development plan, the township may serve written notice upon the owner of record, setting forth the manner in which the owner of records has failed to maintain the undivided open space in reasonable condition.
3. Failure to adequately maintain the undivided open space in reasonable order and condition constitutes a violation of this ordinance. The township is hereby authorized to give notice, by personal service or by United States mail, to the owner or occupant, as the case may be, of any violation, directing the owner to remedy the same within twenty (20) days.
4. Should any bill or bills for maintenance of undivided open space by the township be unpaid by November 1 of each year, a late fee of fifteen percent (15%) shall be added to such bills and a lien shall be filed against the premises in the same manner as other municipal claims.

APPENDIX C

Site Disturbance Ordinance #251

AN ORDINANCE OF KOOTENAI COUNTY, IDAHO, A POLITICAL SUBDIVISION OF THE STATE OF IDAHO, ESTABLISHING REQUIREMENTS FOR GRADING OF LAND, EROSION AND SEDIMENTATION CONTROL, AND STORMWATER MANAGEMENT.

BE IT ORDAINED by the Board of County Commissioners of Kootenai County, Idaho

Section 1	Title
Section 2	Authority
Section 3	Purpose
Section 4	Definitions
Section 5	Applicability
Section 6	Application and Information Requirements
Section 7	Standards
Section 8	Disturbance Restrictions
Section 9	Hazards
Section 10	Administration of Ordinance
Section 11	Inspection
Section 12	Maintenance
Section 13	Prohibited Conduct, Enforcement, and Penalties
Section 14	Severability
Section 15	Conflicting Ordinance Provisions
Section 16	Effective Date

SECTION 1 TITLE

This Ordinance shall be known as the SITE DISTURBANCE ORDINANCE of Kootenai County.

SECTION 2 AUTHORITY

This Ordinance is authorized under the provisions of Idaho Code Section 67-6518.

SECTION 3 PURPOSE

The purpose of this Ordinance shall be to protect property, surface water, and ground water against significant adverse effects from excavation, filling, clearing, unstable earthworks, soil erosion, sedimentation, and stormwater runoff and to provide maximum safety in the development and design of building sites, roads, and other service amenities.

SECTION 4 DEFINITIONS

Administrator—An official appointed by the Board of County Commissioners to administer the provisions of this Ordinance.

Best Management Practices (BMPs)—Physical, structural, and/or managerial practices that, when used singly or in combination, prevent or reduce pollution of water and erosion of soils.

Clearing—The destruction and removal of vegetation by manual, mechanical, or chemical methods.

Community Stormwater System—A BMP or series of BMPs which serve(s) more than one parcel.

Conveyance—A mechanism for transporting water from one point to another, including pipes, ditches, and channels.

Cut—To excavate into a hillside to create a flat area or to steepen or flatten a bank.

Design Professional, Grading, Drainage, or Stormwater Management—A professional engineer, landscape architect, architect, or geologist, registered for their respective profession by the State of Idaho.

Design Professional, Erosion and Sedimentation Control—A professional engineer, landscape architect, architect, or geologist, registered for their respective profession by the State of Idaho or a Certified Professional in Erosion and Sediment control (CPESC) as determined by the Soil and Water Conservation Society and the International Erosion Control Association.

Detention—The temporary storage of storm runoff, used to control the peak discharge rates and provide gravity settling of pollutants.

Driveway—For purposes of managing and treating stormwater, a driveway shall be a means of vehicular access from a public or private road to a point within an individual lot which is less than 150 feet in length.

Easement Drainage—A legal encumbrance placed against a property's title for maintenance access or to reserve other specified privileges for the users and beneficiaries of the drainage facilities contained within the boundaries of the easement.

Erosion—The detachment and movement of soil or rock fragments by water, wind, ice, or gravity.

Erosion and Sedimentation Control—Those Best Management Practices (BMPs) which are employed to prevent or reduce erosion or sedimentation and are typically necessary when ground disturbance occurs (see definition for Best Management Practices).

Excavate—Any act by which earth, sand, gravel, rock, or other earthen material is cut into, dug, uncovered, displaced, or relocated.

Fill—A solid material which increases the ground surface elevation or the act of depositing such materia by mechanical means.

Flood Control Structure—A man-made feature designed or constructed to reduce damage caused by flood events, including, but not limited to, a dam, dike, channel, levy, or similar device.

Grading—Any excavation, filling, or movement of earth for the purposes of changing the shape or topography of the land.

Ground water—Water in a saturated zone or stratum beneath the land surface or a surface water body.

Guarantee of Financial Surety—A surety bond, cash deposit, or escrow account, irrevocable letter of credit, or other means acceptable to or required by the County to guarantee that infrastructure or improvements are completed in compliance with the project's approved plans.

Impervious Surface—Any hard surface area which either prevents or retards the entry of water into the soil mantle as under natural conditions prior to development, and/or a hard surface area which causes water to run off the surface in greater quantities or at an increased rate of flow from the flow present under natural conditions prior to development. Common impervious surfaces include, but are not limited to, roofs, walkways, patios, driveways, parking lots or storage areas, concrete or asphalt paving, gravel and compacted native surface roads, compacted earthen materials, and oiled, macadam or other surfaces which similarly impede the natural infiltration of stormwater.

High Water Mark—The line which water impresses on the soil by covering it for sufficient periods to deprive it of vegetation.

Naturally Occurring Draining Swale—Natural drainage conveyances that provide for the discharge of stormwater to Class 1 or Class 2 streams, but have bed and banks which are vegetatively covered and stable.

Private Road—A means of vehicular access which does not meet the definition of "driveway" and is not maintained by a public highway agency.

Public Highway Agency—The Idaho Transportation Department, a Highway District, or other political subdivision of the state with jurisdiction over public highways, public streets, and public rights-of-way.

Public Road—Public highway or street which has been accepted for maintenance by a Public Highway Agency.

Rathdrum Prairie Aquifer—A geologic stratum containing ground water in northern Kootenai County, further delineated on the Water Resources map in the Kootenai County Comprehensive Plan.

Retention—The holding of runoff in a basin without release except by means of evaporation, infiltration, or emergency bypass.

Scarify—To break up or loosen the ground surface of an area.

Sediment—Fragmented material that originates from weathering and erosion of rocks or unconsolidated deposits and is transported by, suspended in, or deposited by water.

Sedimentation—The deposition of sediment on ground surfaces and in water courses.

Site—The parcel of land on which grading or excavation activity is conducted. A road right-of-way shall be considered a separate site from adjacent properties.

Spoil Pile—Soil and/or rock excavated from an area which will not be used for backfill or final grading on-site.

Stabilized Construction Entrance—A stabilized pad of clean, crushed rock located where traffic enters or leaves a construction site onto a public or private road. The pad shall be a minimum of 6 inches thick, with a minimum rock size of 2-3 inches, and a length sufficient to minimize off-site tracking.

Stormwater—That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, channels, or pipes into a defined surface water channel, or a constructed infiltration facility.

Stormwater Control—Those Best Management Practices (BMPs) which are employed to convey, direct, treat, or dissipate stormwater and are typically necessary when impervious area is created or the natural drainage is interrupted (see definition of Best Management Practices).

Stream—A water course of perceptible extent which confines and conducts continuously or intermittently flowing water. This definition is intended to include streams in natural or man-made channels.

Stream, Class 1—A stream which exhibits a definite bed and banks (a clay, silt, sand, gravel, cobble, boulder, or bedrock stream bottom which results from the scouring action of water flow) and is used for domestic water supply or by fish for spawning, rearing, or migration. Such waters will be considered to be Class 1 upstream from the point of domestic diversion for a minimum distance of 1,320 feet. The Coeur d'Alene River, Spokane River and all recognized Kootenai County lakes are excluded from this definition for purposes of this Ordinance.

Stream, Class 2—A stream which exhibits a definite bed and banks (a clay, silt, sand, gravel, cobble, boulder, or bedrock stream bottom which results from the scouring action of water flow) and is usually found in headwater areas or minor drainages and is not used by fish. Their principal value lies in their influence on water quality or quantity downstream in Class 1 streams.

Treatment—Removal of sediment or other pollutants from stormwater.

Undisturbed Natural Vegetation Buffer—An area where no development activity has occurred or will occur, including, but not limited to, logging, construction of utility trenches, roads, structures, or surface and stormwater facilities. Buffer areas shall be left in their natural state.

SECTION 5 APPLICABILITY

A. Exemptions: The following activities are exempt from the permit requirements of this Ordinance.

1. Mining, quarrying, excavating, processing, stockpiling of rock, sand, gravel, aggregate, or clay when approved for operation under applicable State and local regulations (development of roads, structures, parking areas, and other infrastructure associated with mining activity shall not be exempt);
2. Agricultural crop management limited to the preparation of soil by turning, discing, or other means in common local usage;
3. Logging road construction and routine maintenance, and logging activity under a valid Forest Practices Act Notification;
4. Cemetery graves;
5. Emergency situations involving immediate danger to life or property, substantial fire hazards, or other public safety hazards as determined by the County, or during the period covered by an emergency declaration by the County; and
6. Refuse disposal or landfill operation authorized by permit from the appropriate state and local agencies. Landfill construction shall not be exempt from this Ordinance.
7. Routine landscape maintenance involving not more than 50 cubic yards of excavation or fill on a single parcel of property per year;
8. Landscape installation where fill is confined to less than 1 foot of topsoil, or landscape berms not exceeding 4 feet in height and 50 cubic yards in volume with side slopes flatter than three feet horizontal to one foot vertical (3:1);
9. In any 12-month period, an excavation of less than 50 cubic yards of material which: a) is less than 2 feet in depth; or b) which does not create a cut slope greater than 5 feet in height and steeper than two horizontal to one vertical (2:1);
10. In any 12-month period, a fill less than 1 foot in depth and placed on natural terrain with a slope flatter than five horizontal to one vertical (5:1), or a fill less than 3 feet in depth and not intended to support roadways, driveways, or structures, which does not exceed 50 cubic yards on any one lot and does not obstruct a stream, drainage course, or surface waters. In no case shall this exemption be combined with Item 9 of this Section in a manner which would result in a cut and fill exceeding 50 cubic yards of material;
11. Private road or driveway maintenance where work is limited to the travelway, no cut or fill slopes are created, and no drainage features are created or modified;
12. Excavation of test holes for soil testing activities, provided that no access road will be created for test hole excavation, and the total excavation is less than 50 cubic yards.

    Excavation and grading activities which are exempted from the permit requirement under Items 7 through 12 shall employ reasonable and knowledgeable Best Management Practices to prevent sediment from leaving the site.

B. Permit Required: A site disturbance permit shall be required for the following activities in addition to any permit granted by other agencies:

1. Construction of all new temporary or permanent driveways, private roads, or infrastructure authorized through the subdivision process;
2. Conversion of roads from one use to another (such as a logging road to a private road, private road to a public road, etc.) regardless of the level of improvement required on the road;

3. Excavation for the construction of structures;
4. Creation of a new commercial or industrial access or parking lot, and conversion or paving of an existing access or parking lot for commercial or industrial development;
5. All other excavation and grading activity, except as specifically exempted under Item A above.

C. Other Activities

1. Site disturbing activities conducted by Public Highway Agencies shall be regulated as follows: Kootenai County shall establish a Memorandum of Understanding with each Public Highway Agency outlining the requirements for compliance with the standards set forth in this Ordinance.
2. Site disturbing activities conducted by Utility Installers shall be regulated as follows:
   a. For major installation projects where utility service is regional in nature intending to serve more than one subdivision or intending to upgrade existing service to multiple subdivisions, or commercial or industrial projects, utility installers shall comply with all requirements of this Ordinance.
   b. All other work conducted by utility installers shall use knowledgeable and reasonable Best Management Practices to prevent sediment from leaving the site.

SECTION 6 APPLICATION AND INFORMATION REQUIREMENTS

A. Applications All applications for a site disturbance permit shall be submitted to the County on a form provided by the County. At a minimum, the following information shall be required:

1. Property owner's name and applicant's name if different from the owner;
2. Legal description of property including parcel number;
3. A written description of the work to be done, including an estimate of whether the amount of earth to be moved will exceed 50 or 5000 cubic yards of material and the intended purpose;
4. A site plan, drawn to scale, including property boundaries, north arrow, adjacent roads, location of proposed work, and distances to property lines or prominent features of the land.

Upon receipt of a completed application, the County will perform a site inspection to determine the risk categories as outlined in Appendix A and B of this Ordinance. The outcome of risk assessment shall determine the type of plans required. The area over the Rathdrum Prairie Aquifer area is exempted from the risk assessment procedure for erosion risk, unless the site is within 500 feet of a surface water feature (e.g. lake, stream, etc.). For exempted site, erosion and sedimentation control BMPs shall not be required unless sediment is exported from the site. Exempted sites shall also be exempt from the requirements of Section 7B, items 3, 4, and 5.

B. Improvement Plans The required elements of site disturbance plans shall be outlined in the County's Plan Criteria manual, adopted pursuant to this ordinance.

1. Plans prepared by a design professional shall be required in the following circumstances:
   a. Site disturbing activities governed by this Ordinance on high risk sites.
   b. All commercial and industrial development.
   c. Any project involving more than 5000 cubic yards of material or a site disturbance greater than 2 acres.
   d. When required under Section 5C of this Ordinance.
   e. Subdivision infrastructure development.

2. Plans for moderate risk site may be prepared by a design professional, contractor, or property owner.
3. The Administrator may waive the submission of plans for minor improvements if, in using his or her judgement, the standards of this Ordinance can be met by existing site conditions.

C. Interagency Coordination The Administrator may request comment from affected agencies where appropriate. Where coordinated permits are necessary, signoffs from permitting agencies or copies of other permits may be required. Permit authorities may include, but are not limited to:

1. Public Highway Agencies for work within public rights-of-way, including approach permits;
2. Army Corps of Engineers;
3. Idaho Department of Lands for encroachments into navigable waters, logging activity under the Forest Practices Act, and surface mining activity;
4. Environmental Protection Agency for site disturbing activity involving greater than five (5) acres;
5. Coeur d'Alene Tribe for site disturbing activity involving greater than five (5) acres within the boundaries of the Coeur d'Alene Indian reservation;
6. Idaho Department of Water Resources for work within stream channels.

SECTION 7 STANDARDS

A. Grading

1. The slope of cut surfaces shall be no steeper than is safe for the intended use and shall be no steeper than two horizontal to one vertical (2:1), unless the design professional can demonstrate to the Administrator substantial evidence that steeper slopes are feasible, taking into account safety, stability, erosion control, revegetation, and overall water quality impacts. Subsurface drainage shall be provided as necessary for stability. All engineering reports are subject to review by the Administrator.
2. Fill slopes shall be no steeper than is safe for the intended use and shall be no steeper than two horizontal to one vertical (2:1), unless the design professional can demonstrate to the Administrator substantial evidence that steeper slopes are feasible, taking into account safety, stability, erosion control, revegetation, and overall water quality impacts. Fill slopes shall not be constructed on natural slopes of 40% (2.5 horizontal to 1 vertical) or steeper, without special treatment or design. In addition, the toe of fill slopes shall not be closer to the top of existing or planned downhill cut slopes than the height of that cut (e.g. if an 8-foot cut is planned, the toe of the uphill fill slope shall not be closer than 8 feet to the top of that cut), unless the design professional has demonstrated that comparable stability can be achieved with less setbacks.
3. Prior to placement of fill, the ground surface shall be prepared to receive fill by removing vegetation, topsoil, forest duff, and any other unsuitable material. The area to receive fill shall be scarified to provide a bond with the new fill. Fill shall not be placed until the area is prepared by constructing a level or slightly in-sloped toe bench into competent material at the base of the new fill. The Administrator may waive the benching requirement for minor fills which are not intended to support a road, driveway, or structure. In high risk areas, the position, width, and configuration of the bench shall be determined by a design professional. Fill slopes and the transition zone into natural terrain shall be configured to a generally smooth, planar configuration so that runoff traverses the area as sheet flow and is not concentrated. Fill material shall be composed of mineral soil that is free of organic material. Roadway fills shall be placed in lifts and compacted to a minimum of 95 percent (95%) of the

maximum density as determined by the AASHTO T-99 or ASTM D-698 compaction procedure, or as specified in the design professional's report.

4. Except where roads or driveways cross property lines, the tops and toes of cut and fill slope shall be set back from property boundaries one half of the height of the slope with a minimum of five (5) feet and a maximum of twenty (20) feet, unless the design professional has demonstrated to the Administrator that smaller setbacks provide a sufficient measure of safety and stability for activities which may occur on adjacent property.
5. Terracing shall be required on all cut or fill slopes which exceed 50 feet in height. Spacing, width, and drainage requirements of the terrace(s) shall be determined by the design professional.

B. Erosion and Sedimentation Control

1. Erosion and sedimentation control BMPs for all sites must be sufficient to prevent sediment from leaving the site.
2. Stabilized construction entrances and driveways shall be required for all construction sties to minimize sediment tracking onto roadways. Parking of vehicles shall be restricted to paved or stabilized areas.
3. The erosion and sedimentation control BMPs must be installed or otherwise in effect, and the boundary of the area to be disturbed must be clearly marked, as indicated in the approved plan, prior to any site disturbance.
4. All surfaces where bare soil is exposed during clearing and grading operations, including spoil piles, shall be covered or otherwise protected from erosion if left unworked for more than 48 hours.
5. The property owner, contractor, and design professional shall be responsible for the design and construction of revised temporary erosion and sedimentation control if application of the approved plan fails. The Applicant shall immediately notify the Administrator of alterations to plans.
6. All cut and fill slopes shall be revegetated to the greatest extent possible.

C. Stormwater Detention and Conveyance

1. Stormwater conveyance mechanisms must be sized to convey runoff from a 50-year storm event without causing flooding or other damage to public or private property, the stormwater management system, or other improvements.
2. Culvert size within public rights-of-way shall be determined by the public highway agency with jurisdiction. All other culvert sizing shall be done by an appropriate design professional.
3. Stormwater systems shall provide for sufficient storage volume and detention time to result in no increase in the peak rate of runoff from the site for a 25-year storm. Runoff from impervious and pervious surfaces shall be considered in meeting this requirement.
4. Where treatment of stormwater runoff is required prior to infiltration over the Rathdrum Prairie Aquifer, the runoff shall be conveyed to treatment areas with limited infiltration prior to treatment.

D. Stormwater Treatment

Treatment of the first ½ inch of stormwater runoff from all impervious surfaces shall be required prior to discharge of the stormwater overland or to ground or surface waters.

1. Subdivisions. Stormwater management plans will be developed for subdivisions utilizing calculations that include the runoff from the future developed portions of each lot. Stormwa-

ter shall be managed utilizing a combination of stormwater treatment and erosion control BMPs to produce an anticipated treatment efficiency of:

Pollutant	Treatment Efficiency
Total Phosphorus (P)	70%
Total Nitrogen (N)	70%
Metals	70%
Suspended Solids	90%

2. Commercial or Industrial Development. Stormwater shall be managed utilizing a combination of stormwater treatment and erosion control BMPs to produce an anticipated treatment efficiency of:

   a. Areas over the Rathdrum Prairie Aquifer:

Pollutant	Treatment Efficiency
Total P	85%
Total N, Metals	80%
Suspended Solids	95%
Dissolved Solids	50%
Organic Chemicals	60%
Bacteria	99%

   b. Areas not over the Rathdrum Prairie Aquifer:

      Same treatment level as listed in Item 1. above.

3. Development of public and private roads. Stormwater shall be managed utilizing a combination of stormwater treatment and erosion control BMPs to produce an anticipated treatment efficiency of:

      Same treatment level as listed in Item 1. above.

4. Residential Development on Individual Lots.

   a. For non-waterfront legal lots of record, as defined by the Kootenai County Zoning Ordinance, which were created prior to the effective date of this Ordinance, stormwater shall be managed utilizing a combination of stormwater treatment and erosion control BMPs to produce the following treatment efficiencies based on the ratio of total impervious area to total lot size.

Impervious Area	Pollutant	Treatment Efficiency
0-4%		Stormwater treatment not required
4-8%	Total P, Total N, and Metals	40%
	Suspended Solids	90%
9-15%	Total P, Total N, and Metals	60%
	Suspended Solids	90%
16-35%	Total P, Total N, and Metals	80%
	Suspended Solids	90%

Impervious area ratios greater than 35% shall be prohibited except on residential lots which are 16,000 square feet or less. Such lots shall meet the same treatment efficiency standard for an impervious area of 16 to 35%.

b. Lots created after the efficient date of this Ordinance shall comply with the treatment performance standards as listed in Item 1. above, or in the case of waterfront lots, Item c. below.

c. Waterfront lots. For residential development on lots with frontage on a recognized lake or the Coeur d'Alene or Spokane Rivers, stormwater shall be managed utilizing a combination of stormwater treatment and erosion control BMPs to produce the following treatment efficiency:

Pollutant	Treatment Efficiency
Total P, Total N, and Metals	80%
Suspended Solids	90%

d. For replacement, or additions or alterations to existing site improvements where no stormwater system has previously been required, stormwater shall be managed utilizing a combination of stormwater treatment and erosion control BMPs to produce no net increase in the pollutant export from the site's previously existing conditions. For additions or alterations to existing improvements on a site with a previously approved and implemented stormwater system, the stormwater treatment level shall be based on the total impervious area on the site as outlined in subsection a. above.

For existing legal lots of record with extreme site constraints for stormwater treatment, the property owner may request a variance from the treatment requirements outlined above. Variance requests shall be heard by the Appeal Board as outlined in Section 10D of this Ordinance. The owner's design professional shall demonstrate why the treatment standards of this Section cannot be achieved and shall outline the BMPs which will be implemented for stormwater treatment, including their anticipated treatment efficiencies.

On-site post-construction testing of BMP treatment efficiency will not be required by the County. The stormwater management plans must show that the proposed BMPs are anticipated to meet or exceed the treatment efficiencies listed above. Expected treatment efficiencies shall be included in the County's manual of Best Management Practices or the Plan Criteria manual. The development of the BMP list and required range of removal effectiveness is not intended to limit the use of new or innovative treatment procedures that may be developed through the creativity of the design professional preparing the stormwater management plan. New approaches and procedures will be considered and approved with the submittal of the appropriate support data that confirms the effectiveness of the proposed new treatment method, its use related to site constraints, and the maintenance burden it will produce if adopted and utilized.

E. Groundwater and Springs

Springs and other groundwater sources must be returned to subsurface flow where possible or conveyed through a project by non-erosive means to a location approved by the Administrator. If groundwater is encountered during grading or excavation activity and adequate provisions have not been made in the approved plans, site work in the vicinity of the spring shall be stopped. Site work shall commence only after the Administrator and/or the design professional have been notified and suitable modifications have been made to the approved plans.

SECTION 8 DISTURBANCE RESTRICTION

A. STREAM PROTECTION ZONES During and after construction operations, stream beds and streamside vegetation shall be protected to leave them in the most natural condition possible to maintain water quality and aquatic habitat.

1. Protection Zone Dimensions
   a. Class 1 Stream Protection Zone - The area encompassed by a slope distance of 75 feet on each side of the high water marks.
   b. Class 2 Stream Protection Zone - The area encompassed by a minimum slope distance of 3 feet on each side of the high water marks of a Class 2 stream.
   c. Naturally Occurring Drainage Swale Protection Zone - The area encompassed by a minimum slope distance of 5 feet on each side of the top of a naturally occurring drainage swale. In no case shall this protection zone have a total width greater than 30 feet.
   d. For lots legally created prior to the effective date of this Ordinance, the width of any protection zone may be reduced to be no greater than 40% of the dimension of the lot perpendicular to the stream or water body.
2. Protection Zone Restrictions
   a. No mechanical ground disturbance shall be permitted within the protection zone except at identified and permitted crossings. When disturbance is necessary, across or inside a Protection Zone, it shall be done in such a manner as to minimize stream bank vegetation and channel disturbance. The extent of such disturbance shall be clearly indicated in the approved plans.
   b. When streams must be crossed, adequate structures to carry stream flow shall be installed. Crossings and their approaches shall be at right angles to the channel or otherwise configured to minimize the disturbance within the Protection Zone. (Construction of hydraulic structures in stream channels is regulated by the Stream Protection Act - Title 42, Chapter 38, Idaho Code.) All temporary crossings shall be removed immediately after use.
   c. Large organic debris (LOD), shading, wildlife cover, and water filtering effects of vegetation shall be maintained along streams as outlined in the Idaho Forest Practices Act.
   d. Existing site improvements which lie within a stream protection zone may be replaced, altered, or enlarged, provided no addition or alteration encroaches farther into the protection zone than the existing improvements, site disturbing activity is minimized to the extent possible, and all other requirements of this Ordinance are met.

B. WATERFRONT LOTS For lots with frontage on a recognized lake or the Coeur d'Alene or Spokane Rivers, an undisturbed natural vegetation buffer shall be retained at the waterfront. A stairway or walkway (which does not exceed 4 feet in width), stairway landings (which do not exceed 6 feet in width or length), or a tram shall be allowed to encroach within the buffer. The buffer shall be a minimum of 25 feet in slope distance from the high water mark of the water body. For purposes of this Ordinance, high water marks shall be considered to be the following elevations:

Coeur d'Alene Lake	2125.0 (N.G.V.D. 1929 datum)
Fernan Lake	2131.37
Hauser Lake	2187.0
Hayden Lake	2239.0
Pend Oreille Lake	2062.5
Spirit Lake	2442.0
Twin Lakes	2310.46

The high water marks for all other water bodies shall be determined by on-site inspection of evidence of historical water levels.

C. Flood Zones Grading activity which may result in damage to a flood control structure shall not be permitted by this Ordinance. All work within floodways and other "areas of special flood hazard" as identified on the FEMA Flood Insurance Rate Maps shall be in conformance with the Kootenai County Flood Damage Prevention Ordinance.

SECTION 9 HAZARDS

Whenever the Administrator determines that an existing excavation, embankment, fill, or roadway on private property has become a hazard to life and limb; endangers property; adversely affects the safety, use, or stability of a public or private access, drainage channel, or adjacent or contiguous properties, the Administrator may require the property owner(s) to eliminate the hazard. The Administrator shall give notice in writing to the owner or other person(s) or agent(s) in control of the property. Within the period specified in the notice, the owner(s) or their agent(s) shall have the hazard corrected.

SECTION 10 ADMINISTRATION OF ORDINANCE

A. General The Ordinance shall be administered in a manner consistent with other Ordinances of Kootenai County by an Administrator as approved by the Board of county Commissioners. Kootenai County may, by resolution, adopt design standards, plan criteria, best management practices, administrative procedures, fee schedules, etc., intended to implement the requirements and standards set forth in this Ordinance. Changes in the supporting documents may be accomplished by subsequently adopted resolution.

B. Duration of Permit Permits shall expire if the work authorized by the permit is not started within 180 days of issuance of the permit, or if work is suspended or abandoned at any time after the work has started for a period of 180 days. The Administrator may grant a one time extension for an additional 180 days on written request by the permittee showing that circumstances beyond the control of the permittee have prevented work authorized by the permit. The Administrator may set specific time limits to the permit for project initiation and completion for environmental reasons or for coordination with other permitted site work.

C. Guarantee of Installation

1. Subdivisions. No final subdivision plat, pursuant to the Kootenai County Subdivision Ordinance, shall be recorded until the stormwater management facilities are in place and functioning as designed or until a guarantee of financial surety is provided to, and accepted by, the County.
2. For commercial and industrial development, development on high risk site, projects involving more than 5000 cubic yards of material, and site disturbances greater than 2 acres, the owner shall be required to provide an acceptable guarantee of financial surety to the County prior to issuance of the site disturbance permit. The design professional shall provide an estimate of the cost to implement the approved plan. Estimated costs shall be based upon the current local construction costs. The financial guarantee shall be 150 percent of the estimated cost to complete the plan. The financial guarantee may be reduced to 125 percent of the cost in cases where the property owner has a written contract with a contractor to guarantee completion of the work. All such contracts are subject to review by the County. Prior to release of the financial guarantee, the applicant's design professional shall submit a letter to the County, approving the construction and certifying its completion.

   If the required improvements have not been completed by the specified date, the County may contract to have the work completed with the money from the financial guarantee. The County may also take additional enforcement measures as provided by the law.

3. For development on moderate risk sites, the owner shall be required to provide an acceptable guarantee of financial surety to the County prior to issuance of the site disturbance permit. The owner shall provide an estimate of the cost to implement the approved plan, subject to review and approval of the administrator. Estimated costs shall be based upon the current local construction costs. The financial guarantee shall be 150 percent of the estimated cost to complete the plan. The financial guarantee may be reduced to 125 percent of the cost in cases where the property owner has a written contract with a contractor to guarantee completion of the work. All such contracts are subject to review by the County. Prior to release of the financial guarantee, the County shall conduct an inspection to approve the construction and certify its completion.

   If the required improvements have not been completed by the specified date, the County may contract to have the work completed with the money from the financial guarantee. The County may also take additional enforcement measures as provided by the law.

D. Appeals The Board of County Commissioners shall appoint a 5-member Appeal Board consisting of one current Planning Commissioner and four local design professionals. Members shall serve in staggered, two-year terms. Appeal Board hearings shall be conducted as necessary, but not more frequently than every 30 days.

Appeals concerning interpretation or administration of this Ordinance may be taken by any person aggrieved. Such appeals shall be filed within a reasonable time, not to exceed forty-five (45) days from occurrence of the action being appealed. A Notice of Appeal specifying the grounds of the appeal shall be filed with the Administrator. The Administrator shall transmit to the Appeal Board all papers constituting the record upon which the action appealed was taken. The Administrator shall schedule the item for a hearing to be commenced within thirty (30) days of filing the Notice of Appeal and shall give legal public notice, as well as due notice to the parties in interest. The Appeal Board shall decide the matter within thirty (30) days of completion of the Appeal hearing.

The decision of the Appeal Board may be appealed to the Board of County Commissioners, provided that a Notice of Appeal is filed with the Administrator within ten (10) days of the Appeal Board's decision. The Board of County Commissioners shall also decide the matter within thirty (30) days.

SECTION 11 INSPECTION

A. General All activities governed by these regulations shall be subject to inspection by the County. An approved set of plans must be available for review on-site whenever work is in progress. It shall be the permittee's responsibility to keep the County notified of the progress of the project and call for all required inspections.

B. High Risk Sites At a minimum, two (2) inspections shall be required for high risk sites: 1) after erosion and sedimentation controls have been installed, prior to ground disturbance; and, 2) after the project has been completed, including revegetation. For sites which are active during the winter, two (2) additional inspections shall be required: 3) after the site has been prepared for the winter (typically in September or October); and 4) sometime in January or February to ensure that the erosion and sedimentation control measures are adequate and maintained. The permittee's design professional shall perform the inspections and submit inspection reports to the Administrator.

C. Moderate Risk Sites At a minimum, two (2) inspections shall be required for moderate risk sites: 1) after erosion and sedimentation controls have been installed, prior to ground disturbance; and, 2) after the project has been completed, including revegetation. For sites which are active during the winter, the Administrator may require one (1) additional inspection during the winter

to ensure that the erosion and sedimentation control measures are adequate and maintained. The Administrator, or their designee, shall conduct the inspections for moderate risk sites.

D. Other sites where risk has not been determined For sites where notification is required or other situations where the site risk has not been evaluated, the Administrator shall determine what inspections are necessary, if any.

SECTION 12 MAINTENANCE

Maintenance requirements and responsibility shall be clearly identified for all projects where Best Management Practices are employed, including BMPs for erosion and sedimentation control and stormwater management. When a stormwater system is deigned to service more than one lot, a maintenance agreement between all parties which benefit from the system must be established, including assurance of adequate funding. Easements across private property for maintenance access to community stormwater systems shall also be required where necessary. All maintenance agreements must be approved by the Administrator.

In the event that appropriate maintenance of any stormwater system is not conducted, the County shall have the option of requiring the property owner or association to provide for maintenance, or take other enforcement measures as outlined in Section 13, below.

SECTION 13 PROHIBITED CONDUCT, ENFORCEMENT, AND PENALTIES

The following actions shall be considered violations of this Ordinance:

A. Failure to obtain a permit prior to the start of grading activity;

B. Failure to call for inspections as required by this Ordinance;

C. Once grading activity has begun, failure to complete the grading activity and install the necessary erosion and sedimentation control, stormwater management, and slope stabilization measure, in a timely manner.

D. Failure to maintain temporary and permanent erosion and sedimentation control measures, the stormwater management system, or slope stabilization measures;

E. Conduct work on a site which exceeds the scope of work outlined in the approved plans;

F. Damage or otherwise impede the function of a stormwater system;

G. Export sediment from a site in a manner not authorized by this Ordinance;

H. Continue work at a site after a Stop Work order has been placed;

I. Discharge stormwater in a manner not authorized by this Ordinance;

J. Failure to correct a hazard as outlined in Section 9 of this Ordinance.

If any of the above violations have occurred, the Administrator may revoke the permit or order the work stopped by notice, in writing, served on any persons engaged in doing or causing such work to be done. Such person shall stop all site work until authorized by the Administrator to proceed. The Administrator may also withhold further issuance of permits. Stop Work orders may be appealed in the same manner as other appeals.

Violations of this Ordinance may be considered a criminal misdemeanor and shall be punishable by a maximum fine of $300 or six (6) months in jail, or both. Each day of violation shall constitute a separate offense. The County may also take civil action to compel performance and completion of, or maintenance of, improvements installed pursuant to this Ordinance.

SECTION 14 SEVERABILITY

Should any section, clause, or provision of this Ordinance be declared by a court of competent jurisdiction to be invalid, it shall not affect the validity of the remaining portions of this Ordinance.

SECTION 15 CONFLICTING ORDINANCE PROVISIONS

The provisions of this Ordinance shall supersede the provisions of Kootenai County Stormwater Management Ordinance No. 185.

The provisions of the Kootenai County Building Code Ordinance and the Uniform Building Code shall remain in effect, under the administration of the Building Official, to the extent that they regulate the construction of buildings or other structures. If a conflict occurs between this Ordinance and provisions of the Uniform Building Code or other County Ordinances, this Ordinance shall take precedence.

SECTION 16 EFFECTIVE DATE

This Ordinance shall take effect and be in full force on January 1, 1997.

Erosion Risk Assessment

Site Disturbance Appendix A

SLOPE, measured in percent, as an average across the area to be disturbed

Gradient	Point Value
0-10% slope	1
11-25% slope	5
>25% slope	10

SOIL K FACTOR, for water erosion susceptibility, as indicated in the Soil Survey of Kootenai County Area, Idaho. The highest K factor within the proposed disturbed soil profile will be sued. Soil type from the Soil Survey will be verified on-site by physical description.

K Factor	Point Value
0-0.2	1
0.21-0.4	3
>0.4	5

PROXIMITY TO SURFACE WATER or any feature which conveys water to surface water. Surface water includes all lakes, river, streams, wetlands, and similar features. Conveyance features may include natural or man-made ditches. Distance is measured along the slope from the closest boundary of the proposed disturbance to the conveyance or surface water feature.

Distance	Point Value
>500	1
201'-500'	5
0'-200'	10

THE POINTS FOR EACH FACTOR SHALL BE ADDED. THE RISK CATEGORY SHALL BE DETERMINED FROM THE POINT TOTAL AS FOLLOWS:

0-9	=	Low risk
10-20	=	Moderate or high risk, Administrator makes determination based on experience in the area
>20	=	High risk

Stormwater Risk Assessment

Site Disturbance Appendix B

SLOPE, measured in percent, as an average across the area to be disturbed

Gradient	Point Value
0-5%	0
6-10%	3
11-15%	6
16-25%	10
>25%	15

SOIL PERMEABILITY, measured in inches per hour as indicated in the Soil Survey of Kootenai County Area, Idaho. The lowest permeability in the soil horizon shall be used. Soil type from the Soil Survey will be verified on-site by physical description.

Permeability	Point Value
0.5 or greater	0
<0.5	5

PROXIMITY TO SURFACE WATER or any feature which conveys water to surface water. Surface water includes all lakes, rivers, streams, wetlands, and similar features. Conveyance features may include natural or man-made ditches. Distance is measured along the slope from the closest boundary of the proposed disturbance to the conveyance or surface water feature.

Distance	Point Value
>500'	0
201'-500'	5
0'-200'	10

IMPERVIOUS AREA RATIO, expressed as a percentage of the parcel area covered with impervious surfaces.

Coverage	Point Value
0-19%	0
20-40%	5
>40%	10

TOTAL IMPERVIOUS AREA, expressed in square feet.

Coverage	Point Value
5000 or greater	5
<5000 square feet	0

BUFFER STRIP. If the project has a useable buffer strip, which provides the appropriate level of treatment for the type of project proposed, subtract 10 points.

THE POINTS FOR EACH FACTOR SHALL BE ADDED. THE RISK CATEGORY SHALL BE DETERMINED FROM THE POINT TOTAL AS FOLLOWS:

15 Points or greater	High risk; design professional required
0-14 Points	Low to moderate risk; Owner or Contractor shall develop appropriate BMPs to address stormwater runoff if not naturally treated and infiltrated on site.

Costs associated with this publication are available from the Division of Environmental Quality.
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