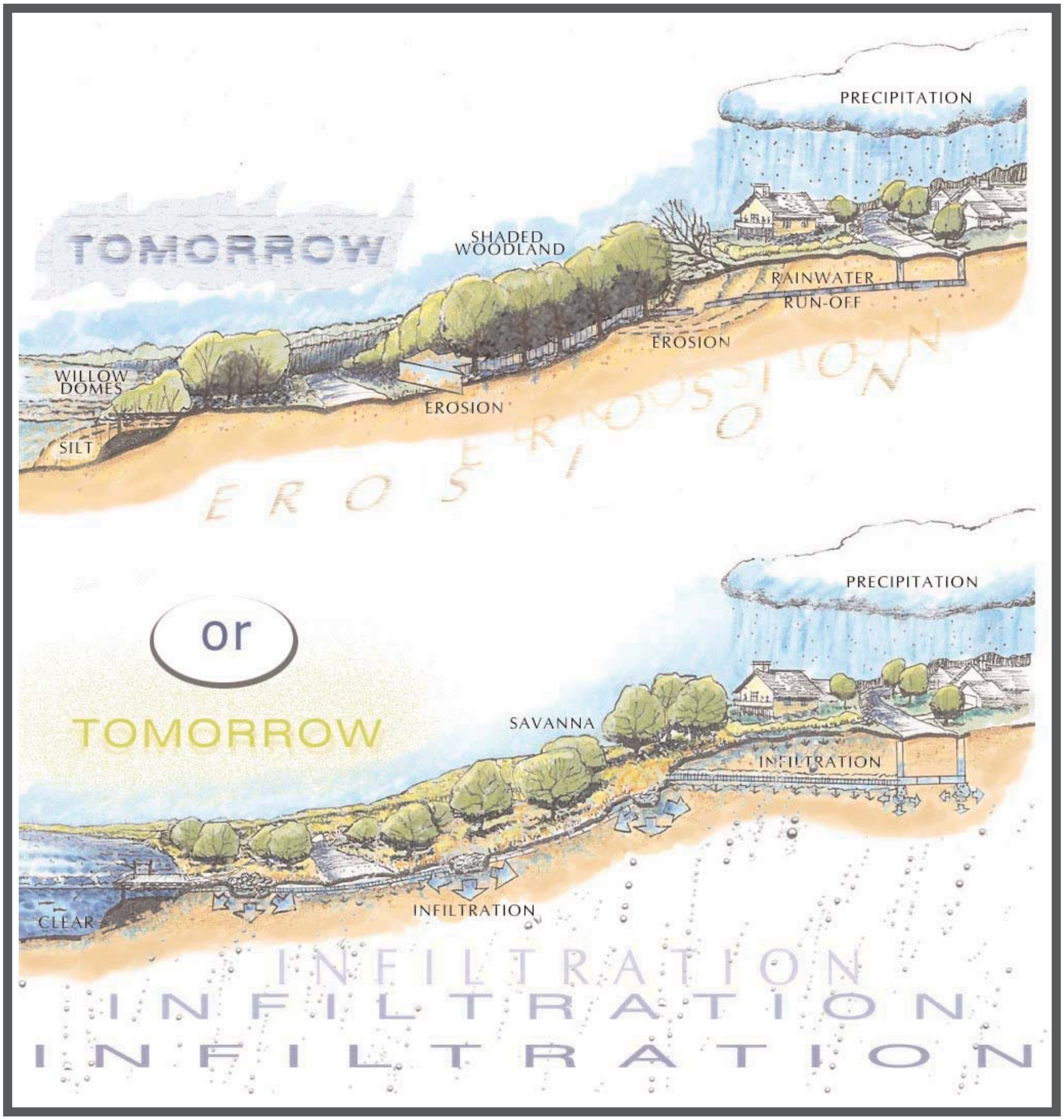
Mossville Bluffs Watershed Restoration Master Plan

October, 2002



Prepared for: Tri-County Regional Planning Commission, City of Peoria, and Peoria County
Prepared by: Conservation Design Forum, Inc. and Clark Engineering, Inc.

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Credits: Project Team - Conservation Design Forum Inc.; Clark Engineers, Inc.; Tri County Planning Commission; City of Peoria; Peoria County; Peoria Park District; and The Nature Conservancy.

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Preface

In a report titled *Peoria Lake Sediment Investigation*, Misganaw Demissie and Nani Bhowmik (1986) cite the following:

> *"Peoria Lake is one of the most important water resources in central Illinois. It provides many benefits to the citizens of Illinois such as opportunities for recreation, fishing, and boating, and a channel for navigation. Most of the benefits were taken for granted for many years. However, continuous sedimentation over the years is threatening the existence of the lake. . . Peoria Lake has lost 77 percent of its original volume. The average depth of. . . Upper Peoria Lake is only about 2 feet".*

> *"Excessive sedimentation not only reduces the lake volume and depth but also impacts water quality, aquatic habitat, navigation, recreation, real estate values, and tourism. Thus it can be said that sedimentation poses a very serious problem to Peoria Lake since it negatively impacts all of the beneficial uses of the lake."*

". . .Peoria Lake has lost 77 percent of its original volume. The average depth of. . . Upper Peoria Lake is only about 2 feet." (Demissie & Bohwmik, 1986)

The authors cite the following sources of erosion contributing to sedimentation of Upper Peoria Lake:

> *"The other major sources of sediment to Peoria Lake are the small tributary streams which drain directly into the lake . . . Because of their steep slopes and close proximity to the lake, the tributary streams which drain directly into the lake contribute a significant amount of sediment to the lake. Factors which contribute to the sediment loads of these streams include watershed erosion, stream bank erosion, and gully erosion. Stream bank and gully erosion are significant along the bluffs which surround the lake."*

To investigate possible solutions to these problems, The City of Peoria, Peoria County, and the Tri-County Planning Commission, hired Conservation Design Forum, Inc. and Clark Engineers, Inc.

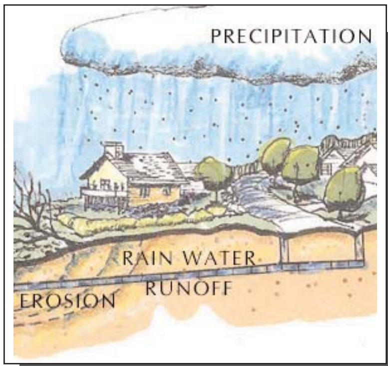
to develop a watershed master plan to propose ways to restore a six square mile watershed just north of Peoria, at Mossville, Illinois. This master plan will refer to this study area as the Mossville Bluffs Watershed.

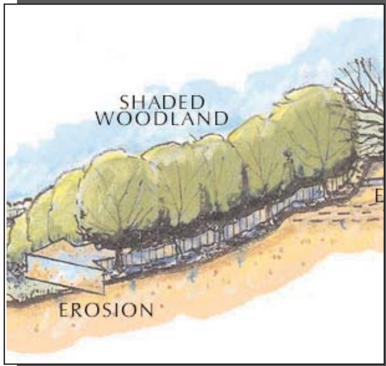
To help give an impression of the scale of the issues at hand, the Upper Peoria Lake Sediment Investigation estimated that the current annual sediment load from the small watershed directly tributary to the lake averages 3 tons of sediment per acre. At this rate, the 3,800 acre Mossville Bluffs Watershed would contribute approximately 11,400 tons of sediment to Peoria Lake each year.

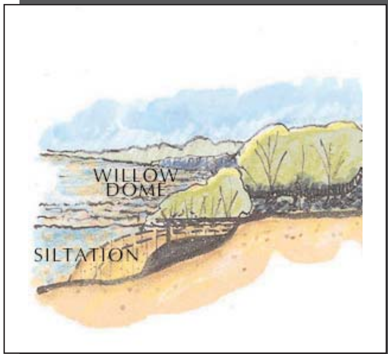
This watershed restoration master plan is a study to uncover the primary factors that cause the Mossville Bluffs Watershed to contribute sediment to Peoria Lake, identify actions that may reduce sedimentation, and propose tools for preventing sedimentation in future development projects within the watershed or adjacent watersheds.

"The other major sources of sediment to Peoria Lake are the small tributary streams which drain directly into the lake . . ." (Demissie & Bohwmik, 1986)

TOMORROW







This Master Plan presents a story about relationships between watershed management practices and their effects on the natural environment and how these practices can be changed.

The images shown above, (from the front cover) show the major sources of ravine and bluff erosion.

Background

Former senator Paul Simon recently spoke on the eastern shores of Upper Peoria Lake to an audience of planners, engineers, elected officials, other professionals, and concerned citizens. The former senator spoke in part to give examples of ways that professionals and local citizens can make positive and well-educated decisions for Peoria and its surrounding communities. His talk was centered on three simple recommendations:

1) work hard, 2) be creative, 3) be willing to take risks.

Senator Simon's message is simple. It speaks directly to what is needed to embrace the complexity of the issues presented in this watershed restoration master plan.

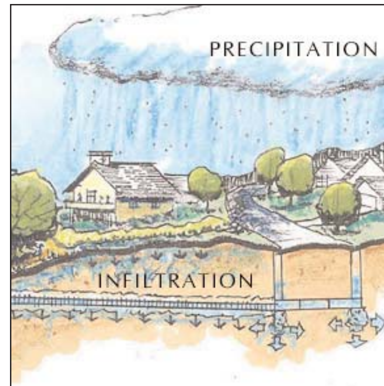
The images on these two pages depict two futures for Mossville. Images shown here to the left and photos shown above depict the current situation. Homes and streets are nestled along the tops of the Mossville Bluffs with associated impervious surfaces such as roofs, driveways and streets. In addition, the contemporary stormwater infrastructure contributes to the collection, concentration, and discharge of runoff from these impervious surfaces into the ravines. Since the ravines and bluffs are composed of highly erodible soils, they are eroding at an escalating rate. If this current scenario continues unabated, future rains will continue to yield erosion and damage to yards, homes, and infrastructure. If not handled where it falls in small manageable volumes, rainwater can become a powerful and destructive force.

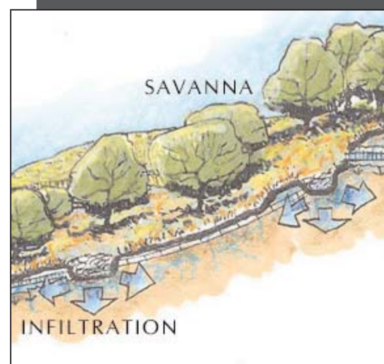
The images shown here to the right and the photos below depict a version of what tomorrow could bring if the bluffs are restored and the effects of impervious surfaces are mitigated. They show the bluff's woody vegetation thinned to allow sunlight to reach the groundplain. When solar energy is allowed to reach the ground, it can warm the soil

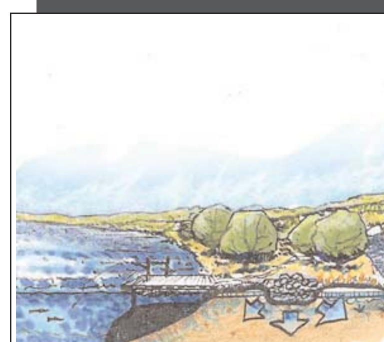
and provide energy for a greater diversity of vegetation. The native plants feature deep and fibrous root systems that hold water and soil in place. The images to the right depict a sustainable watershed achieved through the restoration of native plant communities integrated with other rainwater management tools that will be explored in Chapter 2.

The only way that erosion of the bluffs and deposition of sediment into Upper Lake Peoria can be halted is to prevent rainwater from being discharged at discrete points where it flows as surface water down the ravines. This master plan presents the issues at hand, how they emerged, and what might be done to reverse the destructive patterns that threaten the serene bluff setting.

TOMORROW





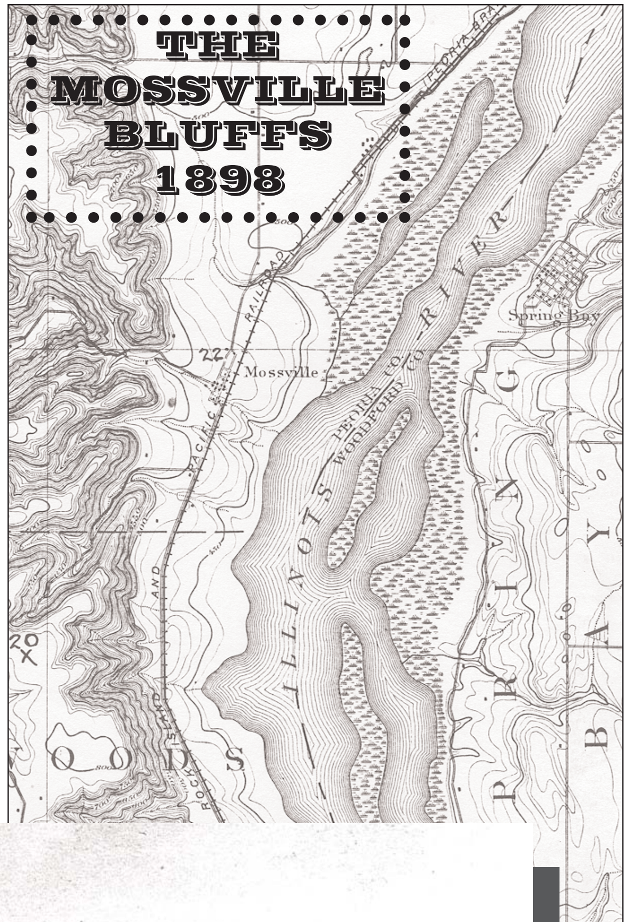


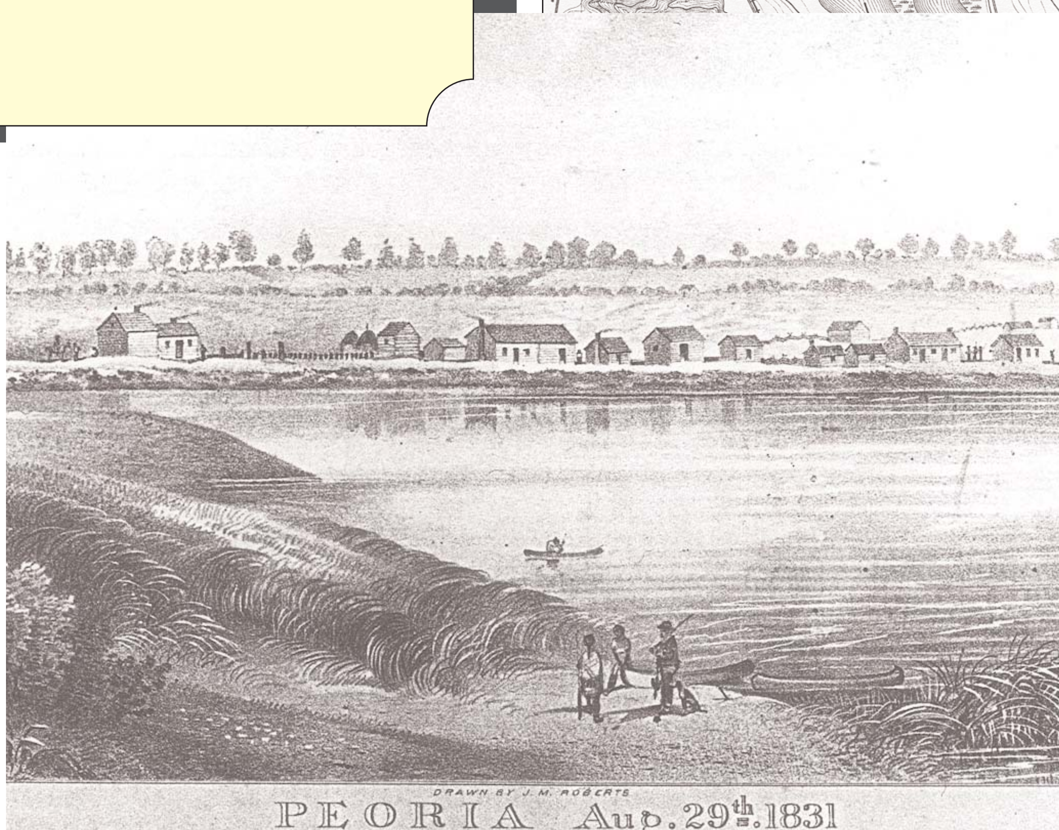
These images show a restored, sustainable hydrology and landscape.

This master plan was prepared from the efforts and cooperation of many from within and from outside the watershed. Its restoration and long-term stewardship depend upon the involvement and efforts of many more yet to become involved.

". . . prairie growth is undergoing a considerable spontaneous change with the progressing settlement and cultivation of the country. Since the prairie grass is no longer burnt off annually. . . . the prairie has gradually given way to softer and shorter grasses, and at somewhat broken points even shrubs and trees have began to sprout up; at the same time their surface has become drier."

(Engelmann, 1867)





Chapter 1 - Cultural and Natural History

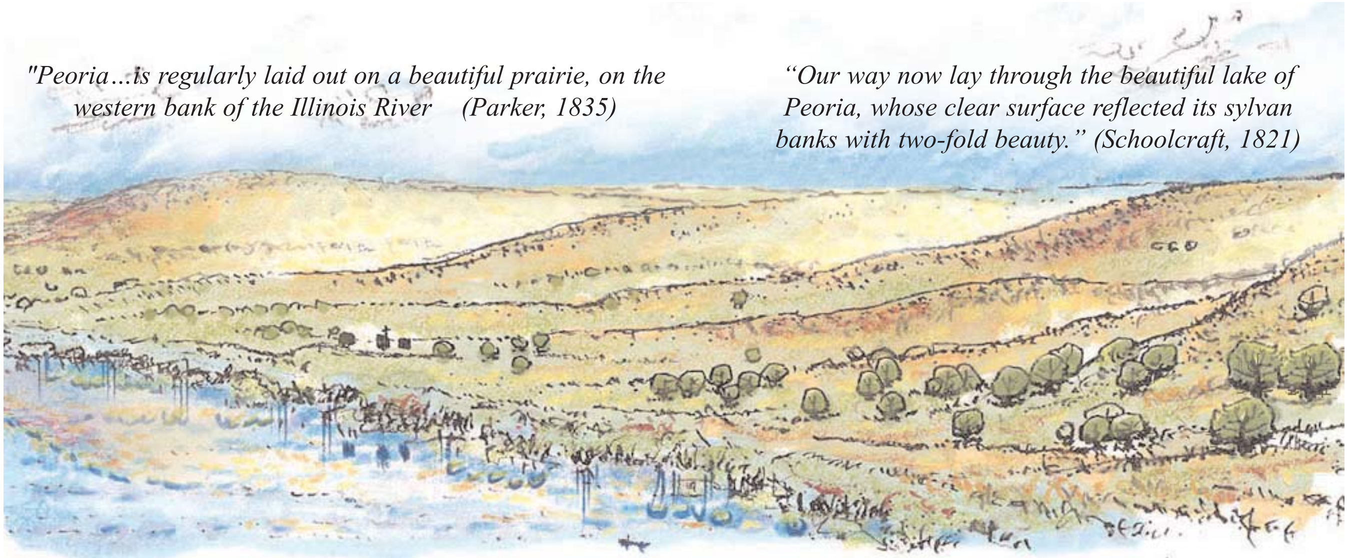


Figure 1. Lush prairie and savanna vegetation reflect in the once clear flowing Illinois River.

Early observers of the Mossville Bluffs region described the river, prairies and savannas along the Upper Peoria Lake as beautiful. They described the river as a beautiful clear flowing river lined with lush and diverse vegetation along the bluffs and ravines (Figure 1). This beauty was different than the beauty experienced along the bluffs today, but was observable throughout the seasons as a rich tapestry of native grasses, wildflowers, sedges and other plants, which held in place and perennially renewed the bluff's glacially derived soils.

The biologically diverse and beautiful area studied in this watershed master plan is outlined in Figure 2. The black line shows the 3,800 acre area that is studied here as the Mossville Bluffs Watershed study area. Appendix "C" includes an aerial photo of the watershed master plan study area and a watershed map that shows the tributary streams.

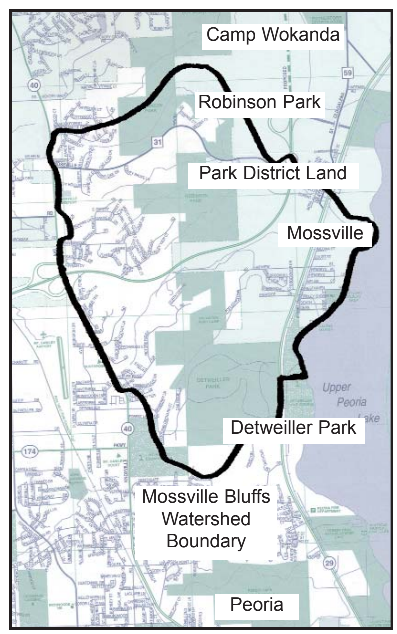


Figure 2. Mossville Bluffs Watershed Study Area (Map from Rand Mc Nally).

The Mossville Bluffs Watershed is under study due to its proximity to Peoria's critical growth area, and because there are many adjacent undeveloped slopes targeted for growth in the near future. This analysis aims to discover ways to restore and preserve the bluff's unique and inherent beauty, culture and natural environment.

Figure 3. The bluffs provide a desirable setting for home construction.

Though significantly altered over the years, the magnificence of the bluffs has attracted many to invest their time and savings to build homes along ridges (Figure 3). While the bluffs are indeed an attractive setting to build homes, the houses and associated infrastructure have not been designed, sited, and built in such a way as to sustain the long-term integrity of the bluffs or the houses. (Figures 4, 5, & 6).

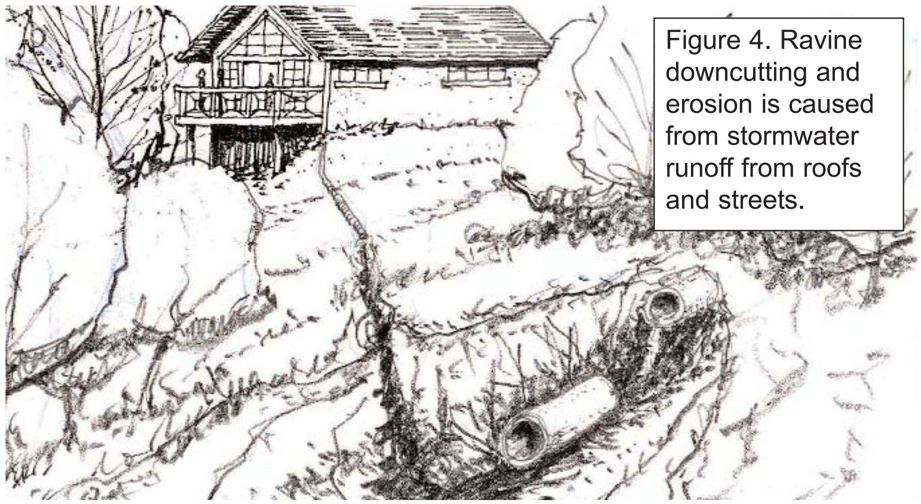


Figure 4. Ravine downcutting and erosion is caused from stormwater runoff from roofs and streets.

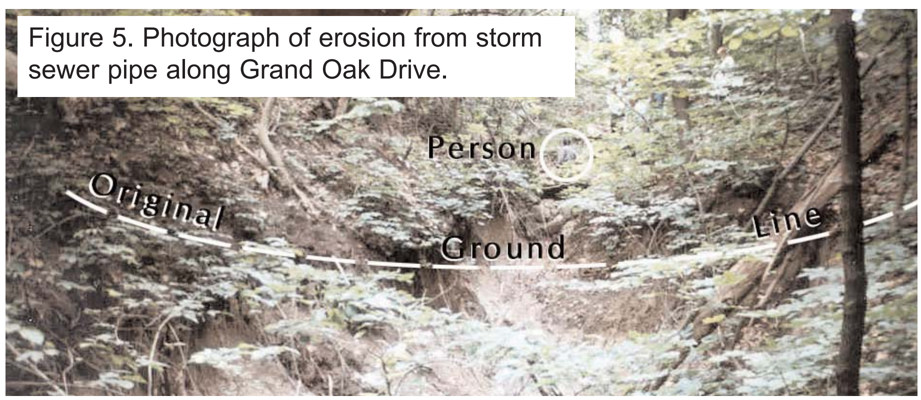
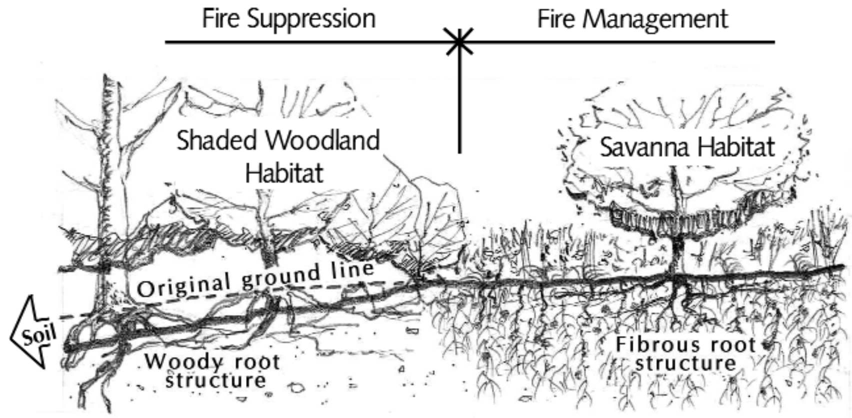


Figure 5. Photograph of erosion from storm sewer pipe along Grand Oak Drive.

Figure 6. Photograph of house at the top of a bluff with severe slope erosion below.

The river bluffs are comprised of soils that are very sensitive to erosion (Soil Map Appendix “C”). Historically, nevertheless, the slopes were quite stable (Figure 7). Slope stability was assured by the fibrous root systems of the dominant native plants of the prairies and savannas that characterized vegetation along the bluffs. The fibrous root systems were renewed every three years or so and provided a constant source of organic matter that enabled complete infiltration of most rainfall events. The integrity of the organic-rich soil, girded by its intensely

Figure 7. Fire suppression yields invasive woodland vegetation. The invasive species grow too dense and produce too much shade for the fibrous rooted vegetation that holds soil in place. Fire management of the Mossville Bluffs natural areas yields fibrous rooted native vegetation which holds soil in place.



intertwined root system, was safe from erosion - in part because there was so little surface water flow. Appendix “C” contains a compilation of the vascular plant species known to have inhabited the bluffs (still present at Detweiller and Robinson parks). The species list is huge, and contains a wide variety of native grasses and sedges. The high levels of diversity are rare for Illinois natural areas and indicate that portions of these two parks are very healthy and are of statewide importance.

One of the first principles for sustaining the river's bluffs is the restoration of the native plant communities.

Post-settlement fire suppression and overgrazing have damaged the structure of the bluffs through chronic and catastrophic losses of soil and biological resources. As fire was eliminated from prairie and savanna habitats, excessive tree-canopy density began to dominate the landscape and shade out the crucial native grasses and sedges. These species require about 15% of available light in order to produce organic matter in amounts that are in equilibrium with the rate at which it is oxidized. Under the heavy shade present today, the light levels at the ground are usually less than 1% of available light (Figure 8).

Consequently, the woodlands lost the native herbaceous groundcover that once stabilized the groundplain. The roots of the existing trees and shrubs do little to hold soil in place or to contribute to the production of organic matter, which is necessary to thwart soil erosion (Figure 7).

Figure 8. Photograph of shaded groundplain in Detweiller Park. Notice the lack of groundplain vegetation compared to the hillside prairie and savanna that once flourished here.

"The prairies are all burnt over once a year, either in spring or fall, but generally in the fall; and the fire is undoubtedly, the true cause of the origin and continuance of them. (Parker, 1835)

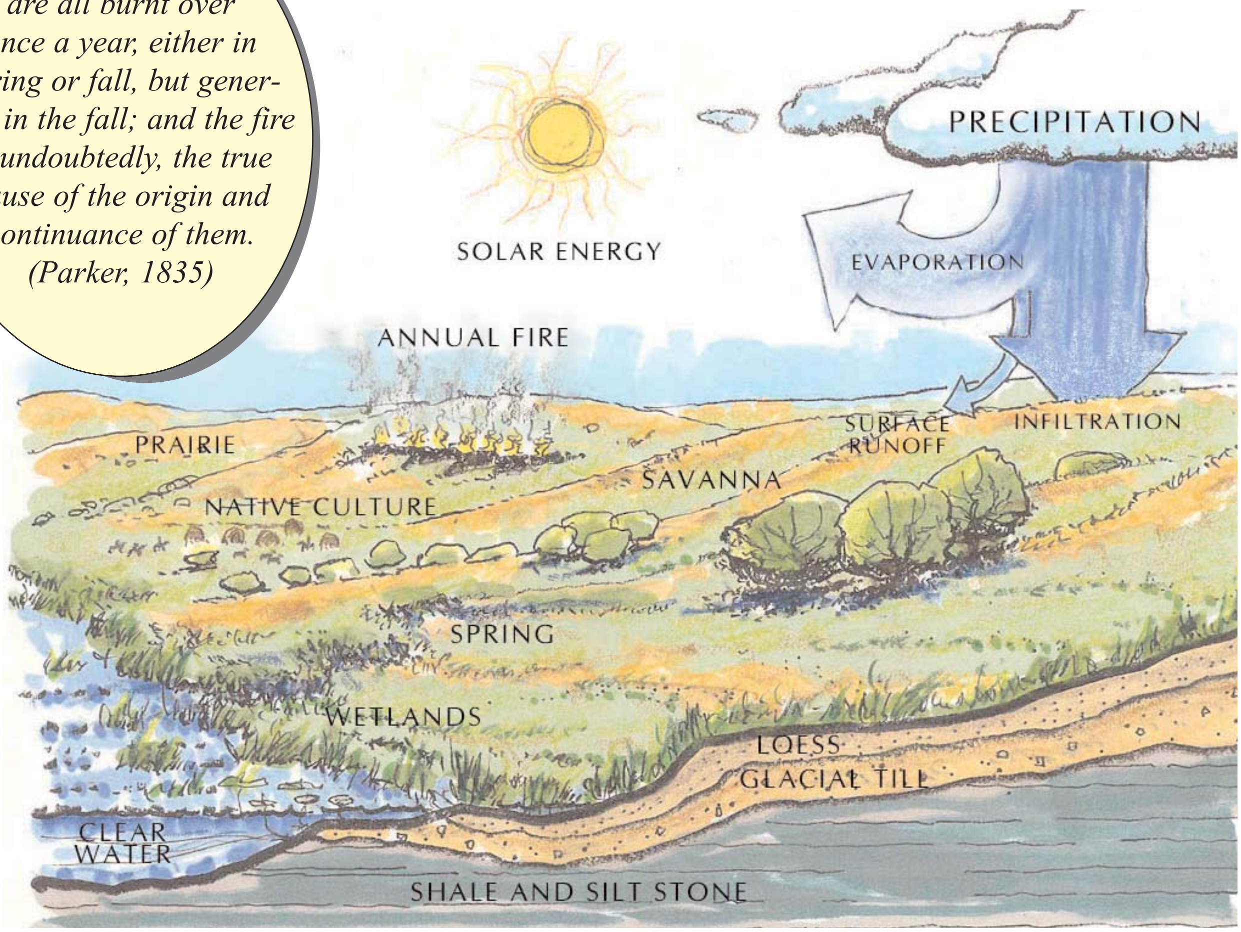


Figure 9. This diagram shows relationships between solar energy, precipitation, bedrock, soils, vegetation, annual fire, and clean water in Upper Peoria Lake. Note the proportion of precipitation that is evaporated, infiltrated through native vegetation and the insignificant amount of surface water runoff. This is the **Natural Rainwater Management Model**.

Prior to European settlement, rainwater was absorbed by the native vegetation and soil at the locations where rainfall fell. Because rainwater was infiltrated into the ground locally, it was distributed throughout the landscape below the ground surface. Prior to European settlement, the Native Americans set fire to the Bluff's vegetation nearly every autumn. Annual burning maintained this landscape as prairie and savanna. This is the natural rainwater management process that developed since the retreat of the last glaciers over 12,000 years ago. Two principles that ordered rainwater in this native habitat include *infiltration* and *dispersion*. The native vegetation infiltrated rainwater where it fell in a dispersed pattern. This process has been labeled the **Natural Rainwater Management Model** (Figure 9). This model is achieved when rainwater infiltrates deep into the soil wherever it falls at every location within a particular watershed.

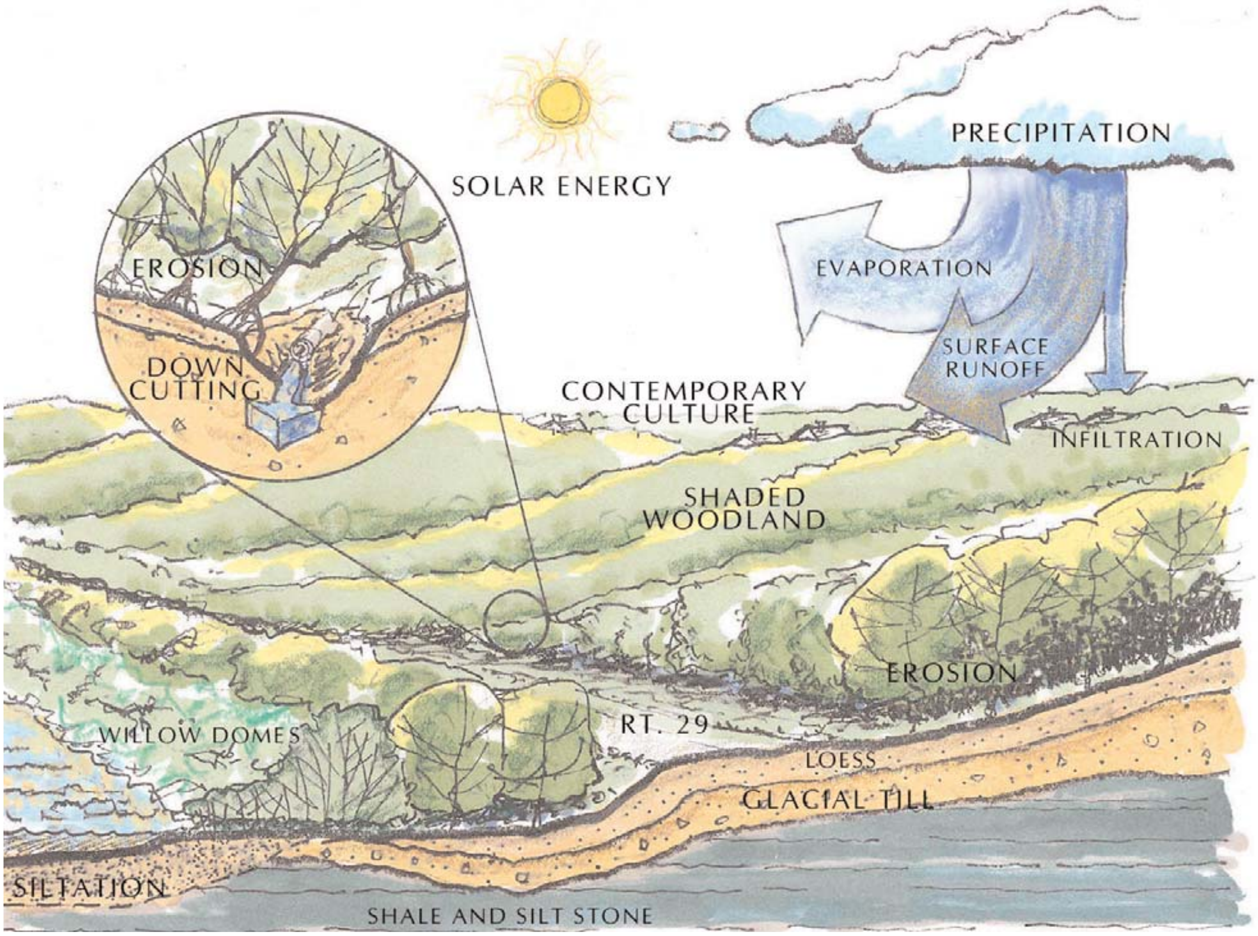


Figure 10. This diagram shows relationships between solar energy, precipitation, bedrock, soils, vegetation, fire suppression, erosion, deposition, and siltation of Upper Peoria Lake.

Note the proportion of significantly less precipitation that is infiltrated through woodland vegetation and contemporary development, and the significant amount of surface runoff and siltation as a result. This is the **Contemporary Rainwater Management Model**.

Contemporary landscape management has disrupted the natural model (Figure 10). Vegetation native to the Mossville Bluffs has been altered by fire suppression, grazing, and shading by invasive woody vegetation. Soils have lost their organic matter as fibrous rooted vegetation has been shaded by invasive trees and shrubs. The organic soils now lie at the bottom of Peoria Lake and the Illinois and Mississippi rivers. The remaining soils are significantly diminished in organic matter, and therefore absorb less water and are more susceptible to erosion.

Contemporary stormwater management practices have disrupted the natural model. The contemporary stormwater model, as influenced by current codes and ordinances, collects water and discharges it at discrete points with destructive energy (Figure 11). Contemporary stormwater practices shed rainwater from lawns, roofs, streets, drive-

Figure 11. Concentrated rainwater discharges from impermeable stormwater pipes.

ways and parking lots throughout the watershed down to Upper Peoria Lake. Even the smallest areas of lawn can contribute to significant erosion of the Bluffs (Figure 12). Gutters and downspouts concentrate rainwater from roofs and discharge water directly down into ravines. Direct runoff from streets contributes a considerable amount of damage to ravine systems. Water is collected in mown grass swales or curb and gutter systems and discharged directly into ravines. Driveways and parking lots also contribute a significant amount of impermeable surface that directs stormwater into ravines. The **Contemporary Rainwater Management Model** (Figures 10 & 13) is achieved wherever rainwater is collected and discharged at discrete points. The prescribed principles that order rainwater in this model are *collection, concentration,* and *discharge*.

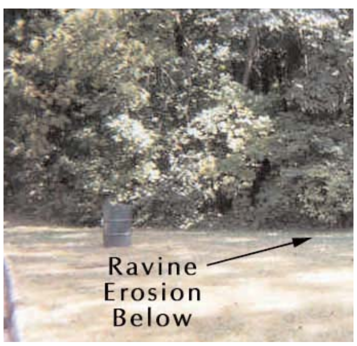


Figure 12. Concentrated rainwater flows across lawn (top) has cut the deep channel exposing tree roots (below). The erosion is due to the lack of fibrous roots to hold soil. Soil that once covered these roots is now sediment at the bottom of the Illinois River.

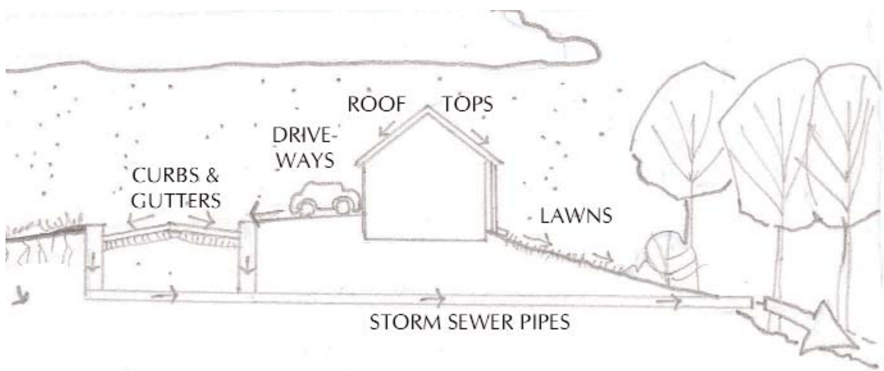


Figure 13. Image shows the collective contribution of concentrated rainwater from streets, driveways, roofs, lawns, & impermeable stormwater pipes.

Further, contemporary planning processes have not taken into account the sensitivity of the bluff and ravine system. They are based upon the assumption that the system is stable and that current standards can solve these complex environmental problems (Figure 13, 15 & 16).

The consequences of widespread application of the Contemporary Rainwater Management Model has been severe degradation of the bluff and ravine system that will continue to fail. Evidence of degradation is found in the erosion of the bluff's slopes and down-cutting of the

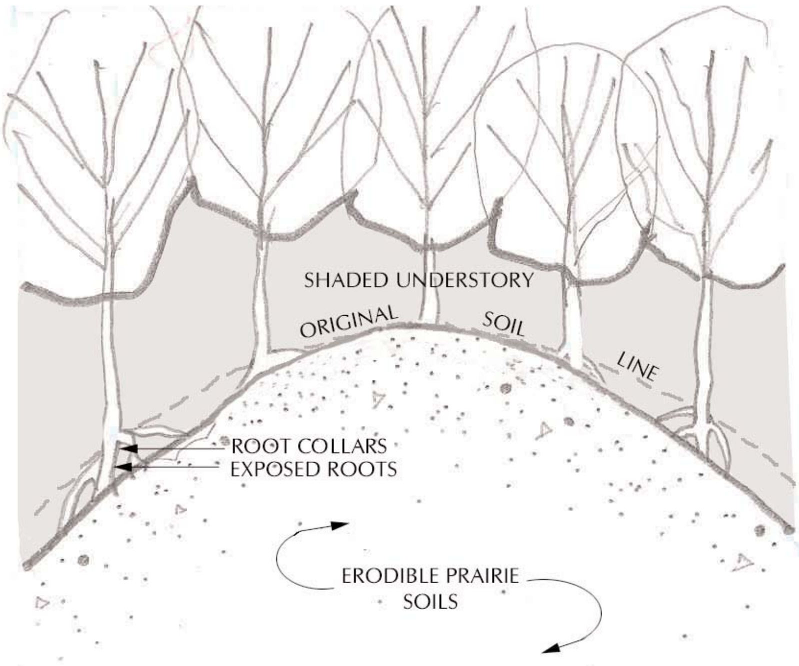


Figure 14 (left). Image shows effects of heavy shade on the groundplain. Root collars are exposed from excessive erosion of soft glacial soils.

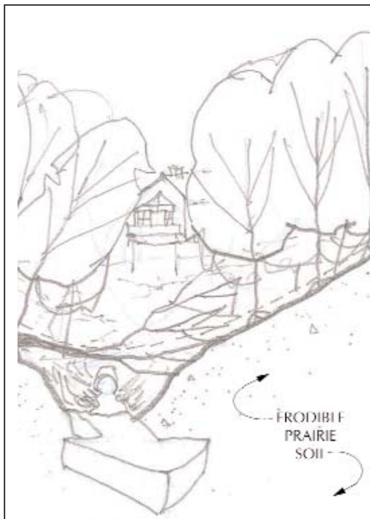


Figure 15. Image shows the collective contribution of concentrated rainwater from streets and the cutting the soft glacial soils.

ravines (see Appendix "C" for slope analysis). Throughout the wooded areas of the watershed, root collars at the base of tree trunks are exposed. The root collar is the point where the ground surface and tree roots meet. An exposed root collar is evidence of soil loss (Figures 12, 14 & 15). Healthy trees would not exhibit this type of soil erosion from the base of the root collars.

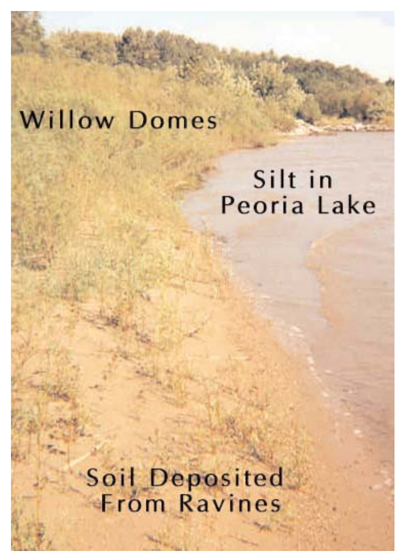


Figure 16 (above). Photograph shows soil deposits, willow domes and silted water. The source of at least 80% of this soil is from Mossville Bluffs.

Ravine downcutting at the rates observed today is not a natural phenomenon for the Mossville Bluffs. As described in the Natural Rainwater Model, the ravines were once covered with fibrous rooted prairie and savanna vegetation. Rainwater was absorbed into the ground where it fell. Water did not run across the surface and collect in ravines. The ravine bottoms were likely moist, but there was little to no surface flow, except for areas where natural springs emerged. The source of spring water is from rainwater that infiltrated into the ground above the slope. If it was a natural condition for water to flow through the ravines along the surface, 12,000 years of surface flow would have turned the Mossville Bluffs into a deep craggy system similar to the Badlands of South Dakota rather than the young, rounded

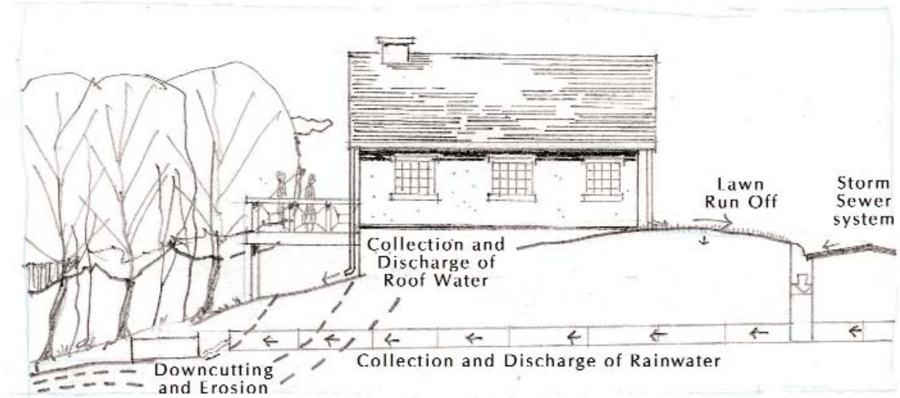
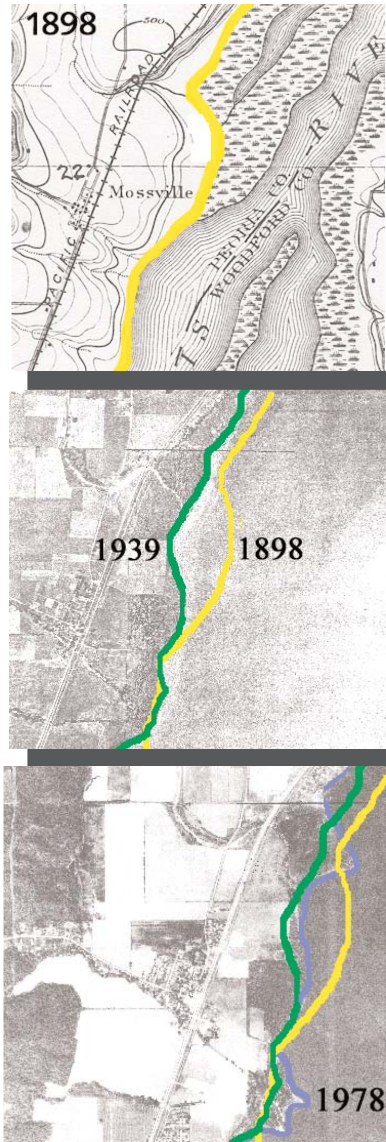


Figure 17 (above). Diagram shows contemporary rainwater management and its effects on ravines and slopes.



The map at top is Upper Peoria Lake at 1898. The middle photograph is from 1939 with a yellow line to show the previous shoreline. The construction of dams initially raised the water level. However, as shown in the bottom image (from 1978), the blue line shows delta formations accumulated from soil eroded and deposited from ravines and bluffs. Notice the extent of riparian wetlands once visible in 1898.

hills that were reported by early scouts and still largely present today. In only 20 to 25 years time, huge channels 20 to 30 feet wide and 10 to15 feet deep have been eroded. Much of this has resulted from point source discharges from concrete storm sewers (Figures 5 & 17). The instability of the ravines is threatening to family investments and the ability of families to sustain their homes on the bluffs. Some homeowners have begun to fill in slopes with riprap, yard debris, and other materials in an attempt to slow soil erosion (Figure 18). Until principles from the Natural Rainwater Management Model are emulated, soil erosion will continue to threaten and undermine homes and infrastructure.

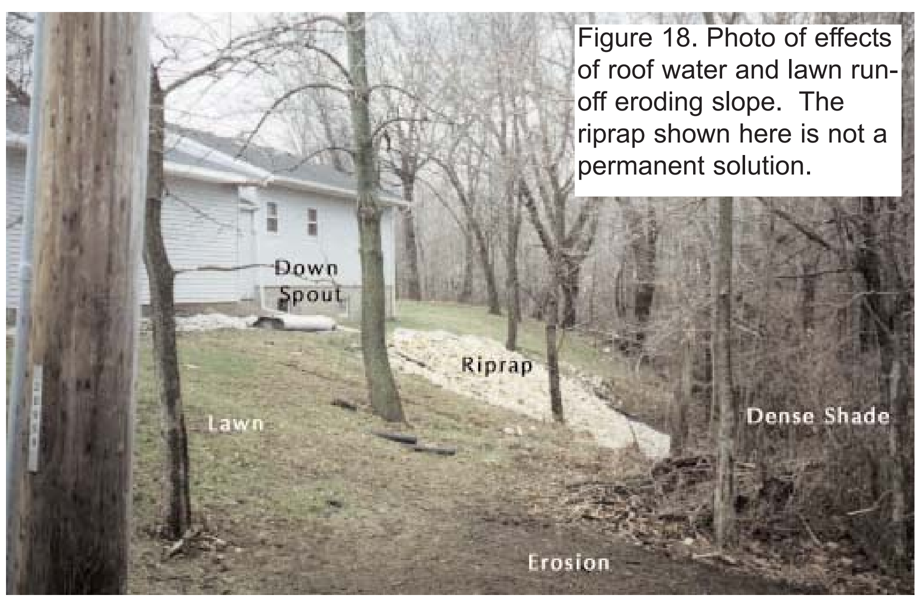


Figure 18. Photo of effects of roof water and lawn runoff eroding slope. The riprap shown here is not a permanent solution.

Figure 19 (left). Photograph of opened woods in Detweiller Park. Notice the deep and fibrous rooted vegetation that re-emerged by selective cutting of trees and prescribed burning of the vegetation. The groundplain vegetation shown emerged from the natural seed bank that lay dormant in the soil.

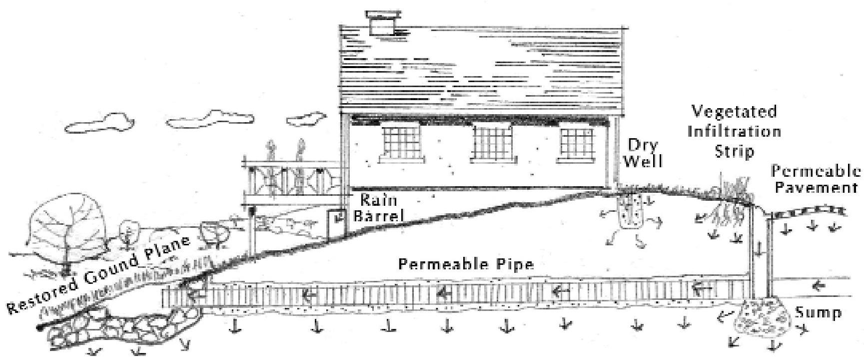


Figure 20 (left). Diagram shows the implementation of devices and management practices that emulate the Natural Rainwater Management Model that will be described in Chapter 2.

Figure 21 (left). Photograph of restored hillside prairie in Robinson Park. Groundplain vegetation is from natural seed bank. Visitors will find little to no erosion on these steep slopes covered with a diverse habitat of native plants, insects, birds, and other wildlife.

To restore bluff stability, beauty, and diverse habitats, water management practices must seek to emulate the Natural Rainwater Management Model (Figures 19, 20 and 21). These concepts are illustrated more thoroughly in Chapter 2.

"From whatever cause the prairies at first originated, they are undoubtedly perpetuated by the autumnal fires that have annually swept over them from an era probably long anterior to the earliest record of history." (Ellsworth, 1837)

Chapter 2 - Watershed Master Plan

This section outlines strategies to implement the Natural Rainwater Management Model within the Mossville Bluffs Watershed. Tools are presented to demonstrate principles for landscape management, Planned Unit Developments (PUDs) and Planning Best Management Practices (BMPs), Stormwater Management BMPs, and ravine restoration scenarios.

Landscape Management

Chapter 1 describes how the ordering principles of rainwater dispersion and infiltration, versus collection, concentration, and discharge, can influence an entire watershed's function and sustainability over time. The sustainable management of a watershed's landscape essentially means the identification and application of appropriate methods to infiltrate rainwater at locations where it falls. This section presents various ways to emulate the Natural Rainwater Management Model within the Mossville Bluffs Watershed.

Managing Vegetation

There are several approaches one could take to manage vegetation within the Mossville Bluffs Watershed study area. Each management approach has significantly different impacts to the long term health of the watershed. A typical approach would be to maintain the bluffs as conventional parkland with mown grass and trees. This approach would not restore a diversity of vegetation but instead maintain a very limited selection of non-native plant species. This approach requires significant maintenance (mowing, herbicide, etc.) and a steady supply of fossil fuels (mowers, petroleum based fertilizers, etc.).

Another approach would be to "do nothing" to maintain the ravines. The Contemporary Rainwater Management Model described in

". . . prairies have been produced by the Indian practice of firing the herbage annually, and thus eventually destroying the grown timber as well as inferior plants." (Featherstonhaugh, 1844)

Chapter 1 represents this "do nothing" approach. This model produces a succession of closed canopy shrubs and trees. Although cheaper initially, the "do nothing" approach is also a very expensive approach, because it wastes away valuable topsoil, groundwater recharge, biotic diversity and eventually creates loss to personal property, buildings and infrastructure. This is the current management technique for the majority of the Mossville Bluffs Watershed.

Prairie and savanna restorations represent another vegetation management practice also present within the watershed today (in a very small percentage of the total acres). A well-maintained, stable native landscape provides significant groundcover, and absorption and infiltration of stormwater, thereby reducing runoff and soil erosion. Controlled burning is the most critical stewardship element used to maintain a native landscape in perpetuity. Maintaining the native vegetation with fire is also much less expensive than the conventional parkland approach.

In general, the fire suppression in the post-settlement era has degraded and simplified the ecosystem of the Illinois River Valley. The restoration work at Robinson and Detweiller parks (see Appendix"C" for plant species list), begun by practitioners of the Peoria Park District, has shown ways to emulate the Natural Rainwater Management Model

Figure 22. Prescribed and controlled prairie burn.

and diversify the ecosystem. Their selective removal and cutting of trees (Figure 19) or extensive removal of trees (Figure 21) has opened up the groundplain to sunlight. As previously mentioned, about 15% of available light must reach the ground, to support a healthy native flora. Presently, the woodland excludes more than 99% of the light available on a mid-July day. Once opened up, the routine application of controlled burns will restore the solar energy that is required to nurture native plants and create the proper proportions of fibrous root system and soil organic matter (Figure 22).

This restoration work within the Mossville Bluffs Watershed has revealed some exciting results. Through only the removal of non-native plants (predominantly trees) and annual burning of the groundplain, many species native to the area have regenerated from dormant seed stock left behind in the soil. Over 444 species of plants have been found within Robinson and Detweiller Parks (See Plant Species List in Appendix "C"). This number of species for the areas identified represent a very high level of restoration potential. This indicates that remnant seed stock is likely present, in many of the areas not currently managed. With each passing year, more soil is eroding away and remnant seed stock is being lost. When the plant species diversity is maintained, little runoff will occur. Proof of diversity within the restoration areas is the presence of an Illinois threatened species. So far, one Illinois threatened species, *Aster schreberi* (Smooth Forked Aster), has been identified within one of the landscapes restored. In general, threatened species are very selective of their habitat. Only future expansion of restoration efforts will reveal if other Illinois threatened species lie dormant.

The Peoria Park District sites represent but a fraction of the amount of land in need of restoration and sustainable landscape stewardship. Also needed is the design and implementation of a monitoring program.

Monitoring is needed to document an accurate assessment of the effectiveness of sustainable landscapes in rainwater absorption within this watershed.

Planned Unit Developments &
Planning Best Management Practices

Aside from sustainable management of vegetation, there are many other opportunities to restore and sustain the watershed through the City's Planned Unit Development (PUD) process and the implementation of Planning Best Management Practices (BMPs). PUDs require developers to present a proposed land development plan and take it through a design review process. Through the PUD process, and adoption of ordinances that require the BMPs in this master plan, City and County staff can ensure that projects conform to sustainable rainwater management practices. Suggested planning BMPs include buffers and easements, open spaces and greenways, and the other techniques described below.

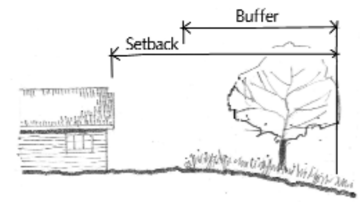


Figure 23. Diagram shows the difference between a setback, and buffer.

Buffers and Setbacks

Communities can protect sensitive landscapes through the creation of buffers and setbacks. A buffer is a green space landscaped with beneficial plants, whereas a setback is the prevention of buildings and structures from encroachment upon sensitive land. Lawns and yard amenities may occur within the setback but not within the buffer.

Buffers and setbacks can be used to protect critical areas such as ravines, wetlands, stream corridors, lakes and ponds. Establishment of setbacks adjacent to critical areas restricts or prohibits new development within the setback zone. This mechanism helps to protect the natural resource from potential direct and indirect adverse impacts from adjacent development (Figures 23 & 24).

Figure 24. Photograph shows reduction in front yard setback to reduce amount of impervious surface in service sidewalks and driveways.

Narrower side yard setbacks and lot widths can help to reduce the total amount of paved roads for the development. The reduction of front yard setbacks will allow for deeper rear yards and improved opportunities for the infiltration of water. It is, however, essential to combine architectural guidelines with modification of setback requirements to ensure attractive, pleasant streetscapes. Conventional garage-forward homes moved closer to the street can result in a monotonous, unfriendly streetscape.

<u>Open Spaces & Greenways</u>

Open spaces and greenways can easily be incorporated into developments, whether residential, commercial, industrial, or mixed-use (Figure 25). Inclusion and incorporation of contiguous open spaces and greenways can provide many benefits. The allowance and creation of open spaces provides land for wetlands, ponds, and prairies to perform their natural functions that protect and preserve natural systems and assist with the protection of ravines, increased wildlife habitat, and the improvement of water quality. These open spaces and greenways can also protect floodplains and act as flood storage and groundwater recharge areas. Open spaces and greenways should be designed to maximize rainwater infiltration. The infiltration of precipitation where it falls diminishes the amount of required stormwater infrastructure and reduces risks of local flooding, ravine erosion, and the transport of polluted water downstream.

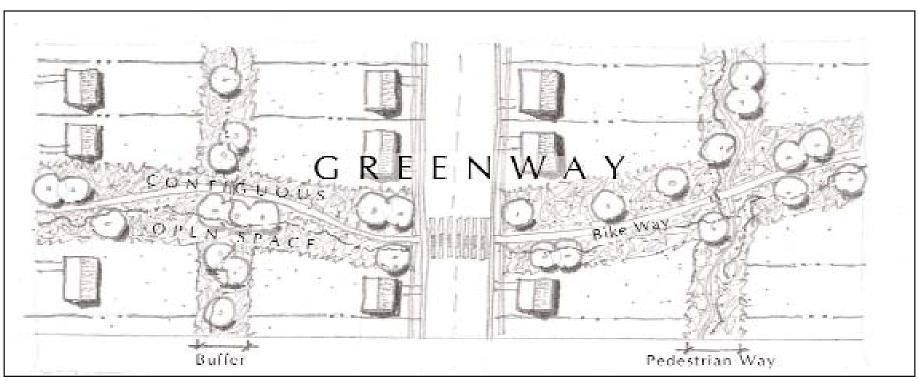


Figure 25. Depiction shows how greenways, as contiguous open space, provide for rainwater infiltration. Wide open space allows for shallow swales and other infiltration devices that can absorb rainwater where it falls.

Minimize Impervious Surfaces

Although conceptually simple, it is not always easy to greatly reduce the amount of impervious surface in contemporary developments. With the application of concepts such as reduced road widths, shared parking, and mixed-use development, acres of impervious surface can be minimized.

Reduced Road Widths: Wide residential streets are typically required by most subdivision ordinances and significantly increase the amount of impervious surface area in a landscape (Figure 26). Wide residential streets are usually the largest component of impervious cover within a subdivision. National engineering organizations, including the American Association of State Highway and Transportation Officials (AASHTO) and the American Society of Civil Engineers, have recommended that residential streets can be as narrow as 22 feet for areas that produce low traffic volumes (less than 500 daily trips or 50 homes). This width accommodates emergency and maintenance vehicles and provides no more pavement than is necessary.

Bucks County, Pennsylvania, has successfully implemented narrow streets for residential areas. They allow, for example, street widths of 20' to 22' with no parking for residential areas with 200 to 1,000 maximum average daily trips and 28' widths with parking on one side for the same average daily traffic numbers.

Total street length is another element that leads to increased impervious cover. The focus in street layout should reflect the shortest street network needed to serve individual lots, not just the movement of automobile traffic.

Shared Parking: Shared parking is the concept of locating uses that have alternating intensities of traffic within close proximity to each

FHA Administration (Flexibility in Hwy Design, 1997), states that narrower streets typically reduce travel speeds and therefore reduces the incidence of potential accidents as well as the severity of injuries sustained in accidents.

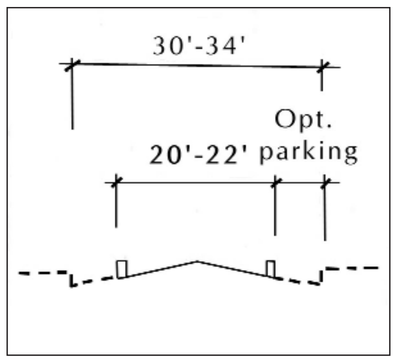


Figure 26. Depiction shows the reduction in impervious surface through the reduction of roadway surface.

other, such as a church and an office building. A plan that utilizes an interconnected network of streets with on-street parking coupled with the siting of compatible uses such as these can help minimize paved surfaces (Figure 27).

Encourage Mixed-Use Development

Mixed-use development simply permits a variety of land uses to occur within a neighborhood or community. By including shops, office space and residential living quarters within the same building or development, the associated infrastructure usually can be reduced. More importantly, transportation alternatives such as walking and biking become possible, which reduces the pressure of automobile traffic on streets and makes for safer, more pleasant, human-scaled places.

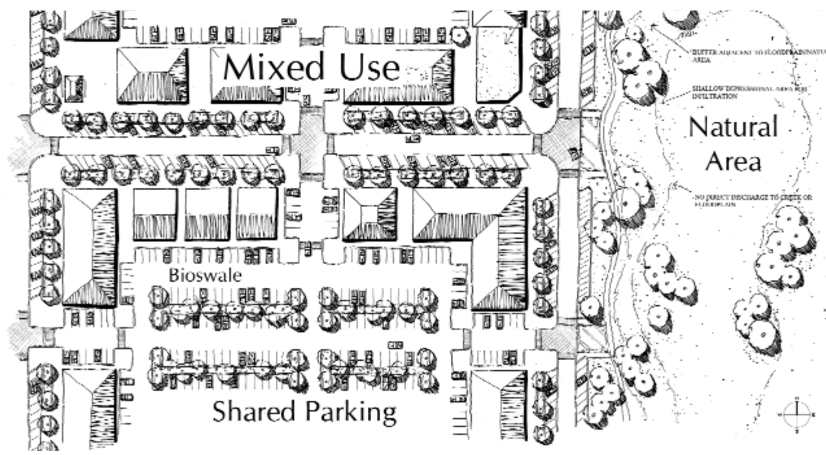


Figure 27. Depiction shows relationships between shared parking and mixed-use developments, and the use of bioswales and natural area open spaces for rainwater infiltration.

Cluster Development

Cluster development is a compact form of development that concentrates density only on portions of a project site. This type of design can provide incentives for the preservation of large contiguous natural areas and common open spaces. A well designed cluster plan can result in benefits for water resource management that include: less street length, (thus impervious cover reduction); expanses of open space that can be incorporated into the stormwater management design (to infiltrate and filter runoff); and the protection of sensitive natural systems.

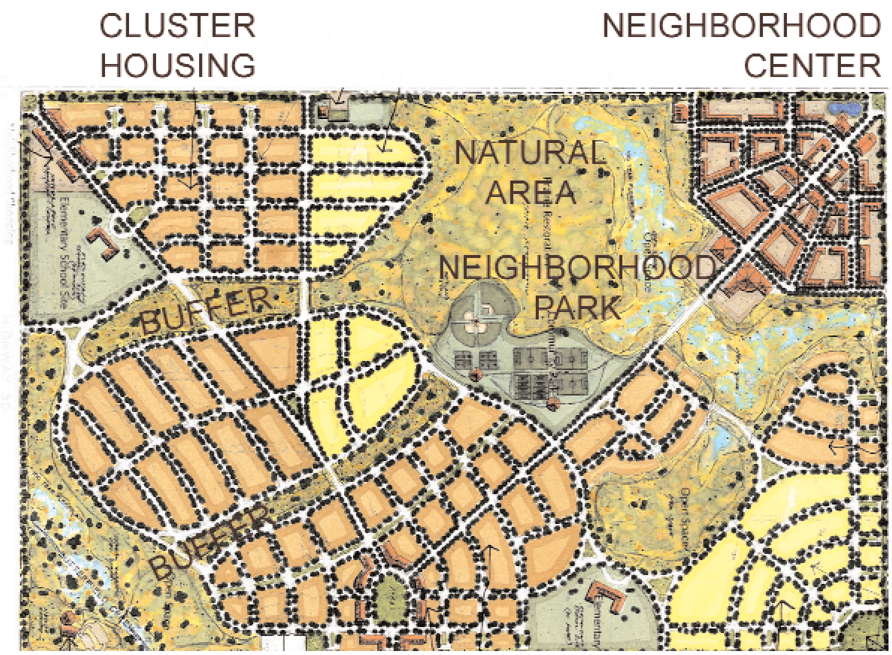


Figure 28. Depiction shows application of cluster development to allow for natural area, buffers, neighborhood parks, neighborhood centers and clusters of housing. By clustering housing, shared open space is designed and managed to function in accord with the Natural Rainwater Management Model.

Clustering development simply means putting the same number of homes in a particular development onto less area of developed land. This creates more contiguous open space, and thus keeps a community from sprawling (Figure 28). Traditionally planned towns and villages, and many of the ideas expressed in the design concepts of New Urbanism are, in fact, true clustering.

New development in the the Mossville Bluffs Watershed should employ clustering principles (some neighborhoods currently are). In the upper reaches of the watershed, it is imperative that homes or buildings are not sprawled across the bluffs. In the lower reaches, new development should cluster to take advantage of open space for the infiltration of rainwater. Clustering is very applicable to the lower watershed because conventional development would likely sprawl. By clustering, space is made available for parks, natural areas, greenways and multi-use paths (e.g. pedestrians and bicycle connections to development).

Figure 29. Photograph shows a back yard converted to prairie.

Stormwater Management Best Management Practices

Along with the restoration and long-term stewardship of Mossville's bluffs and ravines, modifications must be made to built landscapes and existing stormwater infrastructure so that it emulates the Natural Rainwater Management Model. There are both old and new technologies and design strategies that disperse and infiltrate rainwater. This section presents a range of Best Management Practices (BMPs) that can be used to disperse and infiltrate rainfall draining from lawns, roofs, streets, driveways, and parking lots.

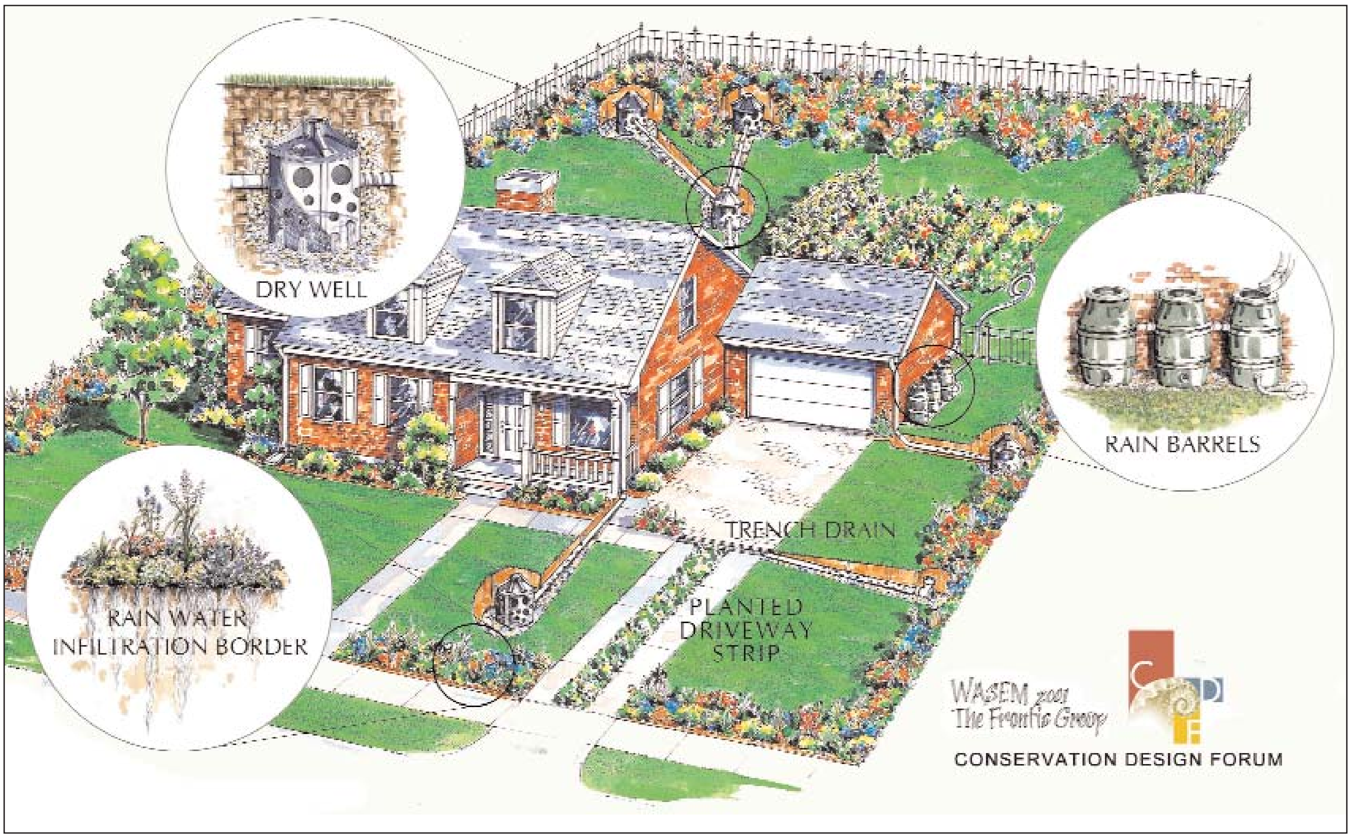


Figure 30 (above). Image of residential property with border planting, dry wells, rain barrels, infiltration trench, planted strip in driveway.

Appropriately used, BMPs have great potential for infiltrating rainwater, but consideration should be given with regard to the potential for contamination of groundwater resources and the reduction of infiltration during winter months when the ground is frozen. Infiltration systems should be designed with consideration of the following criteria:

1). Generally, infiltration should be used only in relatively permeable soils. Appropriate soils would be those identified by USDA Natural Resource Conservation Service with a hydrologic classification of A or B soils and C under certain conditions. The Peoria County soil survey indicates that the soils throughout the Mossville Bluffs Watershed are "B" soils (see Appendix "C" for a map of the Mossville Bluffs Watershed soil category classifications).

2.) Devise pre-treatment measures (e.g., filter strips or vegetated swales), to remove sediments that can clog and cause failure of the system. The bed of the infiltration system should be at least 3 feet above the seasonal high water table, bedrock or an impermeable soil layer.

3). The percolation rate as determined from field test should be at least 0.3 to 0.5 in/hr and not be greater than 2.4 in/hr to avoid contamination of groundwater by stormwater pollutants.

4). Infiltration systems should not be constructed on fill material or on a slope greater than 15 percent.

5). Construction techniques that minimize soil compaction or sub-surface ripping of the soil could be necessary to ensure soil permeability.

6). Do not rely only on infiltration systems to handle all run-off. Use as much of the ambient landscape as feasible to absorb run-off.

The Peoria County soil survey indicates that soils throughout the Mossville Bluffs Watershed are "B" soils (and should provide adequate percolation).

Lawns

Typically, lawns are maintained very short. Unfortunately, the shorter the turf, the shallower the root system. By simply letting turf grow from 1.5" or 2" high to 3" or 4" high, root masses will enlarge and allow more rain to be absorbed. Even turf maintained at 3" or 4" high however, will not typically infiltrate enough rainwater to prevent runoff. Because of this, most lawns in the Mossville Bluffs Watershed, drain rainwater and contribute to bluff erosion. Establishing simple border plantings of deep and fibrous rooted plants at the edges of residential properties could significantly help absorb rainwater (Figures 30 & 31). Where the backyard is adjacent to a natural setting, a majority of a yard can be converted to prairie (Figure 29). A list of plants native to the Mossville Bluffs is presented in Appendix "C".

Figures 31 (below). Photograph of deep and fibrous rooted vegetation along borders.

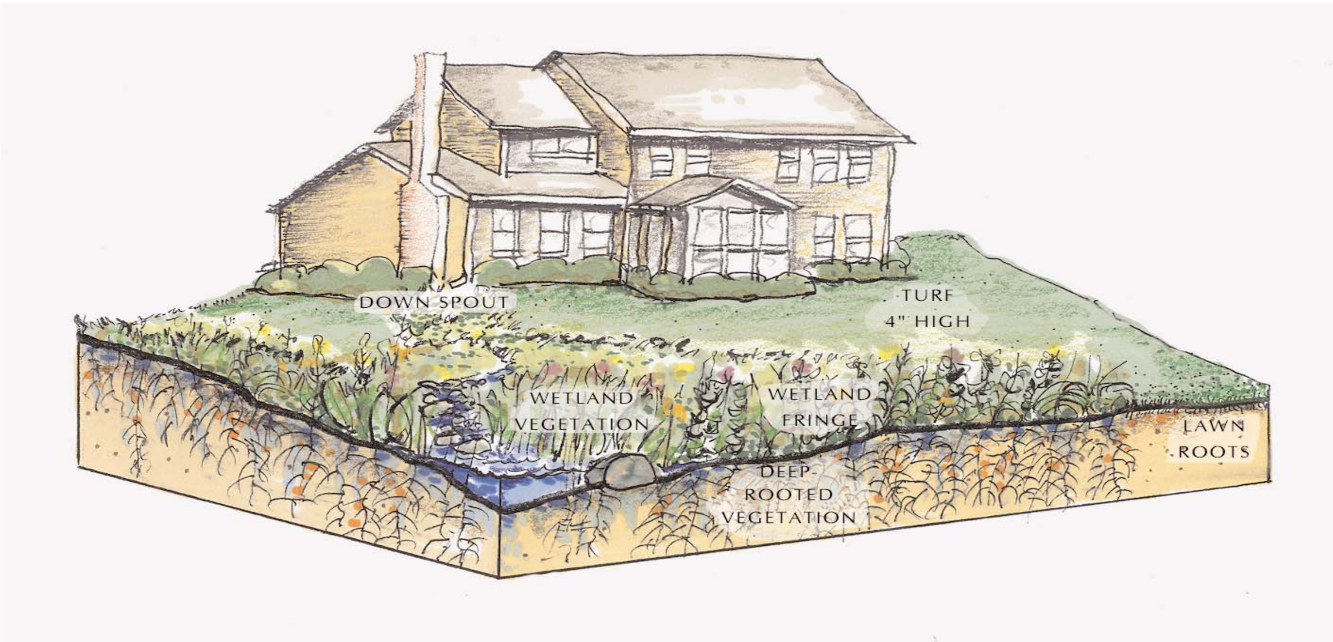
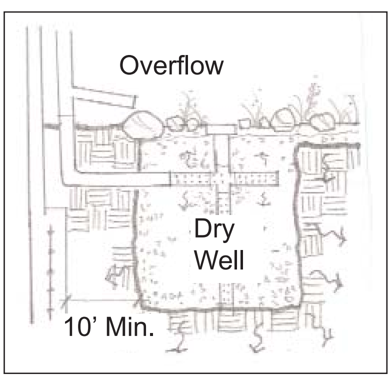


Figure 33 (above). Depiction shows existing residence with the addition of a Rainwater Garden. Rainwater Gardens can detain and infiltrate rainwater from roofs, lawns, patios or other impermeable surfaces.

Roofs

Rooftops typically cover 30% to 60% of residential lots. Where flat roofs can hold or detain rainwater, pitched roofs rapidly send rainwater into gutters. Typically, the water is discharged into downspouts, across lawns, and into streets or ravines. Roof water can be abated with several techniques: rainwater gardens, rain barrels, dry wells, and backyard prairies (Figures 31 & 33).

Figure 34 (below). Cross section shows downspout connection to dry well. Notice overflow pipe. Over flow pipes can be connected to rainwater gardens or other infiltration devices.



Rainwater Gardens: Rainwater gardens are constructed to detain, infiltrate, and cleanse water draining from roofs, lawns, patios or any impervious area (Figure 33). Rainwater gardens should be located at least 10 feet from building foundations to avoid seepage. Swales can be created with a variety of materials including stone, gravel, sand, and deep and fibrous rooted plants that can tolerate wet and dry conditions. Meanders can be added to a swale to prevent water from rushing off the property as can shallow detention pools lined with wetland vegetation. Rainwater gardens can be formalized by adding stone, sculpture or other garden ornaments.

Rain Barrels: Rain barrels capture and store rainwater from downspouts (Figures 30). They are inexpensive and easy to install and can go a long way toward attenuation of stormwater runoff. Water stored in rain barrels can be used at a later time to irrigate gardens, lawns, or be used in water features and fountains.

Dry Wells: Dry wells are infiltration pits that can be used to collect rooftop runoff (Figure 34). When appropriately sited, they reduce the amount of runoff that reaches storm sewers. Dry wells are most commonly used for small sources of runoff such as roof drains, small parking lots, and tennis courts. They require permeable, well-drained soils in order to be effective. They are not, however, recommended for use on a slope greater than 15% and should be set back from edges of ravines. They should be located at least 10 feet from building foundations to avoid seepage into basements.

Green Roofs: Green roofs, refined in Germany and Europe over the past 40 years with new lightweight technologies, can be incorporated onto either new or existing rooftops. Green roof construction consists of several layers of materials that include lightweight drainage material, lightweight soil mixtures, and vegetation selected specifically for the location. Integrated green roof systems are becoming much more affordable to the typical property owner.

Green roof systems can significantly reduce rooftop runoff. They can act as a sponge to reduce total runoff volumes anywhere from 50% to 100%. The vegetation used on green roofs varies depending upon the weight capacity designed into the roof structure and whether the roof is pitched. Existing commercial structures with flat roofs that can support an additional 15-25 pounds per square foot should be able to support simple green roof systems that consist of 2"-3" inches of lightweight soil. Generally, the thicker the green roof, the more benefits it provides.

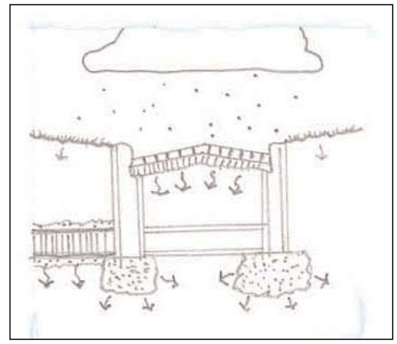
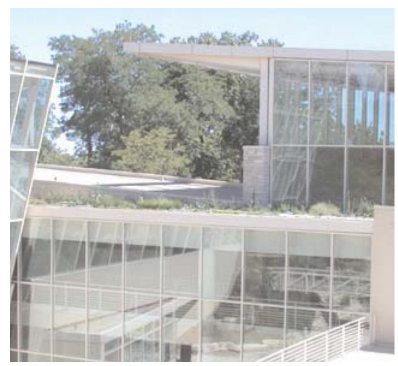


Figure 35 (above). Depiction shows infiltration from permeable pavement, dry well inlets, and permeable pipes. See Appendix A for details.

Figures 36 & 37 (below). Images show green roof technology. Photograph of green roof pilot project at the Peggy Notebaert Nature Museum (Chicago, IL).



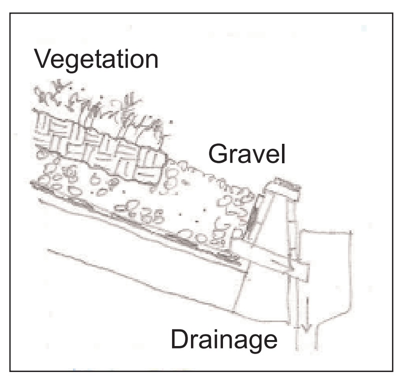


Figure 38 (above). Interlocking porous pavement infiltrates water through small square openings (installed at Dominican University, River Forest, IL).

<u>Streets</u>

Street designs can emulate the natural model when they are constructed with permeable pavements, and/or vegetated swales. Typically, residential streets are paved with asphalt or concrete and shed nearly 100% of rainfall. The following BMPs can make significant reductions to the amount of runoff from residential streets.

Permeable Pavers: Permeable pavers now are manufactured for residential streets (Figures 35, 38, 39 & 40). Manufacturers have produced paver systems that can infiltrate up to the first half inch and more of precipitation, and depending upon the design, up to 100% of most rainfall events. Every 7 to 10 years, asphalt streets need to be re-paved due to cracks, potholes and daily wear. Though currently between two to three times the cost of asphalt, permeable pavers are a more permanent and maintainable paving surface that allow for inexpensive and easy access to buried service utilities.

Figure 39. Photograph showing permeable paving system for residential driveway (Elmhurst, IL).

Permeable pavers are very durable. Simple modifications can be made to snow plows for winter street maintenance. Considering the amount of area dedicated to paved streets in most developments, conversions to permeable systems could make significant reductions to runoff.

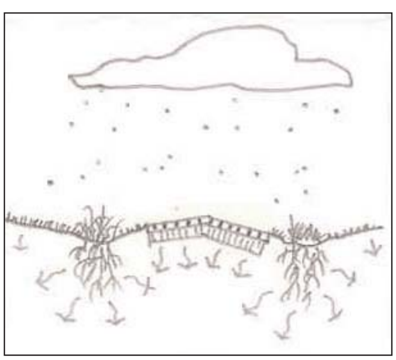


Figure 40. Depiction shows cross section of residential street converted with: permeable paving, and deep and fibrous rooted vegetation in shallow swales.

Permeable paving systems can be divided into three categories: cast-in-place concrete slabs, pre-cast concrete grids, and modular unit pavers. Cast-in-place concrete slabs cover large areas and are suitable for heavy loads. Pre-cast concrete grids have a high percentage of permeable surface. Modular unit pavers can have voids manufactured into the block. Permeable paving can also be done with standard paving blocks installed on a base of permeable material with gaps between the blocks.

The manufacturer's specifications will determine the appropriate application and effectiveness of each type.

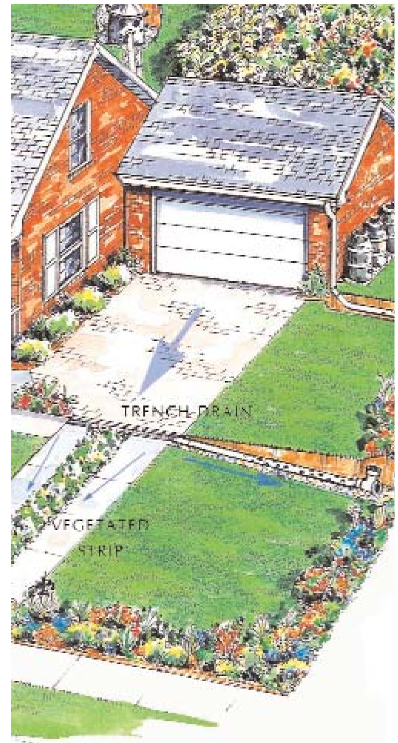


Figure 41 (above). Depiction shows application of trench drain in driveway, and vegetated driveway strip.

Manhole Conversion: Manholes present opportunities for infiltration. If or when manholes require replacement, installing rock and gravel sumps at the bottom of porous manholes allows for rainwater infiltration (Figure 35 & Appendix A for detail drawings).

Vegetated Swales: Streets with curb and gutter stormwater systems can be modified or retrofitted to allow more infiltration at strategic locations. Streets without curbs or with tactically deployed curb cuts (Appendix A) and the use of swales or ditches to absorb water from streets can attenuate storm runoff. Swales can be underdrained with gravel or perforated pipes (Figure 42). Underdrains can be designed to pull excess water from road bases and can be oversized to store, detain and infiltrate runoff.

Driveways: Driveways can compose a large percentage of impermeable surface in the landscape. Several tools can be used to reduce the impact of driveway runoff (Figures 39 & 41). Decorative gravel or permeable pavers can be used as a surface material. The amount of paved surface on long narrow driveways can be reduced by installing a planter strip down the center of the drive, leaving two long gravel or

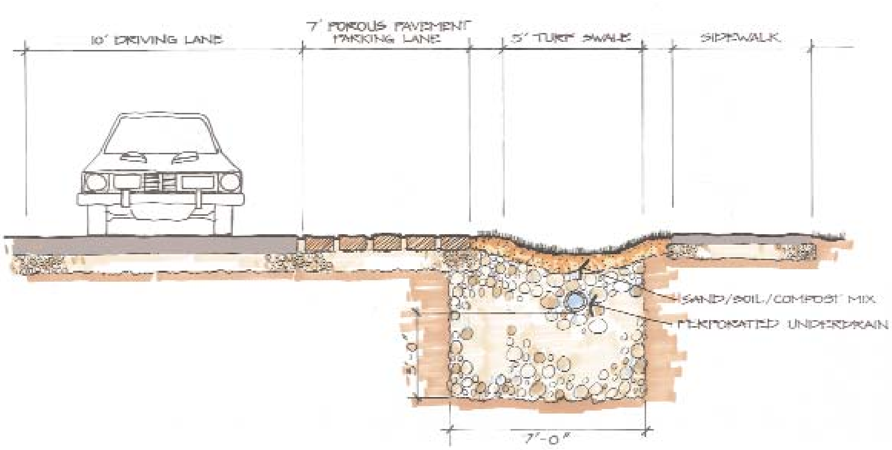
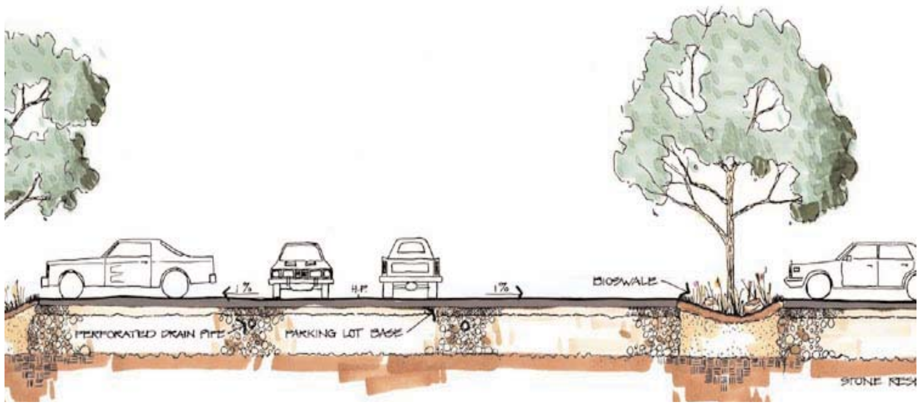


Figure 42 (left). Cross section of a vegetated bioswale at the edge of a roadway. Gravel and perforated pipe serve to store and infiltrate excess water from roads.

paved strips for driving. Trench drains can also be installed at the end of driveways. Trench drains collect rainwater before it leaves a property, and directs it to an infiltration device.

Parking Lots

Figure 43 (right). Cross section of bioswale in parking lot. Deep and fibrous rooted vegetation in bioswale cleanses and infiltrates rainwater runoff from parking surface.



Runoff from contemporary parking lots can contribute significant damage to local streams and rivers from large volumes of polluted runoff. Fortunately, the Mossville Bluffs Watershed has few parking lots in its upper reaches. There are, however, techniques for cleansing and infiltrating rainwater from parking areas. Permeable pavement can do much to reduce the amount of runoff, and bioswales both infiltrate and cleanse rainwater (Figures 43 & 44). Bioswales are linear trenches lined with deep and fibrous rooted plants that can absorb and cleanse parking lot runoff. The use of bioswales can reduce or eliminate the need for sub-surface storm sewers.

Figure 44 (above). Photograph shows bioswale in a parking lot. Pavement slopes towards area planted with deep and fibrous rooted native vegetation (Tellabs Corp. Naperville, IL).

Ravine Restoration

Currently, the ravines are managed as if they are capable of handling huge volumes of rainwater and sustained point source discharges. Soft and highly erodible glacial soils are no match for the forces of water and gravity, particularly when they have lost so much soil, organic matter and structure. The following scenarios exhibit three possible futures: No Change, Extension of Existing Storm Sewer System, and Permeable Pipes in Rock Bedding.

Scenario 1 - is the option to make "No Change" (Figure 45) to the current watershed management regime. At the current rates of erosion, during the next few major storm events, serious damage (Figure 46 & 47) will continue to occur throughout the watershed. The costs of doing nothing can be estimated by 1) sum up costs to perpetually dredge Upper Peoria Lake; 2) add costs to replace roads and private property as they eventually fail (e.g. homes, walls, parking lots); and 3) add legal costs to deal with all of above. It should be obvious that it is much cheaper to tackle these problems before damage becomes too severe to restore economically.

Figure 46 (above). Photograph shows downcutting at the discharge point of concrete pipe.

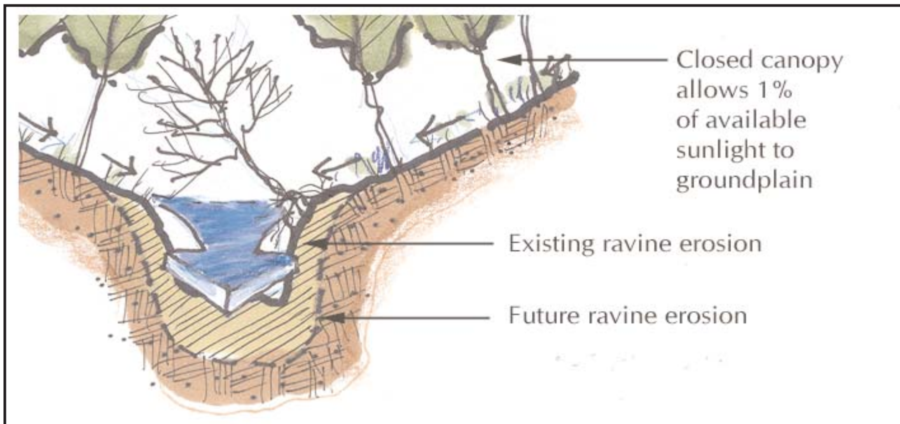


Figure 45 (above). Cross section of current ravine condition. The thick black cut line shows down-cutting of a typical ravine. The dashed line and hatched area shows projections of future downcutting and erosion that will take place if there is no change to rainwater management in the Mossville Bluffs Watershed.

Scenario 1 Summary: No Change

Description: This strategy includes the decision to make no changes to current maintenance and management of the Mossville Bluffs Watershed.
Maintenance: No maintenance required.
Probable Cost Range: No direct cost. Officials must factor costs resulting from failing ravines and associated damage to public and private structures and loss of terrestrial and aquatic habitat.
Longevity: Ravines will continue to fail. They are not self-restoring.
Aesthetic Impact: Continually degrading.
Environmental Impact: failure of ravines, upland development and continued silting of Upper Peoria Lake.
Required Action to Implement: None
Recommendation: Secure funding to investigate scenarios 2 & 3.

Figure 47. Photograph of downcutting just down stream from pipe shown above.

It is imperative that sunlight reaches the ground layer throughout the entire watershed area for any restoration solution to take hold. The degree that water runs down ravines is proportionate to the degree that the ravine restoration scenario will fail.

Scenario 2 - Extension of Existing Storm Sewer System (Figure 48), is possible for selected sections of ravines. At locations where slopes are severe, infiltration is not an option. Therefore, to prevent further erosion, steep ravines will need to be protected from any water traveling over the surface or below. Pipes must be sized to handle existing outlets, plus the accumulation of additional water as tributary ravines tie into these systems. This scenario will not infiltrate water. It transports water from the upper reaches to the lower reaches. Once the water reaches the lower watershed, infiltration or detention facilities should be used to cleanse the runoff prior to discharge to Peoria Lake.

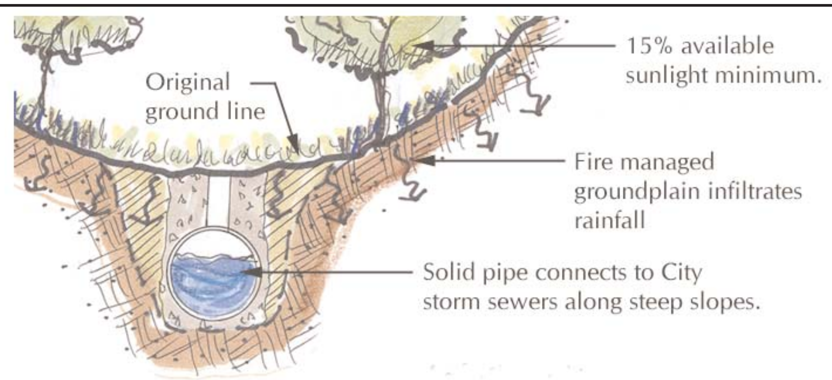


Figure 48 (above). This diagram shows the existing stormwater system extended down portions of steep ravines. The thick black cut line shows that the original ground lines can be sustained if the groundplain vegetation is restored and maintained.

Scenario 2 Summary: Extension of Existing Storm Sewer System

Description: Extend stormwater pipes from curbs, gutters, and culverts into steep portion of ravines.
Maintenance: Yearly inspections for frost heaving and cracking.
Probable Cost Range: Installation costs could range from $160 to $200 per lineal foot (for a 12” diameter pipe) to $360 to $450 per lineal foot (for a 60” diameter pipe).
Longevity: Perhaps twenty years before portions of failing pipe sections need to be restored.
Aesthetic Impact: Buried pipe will not be seen, above will be vegetated.
Environmental Impact: Prevents ravine downcutting at expense of flash flooding to the floodplain and Upper Peoria Lake. Allows ground level to be built back to historic elevations. Prevents historic ground water infiltration. Does not emulate the natural model.
Required Action to Implement: Funding, design, permitting, & installation.
Recommendation: Recommended where slopes are steep. Outside of steep ravines solid pipes are not recommended due to excessive cost and multiple negative effects and results of action.

Scenario 3 - Permeable Pipe in Rock Bedding (Figure 49), should be applied to ravines with 20 to 15 percent or less slope (Appendix "C" for Slope Analysis) and at lower elevations of the watershed. This scenario allows water to infiltrate along the length of the ravine through the use of permeable perforated pipes. This system would function to dissipate energy, hold water to infiltrate at a later time, and prevent erosion of the ravines and discharge of sediment. As with all of these scenarios, the groundplain must be restored (Figures 50 & 51).

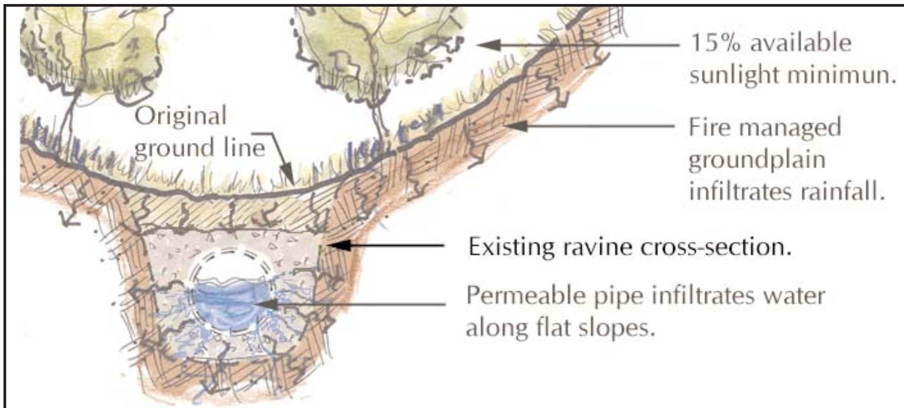


Figure 49 (above). Diagram of permeable stormwater system. Permeable pipe is connected to drain water only from existing storm sewer systems along the flatter sections of ravines.

Figure 50 (above). Photograph shows groundplain (in the foreground) after several years of stewardship. A heavily shaded and eroding groundplain is shown in the background. Without full-time stewardship of natural areas, none of these ravine solutions can take hold. Concentrated runoff discharging to natural areas will undermine ravine restoration projects.

Scenario 3 Summary: Permeable Pipes in Rock Bedding

Description: This strategy involves filling the eroded portion of the ravine with stone and a perforated pipe. The stone is covered with soil upon which native vegetation is established.
Maintenance: Yearly inspections for shifting rock and eroded soils. Ravine vegetation must be restored and maintained to prevent any water flowing down ravines.
Probable Cost Range: Installation costs could range from $180 to $230 per lineal foot (for a 12" diameter pipe) to $320 to $400 per lineal foot (for a 60" diameter pipe).
Longevity: This strategy is likely a long-term solution. Success is related to the type and level of stormwater systems implemented and woodland management established throughout the watershed.
Aesthetic Impact: This strategy would likely improve and perhaps at selected locations, restore bluffs and ravines similar to historic patterns.
Environmental Impact: This is the only strategy that would likely improve water quality, biodiversity, and ecosystem quality.
Required Action to Implement: Funding, design, permitting, installation and long-term stewardship.
Recommendation: Recommended for flat and less steep portions of ravines. Should seek funding for widespread application.

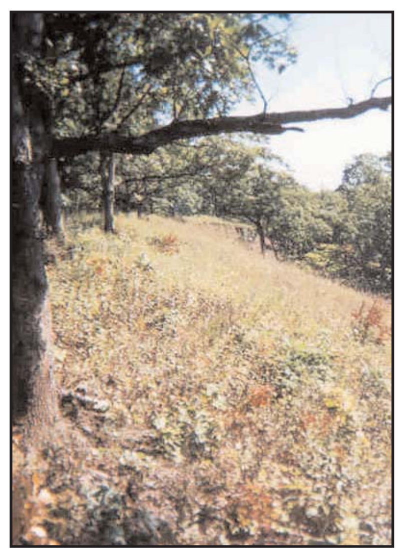


Figure 51. Photograph of restored hillside prairie in Robinson Park.

BMP Summary Matrix

The following matrix describes the BMPs presented in this chapter and presents various qualities attributed to each one. Descriptions, Applicable Areas, Design Considerations, Notes and Benefits are summarized for each BMP. It is important to note that though BMP's can be described as isolated tools, they often perform best when working with other BMPs as an integrated system. Before any BMP is put into use, critical analysis and evaluation of the proposed site is required. Many BMPs may need to be modified to function within the parameters of any given site.

Watershed Master Plan
Best Management Practices Toolbox

		Applicable Area							Design Considerations						
BMP	Description/Comment	Retro-fit	New Development	Residential	Commercial / Industrial	Agricultural	Non-builable Areas (Ravine Slopes)	Design Goal	Maximum Slope	Soil Type	Minimum Permeability, inches/hour	Maximum Permeability, inches/hour	Max. Drainage Area	Other - see Notes	(X) Design Consideration Notes
Landscape Management Tools															
Vegetative Restoration	Restore native vegetation by selective removal and cutting of trees to extensive removal of trees. Resulting light will allow native vegetation and root mass to regrow.	X	X	X			X	to allow 15% of available light to reach the ground. Resulting vegetation and root mass will greatly improve the infiltration capacity.	no	no	no	no	no	X	Existing seed bank will make restoration costs less; access is needed for restoration process and maintenance
Planning Processes Tools															
Buffers	green space adjacent to sensitive landscapes for protection	X	X	X	X	X		to protect sensitive landscapes (ex. ravine slopes) by requiring buffer areas between development and sensitive area.	X	no	no	no	no	X	Recommended minimum buffer: 25 feet on 5% slope or flatter; Use native vegetation to improve infiltration rates and slow velocities
Setbacks - side yard	areas designated for no buildings or structures		X	X	X			to reduce amt. of roadway needed for development by reducing distance between buildings	no	no	no	no	no	X	Architectural guidelines needed to ensure attractive, pleasant streetscapes
Setbacks - front yard	Areas designated for no buildings or structures		X	X	X			to reduce driveway lengths required by reducing front yard setbacks	no	no	no	no	no	X	Architectural guidelines needed to ensure attractive, pleasant streetscapes
Open spaces/ natural greenways	Areas set aside from development. Design areas to protect and preserve natural systems and to infiltrate and utilize water		X			X		to protect and preserve natural resources, to increase infiltration	no	no	no	no	no		
Reduced road widths			X	X				to reduce storm water runoff by reducing impervious area	no	no	no	no	no	X	22 feet minimum width for 500 ADT or 50 homes with no parking; 28 feet minimum width with parking on one side
Shared parking	adjacent facilities with alternating intensities of traffic share parking (ex. a church and an office building)		X		X			to reduce storm water runoff by reducing impervious area	no	no	no	no	no		
Mixed-use development	reduce traffic and infra structure needs by mixing residential and office space in a development		X	X	X			to reduce storm water runoff by reducing impervious area	no	no	no	no	no		
Cluster Development	Putting the same number of homes in a particular development onto less developable land		X	X				to protect more contiguous open space; reduce impervious surfaces by using shorter roads	no	no	no	no	no		

Watershed Master Plan
Best Management Practices Toolbox

		Applicable Area							Design Considerations						
BMP	Description/Comment	Retro-fit	New Development	Residential	Commercial / Industrial	Agricultural	Non-builable Areas (Ravine Slopes)	Design Goal	Maximum Slope	Soil Type	Minimum Permeability, inches/hour	Maximum Permeability, inches/hour	Max. Drainage Area	Other - see Notes	(X) Design Consideration Notes
Storm Water Management Tools															
Lawns															
Turf Management	Increase root mass by letting turf grass grow higher	X	X	X	X	X		to increase infiltration capacity by increasing root mass	no	no	no	no	no		
Prairie Grass	Increase root mass by replacing turf grass with native deep-rooted grasses	X	X	X	X	X		to increase infiltration capacity by increasing root mass	no	no	no	no	no		
Roofs															
Rainwater Gardens	A small depressed area landscaped with native flowers and grasses used to intercept storm water runoff before it gets to the storm sewer system	X	X	X	X			to capture storm water close to the source and increase infiltration, detention, and water quality	< 15%	X	0.3	2.4	yes	X	Recommended soils: HSG A or B (USDA-NRCS Soil Survey); Recommended placement: at least 10 feet from house foundation
Rainbarrels/cisterns	A barrel or container used to capture storm water runoff. Water can be used to irrigate lawn and gardens.	X	X	X				to capture storm water close to the source and allow for re-use	-	no	no	no	yes		1 50-gallon drum will hold a 1-inch rainfall for about 90 square foot area
Dry Wells	Infiltration pits used for small sources of runoff	X	X	X	X			to capture storm water close to the source and allow to infiltrate	< 15%	X	0.3	2.4	yes	X	Recommended soils: well drained soils, HSG A or B (USDA-NRCS Soil Survey); Recommended placement: setback from edge of ravine
Green roofs	Consists of lightweight drainage material, lightweight soil mixtures and vegetation	X	X	X	X			to reduce roof top runoff. Additional benefits include reduced urban heat, improved air quality, and improved aesthetics	-	X	-	-	-	X	Need to determine weight capacity of the roof structure. 3-4" of light weight soil will provide benefit, though generally, the thicker the soil, the more benefit provided.
Streets															
Permeable pavers	Pavement systems with openings to allow infiltration: cast-in-place concrete slabs, pre-cast concrete grids, modular unit pavers, or geo-webs.		X	X	X	X		to increase infiltration on hard-surface areas, increase water quality	<5%	X	X	X	no	X	Use of clean aggregrate (2mm - 5mm) containing no fines provides maximum benefit; steeper pavement slopes may produce higher runoff rates.
Manholes with gravel sumps/ Dry wells	Open bottom manholes on a gravel bed allow for infiltration at the bottom of the manhole; Dry wells are similar but often have holes in the sides to allow additional infiltration	X	X	X	X			to increase infiltration through-out a storm sewer system	-	X	0.3	2.4	X	X	Capacity of dry wells and gravel sumps is greatly increased when installed in sandy soils. Must be sized and designed to account for soils and drainage area size.

Watershed Master Plan
Best Management Practices Toolbox

		Applicable Area							Design Considerations						
BMP	**Description/Comment**	**Retro-fit**	**New Development**	**Residential**	**Commercial / Industrial**	**Agricultural**	**Non-builable Areas (Ravine Slopes)**	**Design Goal**	**Maximum Slope**	**Soil Type**	**Minimum Permeability, inches/hour**	**Maximum Permeability, inches/hour**	**Max. Drainage Area**	**Other - see Notes**	**(X) Design Consideration Notes**
Vegetative Swales	Open drainage systems used to convey storm water runoff (in place of storm sewer pipes)		X	X	X	X		to slow down runoff water, to provide opportunity for infiltration, and to improve water quality	X	no	no	no	X	X	Swales must be sized and designed to account for drainage area, and slope and cross-sectional area.
Vegetative Swales w/ native grasses	Open drainage systems used to convey storm water runoff (in place of storm sewer pipes), planted with native deep-rooted vegetation	X	X	X	X	X		to slow down runoff water, to provide opportunity for infiltration, and to improve water quality	X	no	0.3	2.4	X	X	Same as above, plus infiltration benefits can be increased by planting swales with native deep-rooted vegetation and by minimizing slope. Infiltration rates will be higher in sandy soils than in clay soils.
Bio-swales	Vegetative swales with an underdrain system (ex. gravel and perforated pipe)	X	X	X	X	X		to slow down runoff water, to provide opportunity for temporary water storage, infiltration, and to improve water quality	no	X	0.3	2.4	X	X	Bio-swales must be designed and sized based on drainage area and soils.
Driveways															
Permeable pavers	see above														
Planter Strips	A vegetated strip in the center of two driving strips.		X	X		X		To reduce the volume of storm water runoff.	no	no	no	no	no	X	Will have more impact on a longer driveway.
Trench drains	A drain at the end of a driveway used to intercept runoff water before it gets to the street and storm sewer system	X	X	X				To slow runoff water down, to provide opportunity for infiltration	no	no	no	no	X	X	Size trench and outlet to accommodate drainage area. Route water to a cistern, dry well, or infiltration trench.
Parking Lots															
Permeable pavers	see above														
Bio-swales	see above														

Watershed Master Plan
Best Management Practices Toolbox

		Applicable Area							Design Considerations						
BMP	Description/Comment	Retro-fit	New Development	Residential	Commercial / Industrial	Agricultural	Non-builable Areas (Ravine Slopes)	Design Goal	Maximum Slope	Soil Type	Minimum Permeability, inches/hour	Maximum Permeability, inches/hour	Max. Drainage Area	Other - see Notes	(X) Design Consideration Notes
Ravine Flowline Restoration															
Extension of Existing Storm sewer system in aggregate/rock bedding	Extend storm sewer pipe system to the Illinois River flood plain; raise flow line back up to pre-developed elevations with aggregate/rockfill material.	X		X	X	X	X	To stabilize the ravine flow line and side-slopes by minimizing further ravine down-cutting from uncontrolled storm water runoff.	>15%	no	no	no	no		
Permeable pipe in aggregate/rock bedding	Extend storm sewer pipe system (with perforated pipe) to the Illinois River flood plain; raise flow line back up to pre-developed elevations with aggregate/rockfill material.	X		X	X	X	X	Same as above; plus allow for infiltration of storm water	<15%	no	0.3	2.4	no		

This chapter presents a plan for all those who influence the Mossville Bluffs Watershed to change watershed management practices. With hard work, creativity, and a willingness to take risks, Natural Rainwater Management Practices can become widespread throughout the Mossville Bluffs Watershed.

Chapter 3 - Implementation

The first step needed to implement the Natural Rainwater Management Model into existing city, county and local government agency polices is to identify implementation strategies and activities. The second step is to prioritize these strategies and activities.

One implementation activity is to begin a code and ordinance modification process to allow the BMP "tools" to be incorporated into local development. Other strategies for implementation include creating bluff and ravine overlay districts, conservation easements, pilot and demonstration projects, securing grants, seeking public participation and publicizing the watershed.

Code & Ordinance Revisions

Existing city and county codes and ordinances were reviewed to identify potential revisions to better implement the watershed restoration master plan. Appendix "B" consists of a summary of existing city and county codes and ordinances. The summary listed below presents recommended changes to current codes and ordinances. Recommendations include requirements and incentives for using BMP tools in order to meet or exceed watershed restoration objectives.

1) Amend the City's Landscape Ordinance to encourage the use of native vegetation.

a) Current code is based on a point value system and applies to all land uses except single and dual-family residential.
- Establish a point value requirement for single and dual-family residential.

b) Current code does not give a point value to native plants.
- Add more flexibility in plant material and size, including giving a point value for native vegetation.

c) Current code requires curbs around parking lot landscape areas.
- Revise code to allow depressed landscape areas without curbs or with curb cuts.

2) Establish a Ravine Overlay Ordinance.

- Establish minimum criteria for vegetated buffers between development and ravine slopes.
  - Ex. 25-foot minimum buffer (Reference: Town of Caledonia, WI)
  - Ex. 10 to 40-feet minimum (Reference: City of Highland Park)
- Prohibit establishment of turf (example, Kentucky Blue Grass) on ravine slopes and in buffers.
- Prohibit dumping of grass clippings, leaves, or other natural or man-made debris that may damage underlying vegetation or prevent re-vegetation.
- Prohibit structures from being constructed within 10 feet of ravine slopes greater than 10% and within 25 ft. of, or on ravine slope more than 20%.
  - Ex. Slopes greater than 12% (Reference: Town of Caledonia, WI)
  - Ex. Slopes greater than 10% (Reference: City of Highland Park)
  - Ex. Slopes greater than 25% (Reference: Growing Greener, R. Arendt)
- Prohibit downspouts pipe and/or sump pump outlets within 10 feet of or on steep ravine slopes.
- Prohibit fill in or on ravine steep slopes.
- Prohibit fill in natural drainage ways. Exemptions may include fill deemed necessary for slope stabilization, and fill for construction of roads, drive ways, or other infrastructure.
- DO ALLOW cutting of trees on ravine slopes for the purpose of vegetative restoration.
- Limit concentrated discharges to storm events larger than the 1-year frequency.

References

Model Conservation Subdivision Ordinance, Town of Caledonia, WI
City of Highland Park, IL Code, Section 150 Steep Slope Zone.

3) Amend the City's Weed Ordinance to allow use of native vegetation. Current code prohibits growth of weeds. It defines weeds as all noxious vegetation and all grasses, annual plants and vegetation other than trees or shrubs which exceed a height or length of ten inches. This term shall not include cultivated flowers and gardens.

- Revise code to refine the definition of weeds, specifically to allow for native vegetation.

4) Amend the City's Burning Regulations to allow controlled burning for landscape management. Current regulations read: no person shall kindle or maintain any outside fire in the city or permit or authorize any such fire either private or public premises unless such fire is contained in an approved incinerator. Forest Park Nature Center serves as a model to replicate which includes burn plans, training and IEPA permits.

5) Revise existing codes and ordinances to allow alternate storm water conveyance systems. Suggested language:

"In ravine overlay districts, alternate stormwater management systems will be required in lieu of underground storm sewer pipes with concen trated discharge. For example, overland stormwater conveyance systems in conjunction with curb and gutter with curb cuts shall be used when feasible, based on the site topography, soils, slope, and other factors."

6) Revise existing codes to minimize the amount of impervious surfaces required for development:

a) Low Density Residential street widths with Average Daily Traffic less than 500:

Current code is 34 feet (City) and 24 feet (County)

- Add language to the existing code. Suggested language:

"In ravine overlay districts, narrower street widths will be considered based on traffic volumes. Street width must be 22 feet min."

Sources for the recommended (width) included Center for Watershed Protection, Institute of Transportation Engineers, American Society of Civil Engineers, and the Federal Highway Administration.

b) Cul-de-sacs:
Current code is 40-foot radius (City) and 60-foot by 24-foot T or Y (County)

- Add language to the existing code. Suggested language:

" Vegetation and/or porous pavement in the center of the cul-de-sac is encouraged, and may be used as part of the stormwater management system (example bioswale-retention filters or rainwater gardens)."

Source for this recommendation (width) is Center for Watershed Protection.

c) Frontages:
Current code for R-1 minimum lot width is:

80-feet on interior lots (City) and 125-feet for septic and 100-feet for sewer (County)

- Add language to the existing code. Suggested language:

"In ravine overlay districts, smaller frontages will be considered based on a planned concept (such as architectural style and integrated open space)."

d) Setbacks:
Current code for R-1 front-yard, rear-yard, and side-yard interior lots are:

35-feet, 25-feet and 12-feet (City) and 25-feet front-yard (County)

6.) Continued

- Add language to the existing code. Suggested language:

"In ravine overlay districts, smaller setbacks and frontages will be considered based on a planned concept (such as architectural style and integrated open space)."

e) Sidewalks:
Current code for residential and commercial zoned areas require 5 feet wide sidewalks on both sides of the roadway.

- Add language to the existing code. Suggested language:

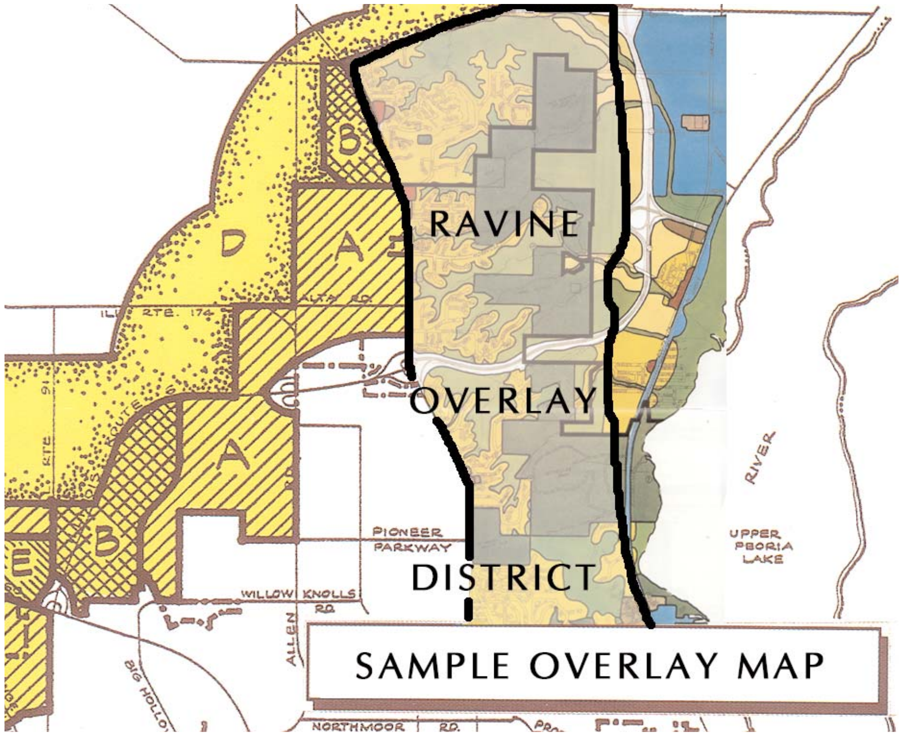
"In ravine overlay districts, alternate, multi-use paths will be considered in lieu of one or both sidewalks as part of a planned concept."

Bluff and Ravine Overlay Districts

Establishing Bluff and Ravine Overlay Districts would be a good vehicle to implement specific rainwater management and planning techniques (Figure 52). Special regulations for the district areas should be developed to gain compliance from land owners and developers (see Appendix "C" for Land Use Map). Demonstration sites should be established to educate and demonstrate how specific rainwater infiltration tools presented in previous chapters can fit into specific properties within the watershed.

Concepts and ideas in overlay districts might include the following: establish requirements for the elimination of surface runoff, minimize the use of gutter and storm sewer systems, eliminate drainage directly into ravines, allow slotted curbs, minimize impervious surfaces, require a percentage of permeable pavers, green roofs, rainwater catchment devices and rainwater gardens, allow for a diversity of creative solutions for the infiltration of rainwater, require landscape stewardship plans, recommend conservation districts, and allow development through a PUD process that requires these tools. Specific recommendations are presented above in the Code & Ordinance section.

Figure 52. Map shows sample delineation of Ravine Overlay District. District would be a blanket coverage for ravine and bluff slopes. This sample map is not part of Peoria's plans, but is for demonstration purposes only.



Conservation Easements

Conservation easements are legal boundaries where a private or public entity is created to steward land. There are many types of easements, and many ways of setting them up. In the Mossville Bluffs Watershed, easements could be established where homeowners give land management access to a private or public agency that would oversee land stewardship. The advantage of such an easement would be that the private or public agency would be able to hire contractors that specialize in natural lands management. New developments should work conservation easements into PUDs.

Pilot and Demonstration Projects

One way to begin implementing ideas presented in this master plan, is to identify and implement pilot and demonstration projects within the Mossville Bluffs Watershed area. Demonstration and pilot projects can be used to show local landowners, policy makers and others applications of the recommended strategies needed to begin restoring the Mossville Bluffs Watershed. Pilot projects can be used not only to demonstrate these strategies, but also to monitor and study their successes and failures. Once the watershed restoration tools are applied to a specific property, it will be necessary to set up monitoring programs so that changes in rainwater management can be recorded. Such data will be extremely valuable for similar applications in the Midwest.

A conceptual restoration plan (see Figure 53 and Appendix "A") was developed for a sub-watershed. The concept plan was developed for a site-specific study area (sub-watershed area) within the Mossville Bluffs Watershed. The study area was selected for the following reasons: it is representative of many conditions throughout the watershed and other developed bluffs, there are potential property owners within the study-area that are interested in participating in demonstration projects, and there is access to the ravine flowlines along Mossville Road (through Park District property). The concept plan shows recommended management practices based on a field investigation of the study area.

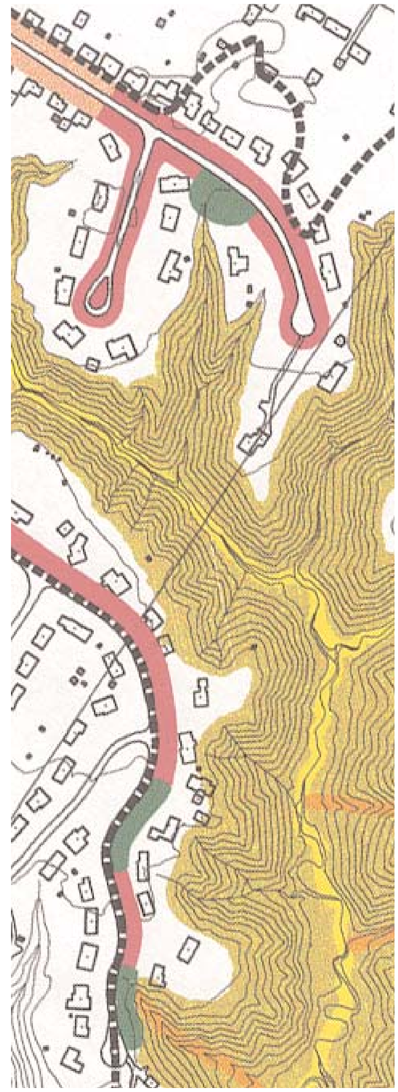


Figure 53. Detail from the Concept Restoration Plan. Best Management Practices are proposed for this sub-watershed. See Appendix "A" for a more detailed discussion.

Demonstration and/or pilot projects should be implemented on individual sites as recommended in this restoration plan. These sites will serve as tangible, on-the-ground examples of the recommendations made. While restoration projects on individual properties within the Mossville Bluffs Watershed will certainly impact the watershed dynamics, it is important to note that implementation of only one or two of the recommended management practices will not be sufficient to restore the watershed. Likewise, restoration efforts on only a portion of the ravine watershed will not be sufficient. In order for a ravine to be restored, the entire system must be restored. Successful restoration must include a combination of the recommended landscape management, stormwater management, and ravine flowline restoration techniques.

Figure 54. Grants are available for restoring watersheds through water quality improvements. Restoration work in the Mossville Bluffs is already funded though C-2000 grants (Illinois River Bluffs Ecosystem Partnership) such as in Detweiller Park shown above.

Grants

A variety of grants exist to restore watersheds and improve water quality. The Illinois EPA has funds available yearly though the Section 319 (Nonpoint Source Program) and Section 314 (Clean Lakes Program). The Illinois Department of Natural Resources has the Conservation 2000 (C-2000) program for restoring natural areas (Figure 54). The Illinois Clean Energy Community Foundation has a section for funding natural areas restoration. For smaller scale and residential projects, home owners, in addition to applying for City of Peoria Erosion Control Project funding (up to $7,000.00 per household), may compete for Wildlife Preservation Funds (from Illinois taxpayer voluntary contributions). This fund may be perfect for implementing back yard prairies and woodland habitat restoration.

THE SECTION 319(H) PROGRAM

The Illinois Environmental Protection Agency (Illinois EPA) receives federal funds through Section 319(h) of the Clean Water Act to implement Illinois' Non-point Source Pollution (NPS) Management Program (Program). The purpose of the Program is to work cooperatively with local units of government and other organizations toward our mutual goal of protecting the quality of water in the state of Illinois by controlling NPS pollution. The Program emphasizes: funding for implementing cost-effective corrective and preventative Best Management Practices (BMPs) on a watershed scale; funding for the demonstration of new and innovative BMPs on a non-watershed scale; and the development of information/education NPS pollution control programs.

Public Participation-Ravine Associations

Restoration efforts can become energized with public participation. Many communities across the country have river and stream action groups where volunteers are making significant contributions. Portland, Oregon, for example, has dozens of "Friends" of creek restoration groups. Neighbors gather together to remove weedy vegetation, plant native vegetation, and generally steward the land. In Chicago, Illinois a group called the North Branch Restoration Project is a well organized group of volunteers that help vegetate Cook County forest preserve lands with prairie and savanna habitat. In Peoria, Peoria Wilds is a group of volunteers that have taken on restoring natural areas along the Mossville Bluffs and beyond.

Figure 55. Watershed stewardship is an ongoing process. When citizens learn how to read the ecology of a landscape, they can learn how to best manage them.

Though there are quality restoration efforts currently underway in the Mossville Bluffs, a majority of the watershed still needs restoration. The amount of stewardship activity needs to increase greatly. One way to achieve restoration at a greater scale is to involve more of the local residents (Figure 55).

The Mossville Bluffs Watershed could become restored through the establishment and organization of hundreds of volunteers with the establishment of "Ravine Families". These groups would be responsible for the restoration and stewardship of ravines where they live. This level of commitment is possible with the right approach and a lot of energy. Peoria Wilds and the Peoria Park District serve as a local model for education, organization, and leadership.

Publicize Watershed

By publicizing the watershed plan and enlisting the resources of the greater watershed community, many people will come to know about the current situation, and will want to know more about what they can do to help. The more people that know about the issues and challenges, the more hard work and creativity will be available (Figure 56).

Sources of inexpensive but broad casting media that can be used to invite and inform the public include newsletters, webpage listings, and flyer postings at public sites such as libraries, nature centers, schools and other public sites. Workshops, lectures and field days are all great

Figure 56. Education and involvement by many are at the core of establishing a long term stewardship of the Mossville watershed.

activities to promote and gather public support. These activities can be sponsored through existing organizations such as Park Districts, nature centers, Peoria Wilds, and other volunteer organizations with talent and leadership currently in place.

Prioritization

The watershed restoration tools and implementation strategies presented in previous chapters can be implemented according to two levels of priority. Some tools can be implemented "now" while others are "ongoing" activities. The category "Now" implies that these activities and tools can begin right away. The category "Ongoing" implies that these activities need to be implemented into existing infrastructure.

Now

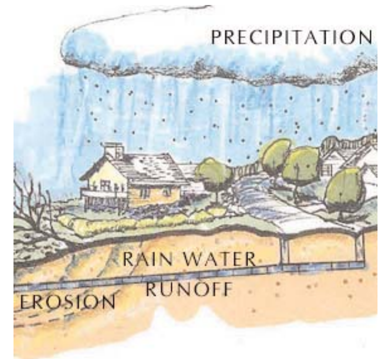
Code modifications and stormwater management guidelines.
Educate public on problems, causes and solution.
Establish ravine associations.
Identify & prepare guidelines to implement tools:
- Border plantings, buffer strips, mow turf 3"-4"
- Dry wells, rain barrels, rainwater gardens.

Identify & seek grants for restoration and demonstration projects.
Landscape restoration/ravine restoration.

Ongoing

Convert existing swales to infiltration swales as road and/or swale maintenance is required.
Install bioswales into existing parking lots as part of resurfacing and other maintenance is performed.
Install street infiltration trenches along existing streets as part of curb repair/replacement projects.
Landscape restoration.
Ravine restoration throughout the watershed.
Replace existing roofs with green roofs (at least for flat roofs) as roofs need replacement.

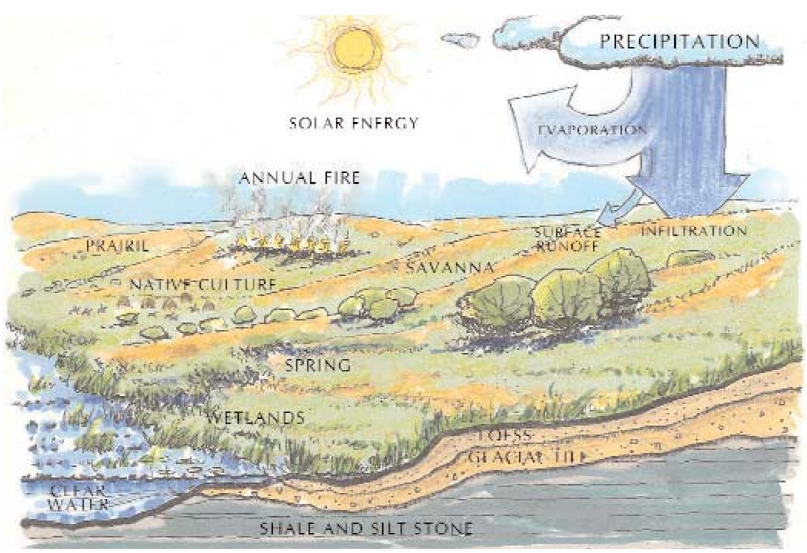
Conclusions



This document's front cover shows diagrammatic cross sections of both degradation and restoration within the Mossville Bluffs Watershed. These processes are visible at Detweiller Park, Robinson Park, and local residential roads in the upper watershed. The future remains to be defined but it is certain that whichever approach is pursued, the Mossville Bluffs Watershed will continue to change.

The Natural Rainwater Management Model is founded upon unchangeable principles. By working with these principles, stewarding the land, revising codes and ordinances, and implementing planning tools for developers, erosion and sedimentation can be drastically slowed and rainwater can once again be infiltrated and dispersed wherever it falls.

Two futures are possible. One future undermines the beauty of the Mossville Bluffs Watershed; the other future begins a long and creative process to restore a balance between people and their environment. A future that implements a massive restoration effort would help reduce sedimentation in Upper Peoria Lake. The first step has been taken with the production of this watershed restoration master plan. The next steps have been outlined and are ready to put into action by all those that influence the Mossville Bluffs Watershed.



Appendix A - Stormwater Management Study and Restoration Concept Plan

Standard abbreviations used in photo descriptions and tables

CIP	Cast-in-Place concrete
CMP	Corrugated Metal Pipe (culvert)
CPT	Corrugated Plastic Tubing (small diameter drain pipe, typically 4 to 6" diameter)
DS	Downstream
LT	Left
PRC	Pre-cast Reinforced Concrete
PVC	Polyvinyl Chloride pipe(frequently 4 to 6" diameter pipe outlets, used for sanitary drain fields)
RCP	Reinforced Concrete Pipe
RT	Right
US	Upstream

Appendix A -Mossville Bluffs Watershed Stormwater Management Study and Restoration Concept Plan

As part of a comprehensive watershed restoration and development plan for the Mossville Bluffs Watershed, a study was done on a sub-watershed to better define the effects of current and historic stormwater management practices as they pertain to the health of this sensitive bluff region.

The purpose of the study was to provide a basis to make recommendations for best stormwater management, landscape management, and planning practices to be used in future development in watersheds with similar characteristics and for retrofit solutions for watersheds already developed. These practices are presented in Chapter 2 – Watershed Master Plan.

A restoration concept plan was then developed to show an example of how the tools presented in Chapter 2 can be applied to the sub-watershed to restore its historic hydrologic and hydraulic characteristics. Successful restoration must include a combination of the recommended landscape management, stormwater management, and ravine flowline restoration tools. The concept plan identifies, on a map, the recommended management and restoration practices specific to the sub-watershed.

Sub-watershed Description

The sub-watershed includes the upper portion of a ravine system that is surrounded by residential development, a church, and a cemetery. The northern boundary of the sub-watershed is Mossville Road and the Western boundary is Knoxville Avenue. The drainage from this ravine system feeds into an unnamed tributary of Moon Hollow. See Figure 1.

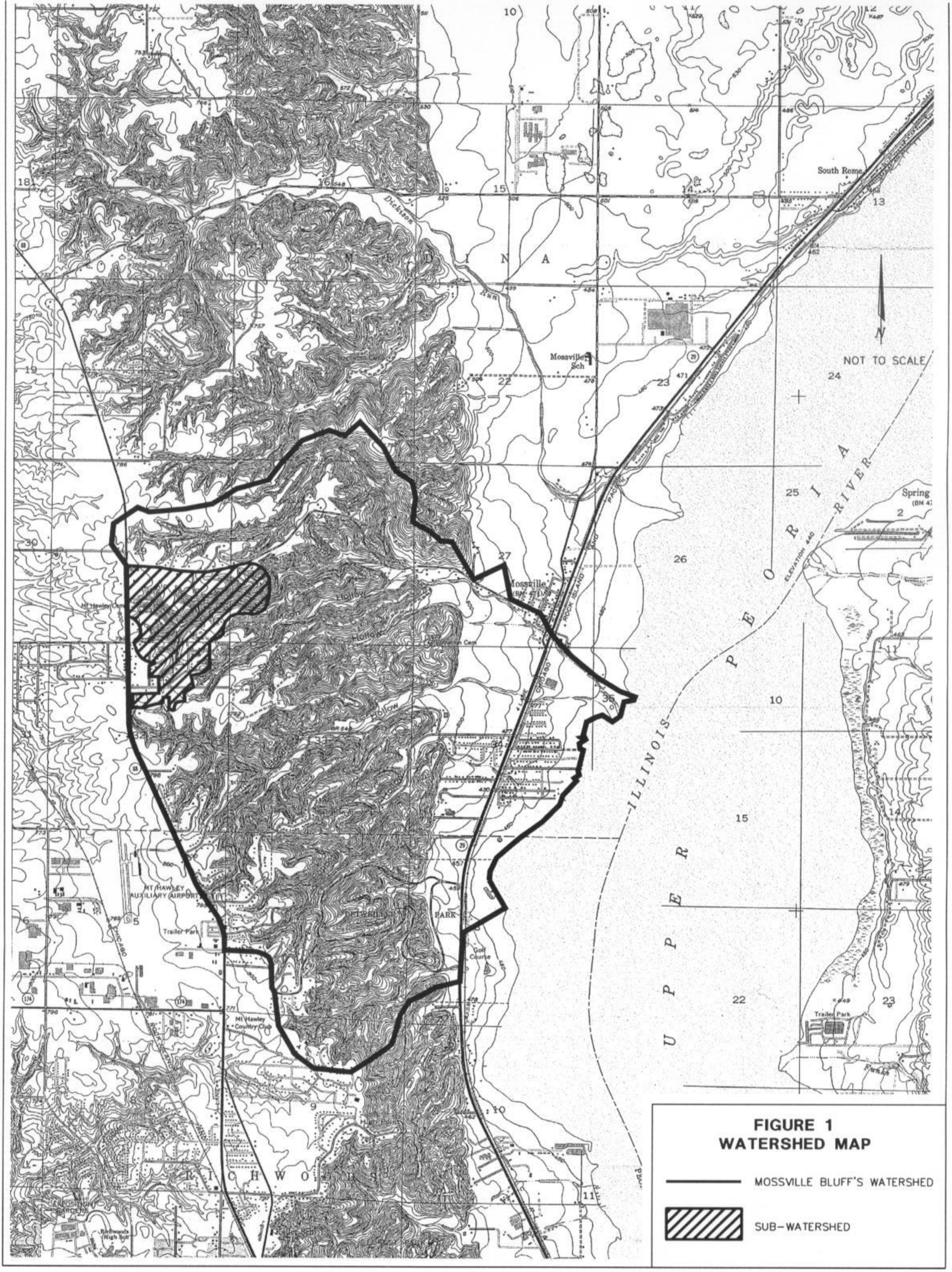


FIGURE 1
WATERSHED MAP

Factors Considered

The study includes the following:

1) Inventory of existing land use.
2) Inventory of available data.
3) Inventory of in-place stormwater systems.
    a) Inventory of drainage patterns.
    b) Overland drainage systems (ditches and culvert) and outlets.
    c) Underground storm sewer systems and outlets.
4) Field Investigation (and photographic documentation) of stormwater outlet points (at ravine heads).
5) Analysis of stormwater system outlets
    a) Drainage areas contributing to each stormwater system.
    b) Quantify amount of residential area contributing to each stormwater system.
    c) Time stormwater system has been in place.
    d) Description of the existing outlet conditions.
    e) Observations.
6) Potential future development.

Land Use

The sub-watershed has a variety of land uses including residential development, a church, a cemetery, roadways and agricultural land.

The majority of the sub-watershed area is residential development along Knoxville Avenue, Mossville Road, and Ravinwoods Road, as well as five residential developments: Ravinwood Dells, Ravinwoods Farm, Mossville Point, The Oaks, and an unnamed development along the private drive, Stony Broke Lane. These developments include single family dwellings ranging in size from one-quarter to one acre, with a few parcels ranging from two to four acres.

The church, Northminister Presbyterian Church, makes up about 15 acres of the sub-watershed that includes approximately one-half acre of impervious land cover (roof tops).

Most of the parking lot and about one-half of the church drains toward the north into the adjacent drainage area. The remaining church property is traditional turf grass and steep wooded ravine slopes.

The cemetery has an area of about 5 acres, consisting of a narrow private drive, traditional turf grass and steep wooded ravine slopes. The roadways include a small area of state highway, Knoxville Avenue, as well as two county roads, Mossville Avenue and Ravinwoods Road. The remaining area, about 7 acres, is used for agriculture.

Available Data Sources

The study was performed using information from the following sources:

1) USGS 7.5 minute quadrangle map, Spring Bay Illinois, 1967.
2) Sidwell Maps, 1991.
3) GIS data (topography, transportation, hydrology, buildings) obtained from the City of Peoria.
4) Subdivision construction drawings. Only Mossville Point could be located in the City of Peoria archives. Construction drawings for two adjacent subdivisions, Nassau Estates Section One and Nassau Estates Section Two, were also located. These were used to help define drainage area boundaries.
5) Building permit records (used to determine approximate dates of development).
6) Field Investigation.
7) Peoria County and City of Peoria staff interviews.

Inventory of In-place Stormwater Systems

This inventory was done, for the most part, by visual observation in the field, since a limited number of construction plans and engineering drawings were available.

<u>Inventory of drainage patterns</u>

The stormwater drainage systems in this sub-watershed include both overland drainage systems (road ditches, and driveway and cross-road culverts) and roadway and underground storm sewer systems (curb and gutter, curb-side inlets, concrete storm sewer pipe and outlets). The roadways are typically crested at the center, and the drainage from each half of the roadway flows into its adjacent road ditch or gutter.

A map detailing the roadway drainage patterns for the sub-watershed is included in Figure 2. Cross-road culverts, curb-side inlets, storm sewer pipe and end-sections are shown in approximate locations. Flow directions in the road side ditches are indicated, along each side of the roadway. Flow directions shown in the center of the roadway indicate the direction of flow in gutters.

Overland drainage systems

The state highway, Knoxville Avenue, as well as the two county roads, Ravinwoods Road and Mossville Road, were constructed with overland stormwater drainage systems, including road ditches, driveway culverts and cross-road culverts. Three of the older residential subdivisions, Ravinwoods Farm, Ravinwood Dells and the development along private Stony Brook Lane, were also constructed with overland stormwater drainage systems. These systems discharge into the ravine system at many locations.

The roads are typically crested in the center, with road side ditches along each side of the road. In some areas, the roadside ditches are well defined, with depths ranging from 1 to 3 feet, and sideslopes of 3 to 4 horizontal to 1 vertical. In other areas, the ditches are broad swales with flatter sideslopes and minimal depth. The residential ditches are vegetated with traditional turf and are typically maintained (mowed) by the adjacent land owners.

The driveway culverts are typically 12-inch corrugated metal pipes. Many are silted in about ¼ to ½ the depth of the culvert.

The cross-road culverts are typically corrugated metal pipes and range in size from 12" diameter to 36" diameter.

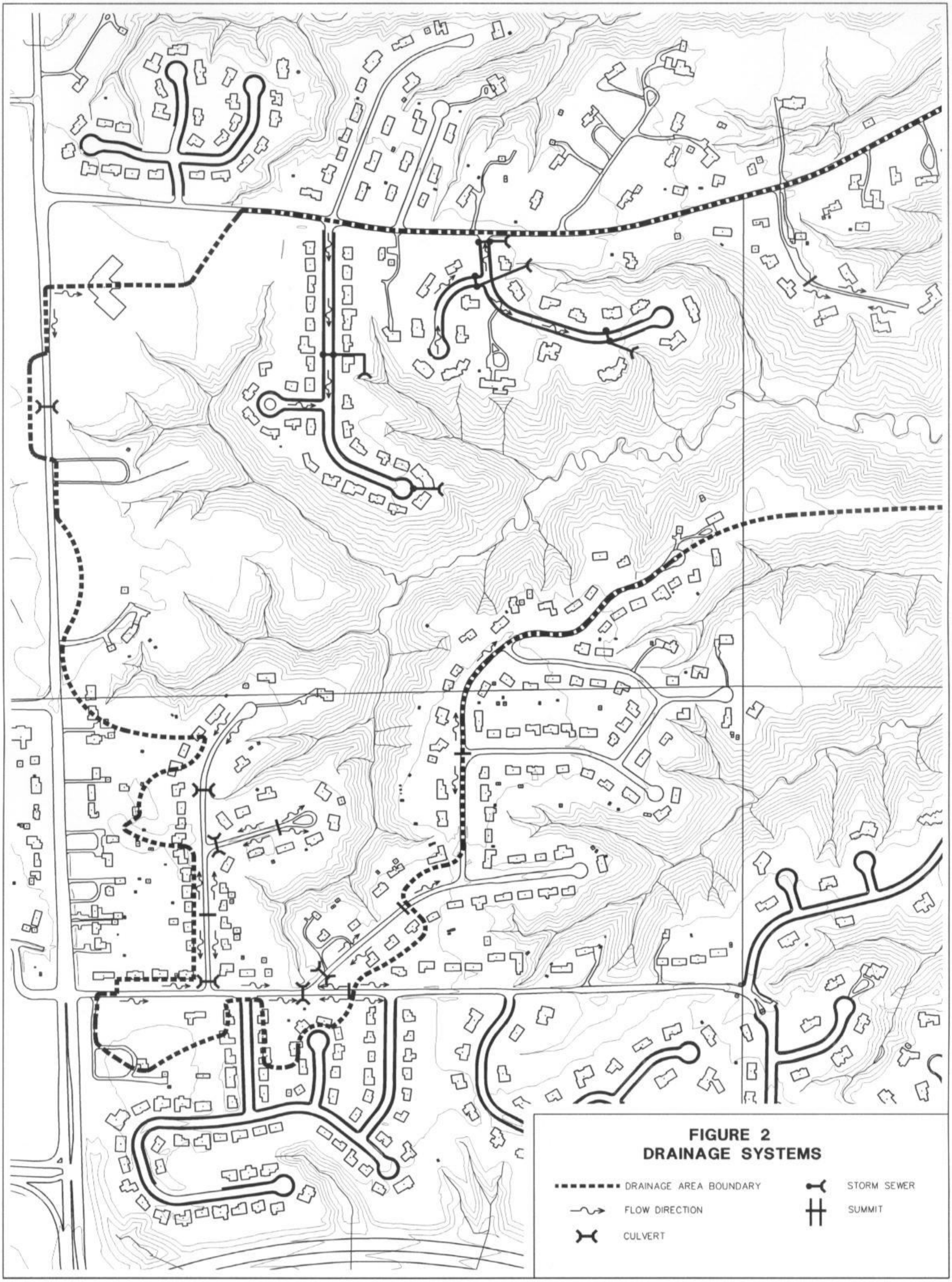


FIGURE 2
DRAINAGE SYSTEMS

Underground storm sewer systems

Two of the newest subdivisions, Mossville Point and The Oaks, were constructed with underground stormwater drainage systems in accordance with current-day codes, ordinances, and policy.

These regulations require concrete curb and gutter, curb-side inlets, and reinforced concrete storm sewer pipe. The minimum pipe diameter accepted by the city and the county is 12 inches. End-sections are required at the outlet. Standard practice includes placing the most-downstream pipe sections at a mild slope (1-2% grade). Often times, in places where there is a large difference in elevation between the roadway storm sewer system and the outlet, a manhole is used to "drop the pipe" so a mild outlet slope can be constructed. Outlet protection (for scour and erosion) is recommended, though not required.

Field Investigation

A field investigation of the stormwater management systems in the sub-watershed was conducted in April of 2001. Visual inspection and photo documentation were done at nineteen study areas (ravine heads) where stormwater systems outlet into the ravine system.

These nineteen study areas are shown in Figure 3. Many photos were taken at each of the study areas. Some of the most descriptive ones are included herein to help illustrate the observations made during the field investigation.

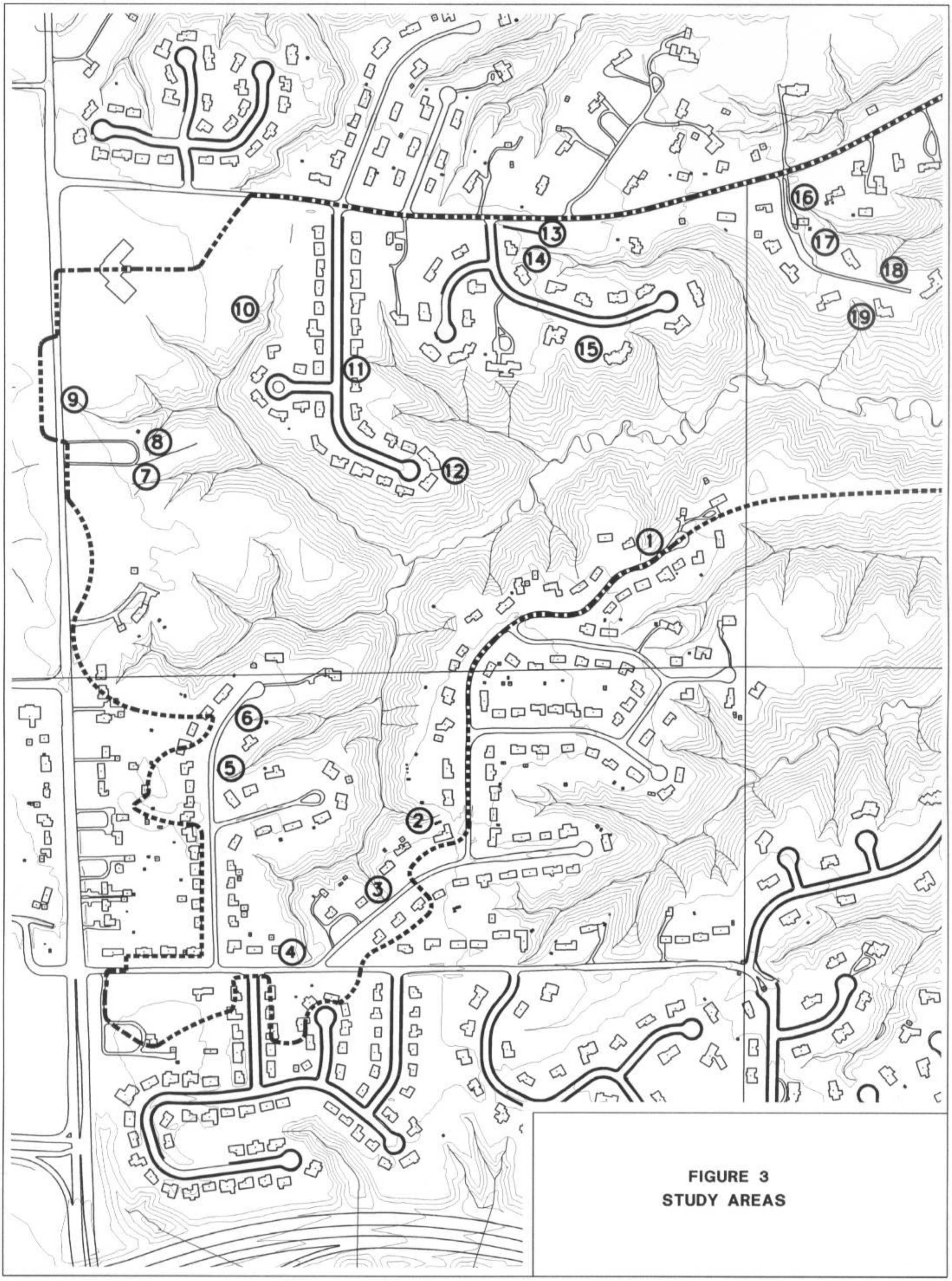


FIGURE 3
STUDY AREAS

Analysis of Stormwater System Outlets

A summary of the nineteen study areas is included in Table 1. The summary includes the following information:

1) Name of Development
2) Approximate date Development was constructed - Historical data to determine when the stormwater drainage infrastructure was installed is limited. As an indicator of how long each system has been in place, we looked up building permit records for one or two lots per subdivision.
3) Type of drainage system - Stormwater systems are described as either road ditches with culverts, or storm sewer.
4) Length of street - The length of street that contributes to each stormwater system was measured and is included in the table. This is used as an indicator of the amount of impervious area contributing to each stormwater system. Runoff from the residential front yards, driveways, and sometimes ½ the roof, also contribute to the stormwater. However, more often a portion of the front yards and all of the rooftop runoff drains directly into the ravine system (drain away from the roadway stormwater system). It was assumed that the roadway was crested in the center and only half the width of the roadway contributed to the runoff. When both sides contributed (due to a crossroad culvert), the length of the roadway was doubled.
5) Size of drainage area - The drainage areas contributing to each study area were delineated and measured. The areas are shown in Figure 4, and the sizes are listed in Table 1.
6) Description of existing outlet conditions - At each study area, a general description is given of the condition of the stormwater system outlet at the ravine head and within 100-feet downstream. These descriptions are based on field observations made in April of 2001.

Table 1. Mossville Bluffs Storm Water Management Study
Sub-Watershed Study Areas

Study Area	Name of Development	Approx. Date Developed	Type of Drainage System	Approx. Length of Street being drained (ft)	Approx. Drainage Area (ac)	Pipe/Culvert Outlet Size @ Ravine Head (inches)	Description of Ravine w/in 100 feet of water source
1	Ravinwood Dells	Late 1960s	road ditches/ culverts	1279	2.6	unknown	Nearly level leaf-covered area between roadway and head of ravine. Looks like a cross-road culvert point, but could not find one. Nor could we determine how water drains to ravine from opposite side of roadway (from apparent low spot). Six-foot deep cut in ravine bottom is working upstream toward roadway.
2	Ravinwoods Farm	Early 1970s	road ditches/ culverts	436	1.2	none	Nearly level grass-covered area between roadway and head of ravine. Vegetation (traditional turf grass) is sparse. Ravine is fairly stable. No fresh or deep cuts. Two PVC drainfield outlets visible at head of ravine.
3	Ravinwoods Farm	Early 1970s	road ditches/ culverts	475	0.7	none	Area between roadway and head of ravine is well-vegetated, except in narrow flow-area for small flows. Vegetation (traditional turf grass) is sparse. Ravine is fairly stable. No fresh or deep cuts. Two PVC drainfield outlets visible at head of ravine.
4	Ravinwoods Farm	Late 1970s	road ditches/ culverts	5997	10.0	36" and 18" CMP	36" CMP and 18" CMP drain into ravine head and are undercut 2 feet. Left downstream ravine slope is lined with fabric and rock riprap. Five to six drain tiles, immediately downstream of the riprap, outlet along the slope.
5	Ravinwoods Farm	Late 1970s	road ditches/ culverts	2086	4.8	15" CMP	Nearly level grass-covered area between roadway and head of ravine. Vegetation (traditional turf grass) is dense. Wooded area is stable, gentle slope. Upper section of flow path is rock lined. No fresh erosion in upper area. Erosion 3 to 4 feet wide by 2-1/2 feet deep) begins about 150 feet from water source.
6	Ravinwoods Farm	Late 1970s	road ditches/ culverts	424	0.6	none	Nearly level grass-covered area between roadway and wooded ravine area. Recently disturbed: 6 inch diameter CPT pipe installed to dewater roadside swale area. Wooded area is also gently sloping, no visible signs of erosion.
7	Knoxville Ave	-	road ditches/ culverts		1.7	none	Nearly level wooded area just downstream of cropland. Visible erosion cuts, about 6" to 1-ft deep and 2-ft wide. Little ground cover.
8	Knoxville Ave/ Cemetery	-	road ditches/ culverts		1.1	none	Lots of leaves, soil and trash dumped into head of ravine, next to cemetery roadway. Some erosion visible at bottom of ravine.
9	Knoxville Ave.	-	road ditches/ culverts	878	2.3	12" Clay (15" RCP under Knoxville)	Nearly level area between roadway and wooded ravine area. Erosion begins in wooded area, about 3 feet deep by 3 to 4 feet wide cut. The IL Department of Conservation installed grade control structures in this ravine (concrete block and steel fence posts). These structures have since failed. There is a lot of sediment built up behind each of the grade control structures.
10	Church	-	road ditches/ culverts		1.5		Bottom of ravine behind the church has fresh erosion cuts, approximately 15 feet wide by 5 feet deep.
11	Mossville Point	Mid 1970s	storm sewer	1112	2.0	18" RCP (per plans)	Outlet to a storm sewer system is shown on plans, but could not be found in the field.

Table 1. Mossville Bluffs Storm Water Management Study
Sub-Watershed Study Areas

Study Area	Name of Development	Approx. Date Developed	Type of Drainage System	Approx. Length of Street being drained (ft)	Approx. Drainage Area (ac)	Pipe/Culvert Outlet Size @ Ravine Head (inches)	Description of Ravine w/in 100 feet of water source
12	Mossville Point	May-73	storm sewer	2266	4.0	18" RCP	A storm sewer system outlets at the head of this ravine, about 15 feet below the street grade. The outlet, an 18" cast-in-place end-section with a concrete energy dissipater block, has been undermined about four feet. Just downstream of the end-section, the erosion cut is triangular in shape, about 8-10 feet wide by about 8 feet deep. Note the trees up the slope are being undermined by the erosion. The condition is unstable.
13	The Oaks	Early 1990s	storm sewer	2692	3.8	12" RCP SS outlet + 18" (equiv.) RCP	A storm sewer system outlets at this road ditch. The outlet, an 12" precast reinforced end-section, has silted in about 6 inches deep. An elliptical crossroad culvert (about 18" diameter equivalent) also outlets here. The road ditch appears stable at this point.
14	The Oaks	Early 1990s	storm sewer	473	3.0	15" RCP	A storm sewer system outlets at the head of this ravine. The 15" precast end-section, outlets in a fairly stable condition. The flowline slope is mild. Slopes and channel bottom are lined with rock.
15	The Oaks	Early 1990s	storm sewer	901	2.7	18" RCP	A storm sewer system outlets at the head of this ravine, about 15 feet below the street grade. The outlet, an 18" precast end-section with a cemented riprap dissipation pad, has been undermined about three feet. Just downstream of the riprap, the ravine drops another 8 feet. The erosion cut downstream is triangular in shape, about 8 feet deep by about 8 feet wide. The condition is unstable.
16	(private)	Early 1950s	road ditches/ culverts	26	0.2	none	Fairly stable: Mild flowline slope, no visible active erosion. Area planted with groundcover (Winter Creeper). The retaining wall between the ravine area and the driveway is leaning into the ravine.
17	(private)	Early 1950s	road ditches/ culverts	310	0.4	none	Steep ravine area, planted with groundcover on left DS slope (Winter Creeper). Erosion cuts visible in bottom at the confluence of two flowlines: about 4 to 6 ft deep by 8 ft wide.
18	(private)	Early 1950s	road ditches/ culverts	463	0.4	none	Some erosion visible in bottom of ravine. Very little ground cover, lots of leaves.
19	(private)	Early 1950s	road ditches/ culverts	463	0.4	none	Nearly level area between roadway and ravine head. Sparse vegetation in shaded area. Little vegetation in wooded ravine area. 3-ft deep cut at ravine bottom

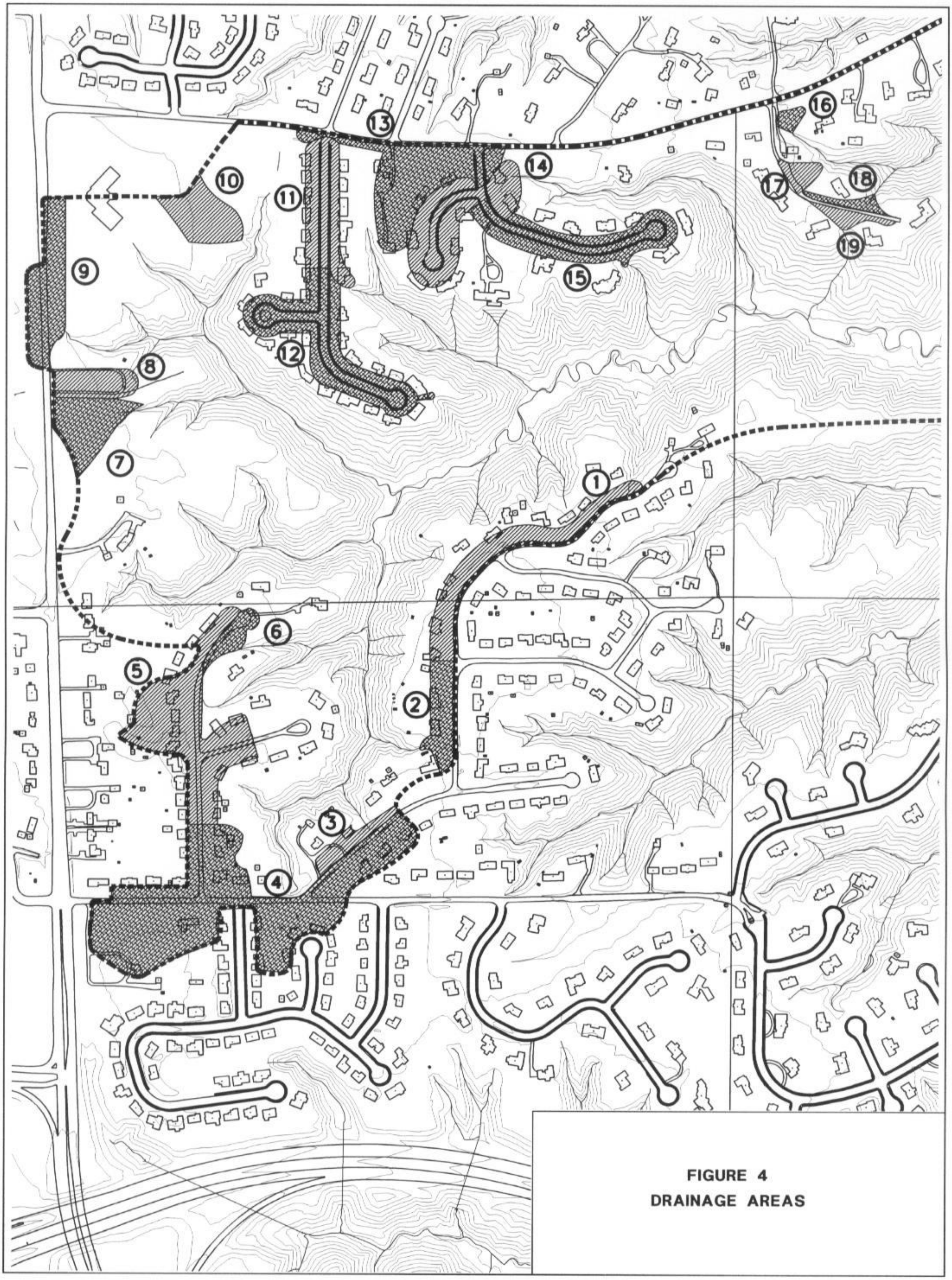


FIGURE 4
DRAINAGE AREAS

Observations

Erosion from the stormwater management systems is evident as documented during the field investigation.

Underground Storm Sewer Systems

Two of the underground stormwater management system outlets show significant erosion. In each case, the outlet is undercut, and the ravine has eroded 8 to 10 feet deep immediately downstream of the outlet elevation. See Photos 1, 2, and 3.

Slope stability at these storm sewer outlets is in jeopardy. Photo 4 shows slope failure directly above the outlet, which will affect the health and stability of the slope vegetation (trees). Houses constructed in close proximity to these failing ravine slopes may also realize negative impacts.

Construction drawings at Mossville Point indicate that the storm sewer outlets were constructed at the existing ravine flowline. It can be easily assumed that the second outlet in The Oaks was also constructed at the existing grade. The Mossville Point stormwater infrastructure was constructed in the early 1970s, and The Oaks was constructed in the early 1990s. The erosion documented has occurred in less than 30 and less than 10 years respectively.

Overland Drainage Systems

Erosion is also evident at outlet points for overland stormwater management systems. Photo 5, Ravinwoods Farm, shows the outlet for a 12.7 acre drainage area through 36-inch and 18-inch corrugated metal culverts. At this location, the culverts have been undercut by two feet. Slope stability problems were not observed in April. However, the adjacent land owner has installed rock riprap along the ravine slope, immediately downslope of the culverts (Photo 6). Protection may have been needed due to erosion from the culvert discharge, or from the additional surface or subsurface runoff discharged at the ravine slope through four to six drain pipes.

Photo 1 Study Area #15 - Grand Oak Drive - Erosion DS of end section and riprap is about 8-ft deep. (0_pic12.jpg)

Photo 2 Study Area #12 - Sleepy Hollow Road - SS outlet: 18" RCP and CIP end section with disipation block. Slope is undercutting end section 4-ft deep. (0_19pic.jpg)

Photo 3 Study Area #12 - Sleepy Hollow Road - Looking DS from end section. Erosion cut is about 8-ft deep and 8-ft wide (triangular section) (0_pic21.jpg)

Photo 4 Study Area #12 - Sleepy Hollow Road - Looking US and to the LT of SS outlet. Note tree life in jeopardy due to slope failure. (0_pic23.jpg)

Photo 5 Study Area #4 - Ravinswood Dr/Ravin Rd - Looking US at head of ravine. One 18" diameter and one 36" diameter CMP outlet at this point. (0_pic07.jpg)

Photo 6 Study Area #4 - Ravinswood Dr/Ravin Rd - Looking DS from head of ravine. Deep cuts below culvert (0_pic06.jpg)

Photo 7 Study Area #1 - N. North Forest Trail - Looking DS at head of ravine. 6' deep cut working its way toward roadway (0_pic00.jpg)

Erosion was also observed at some locations where overland ditch flow enters the ravine (no culvert at outlet point). A six-foot deep by six-foot wide cut was observed in the wooded ravine just down slope of the point where this overland system discharges into the ravine. (See Photo 7.) Though many of these points had little to no noticeable fresh erosion cuts.

In the ravine where the Knoxville Avenue cross-road culvert discharges, there is a history of erosion problems. The Illinois Department of Conservation assisted with construction of six to eight grade control structures (concrete block and steel fence posts). These structures have collected sediment, and have since failed. In April, fresh erosion cuts about 50 feet downstream of the first control structure measured three feet deep and three to four feet wide. (See Photos 8 and 9).

At other overland system outlet points, much less erosion was observed. These points included those with smaller drainage areas, and/or gentler slopes at the ravine heads.

Potential Future Development

Future development will have an impact on the restoration efforts within the sub-watershed area. Only about seven acres, currently in agricultural use, is available for development. These seven acres are adjacent to Knoxville Avenue, just south of the Cemetery.

Other potential "improvements" which may affect the sub-watershed include roadway widening and the replacement of overland drainage systems with curb and gutter and storm sewers. Plans have already been developed to widen Knoxville Avenue.

Photo 8 Study Area #8 - Knoxville Avenue - Failed grade control structure (concrete block and fence posts) further US of confluence. (2_pic24.jpg)

Photo 9 Study Area #9 - Knoxville Avenue - 3-ft deep by 4-ft wide head cut about 50-ft US of first grade stabilization structure. (3_pic2.jpg)

Restoration Concept Plan

Based on the study of the sub-watershed, the following best management practices as described in Chapter 2 – Watershed Master Plan, were identified as effective restoration tools for the sub-watershed. The proposed locations for each of the practices are shown in Figure 5 – Mossville Bluffs Restoration Concept Plan.

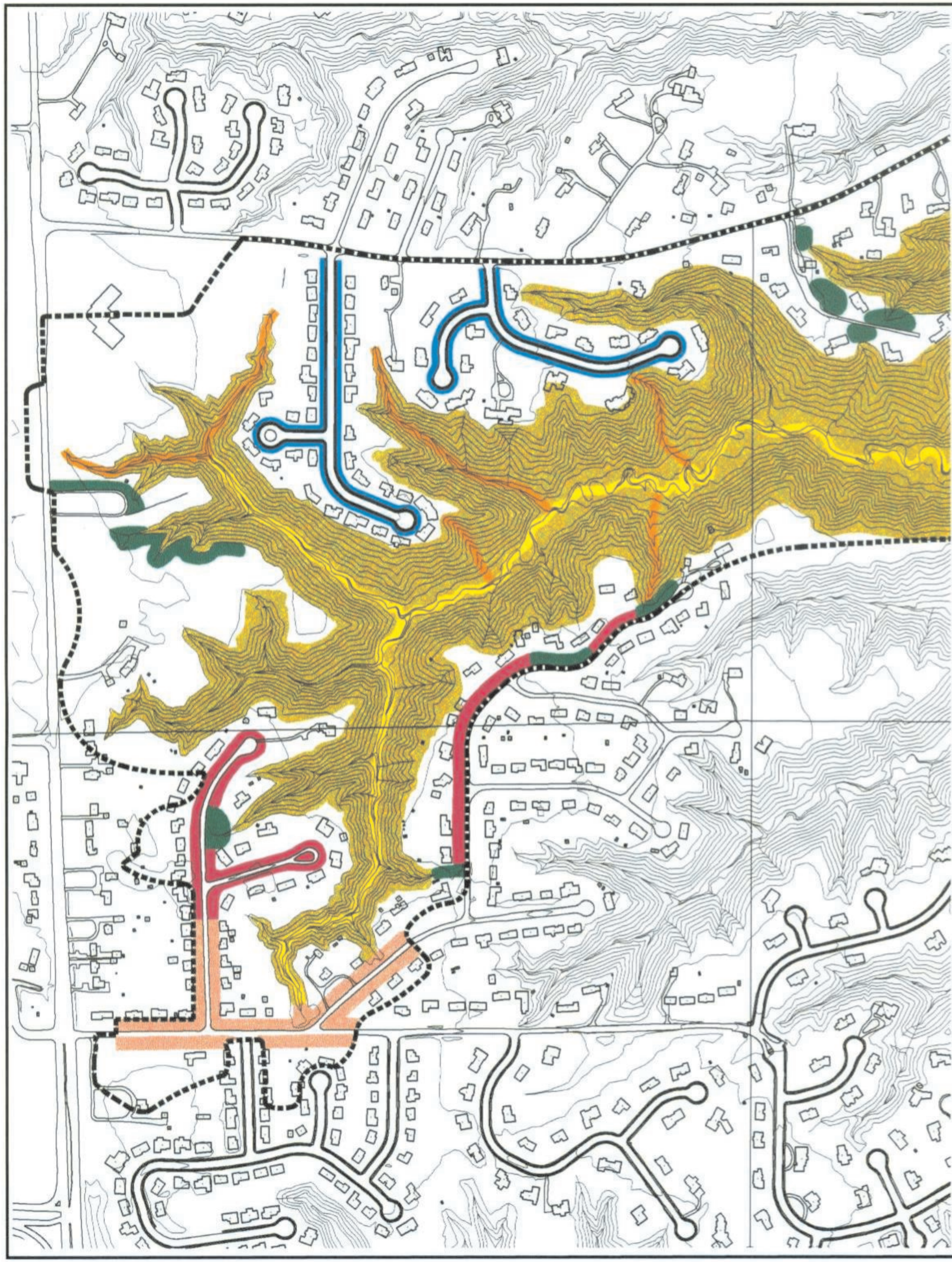
1) Vegetative Buffer Strips – Buffer strips are recommended at the heads of ravines, where there are relatively flat open areas.
2) Infiltration Trenches - This practice is recommended for those areas that have existing curb and gutter with storm sewer. Additional curb inlets with sand filters will be needed upstream of each existing curb inlet, to provide a flowpath from the roadway to the infiltration trench. The existing storm sewer system should remain in place for storm events in excess of the design storm. Example calculations for sizing the infiltration trench, based on the Rational Method, are shown in Tables 2 and 3. Table 2 shows a design for a 1-year frequency storm event, resulting in a trench depth of 3.1 feet; while Table 3 shows a design for a 2-year frequency storm event, resulting in a trench depth of 3.9 feet.
3) Rainwater Gardens – This practice is recommended in areas with existing broad, shallow swales. Typically these areas are less than 2 feet deep and are at the upstream end of individual drainage areas.
4) Native Vegetation – This practice is recommended in those areas that have existing roadside ditches. These areas typically have steeper slopes (for example, steeper than 1-foot vertical to 4-feet horizontal) and are deeper than 2 feet.
5) Vegetative Restoration – Vegetative restoration is recommended for all ravine slopes.
6) Ravine Flowline Restoration – Ravine Flowline Restoration is recommended throughout the sub-watershed, though some areas are designated as "high-priority" areas based on the observations made during the field investigation. At the time, these areas showed signs of the most severe erosion.

In addition, the following practices are recommended throughout the watershed on individual properties. Downspouts and sump pump discharge pipes should be re-routed or diverted to any combination of these practices.

1) Rainwater Gardens
2) Rain Barrels
3) Vegetative Buffer Strips with Level Spreaders
4) Cisterns

Finally, it is recommended that dumping of grass clippings, leaves, or other natural or manmade debris into the ravine slopes be prohibited through out the sub-watershed. Presence of these "dumpings" prevents vegetation growth.

The Mossville Bluffs Restoration Concept Plan is based on knowledge of the sub-watershed gained throughout the process of developing the Watershed Master Plan and through this Stormwater Management Study. Some of the site-specific practices shown on the Concept Plan as well as those recommended for application throughout the sub-watershed will require additional field investigation and design prior to implementation. Additional data needed may include engineering field surveys, field measurements, or soil testing to determine slopes, drainage area, soil types and permeability rates. These design considerations are listed in the Best Management Practices Toolbox in Chapter 2.



LEGEND

- VEGETATIVE BUFFER STRIP
- INFILTRATION TRENCH (DETAIL 1-2)
- RAINWATER GARDEN (DETAIL 2-2)
- NATIVE VEGETATION
- VEGETATIVE RESTORATION
- RAVINE FLOWLINE RESTORATION (HIGHEST PRIORITY)
- RAVINE FLOWLINE RESTORATION

GENERAL NOTES

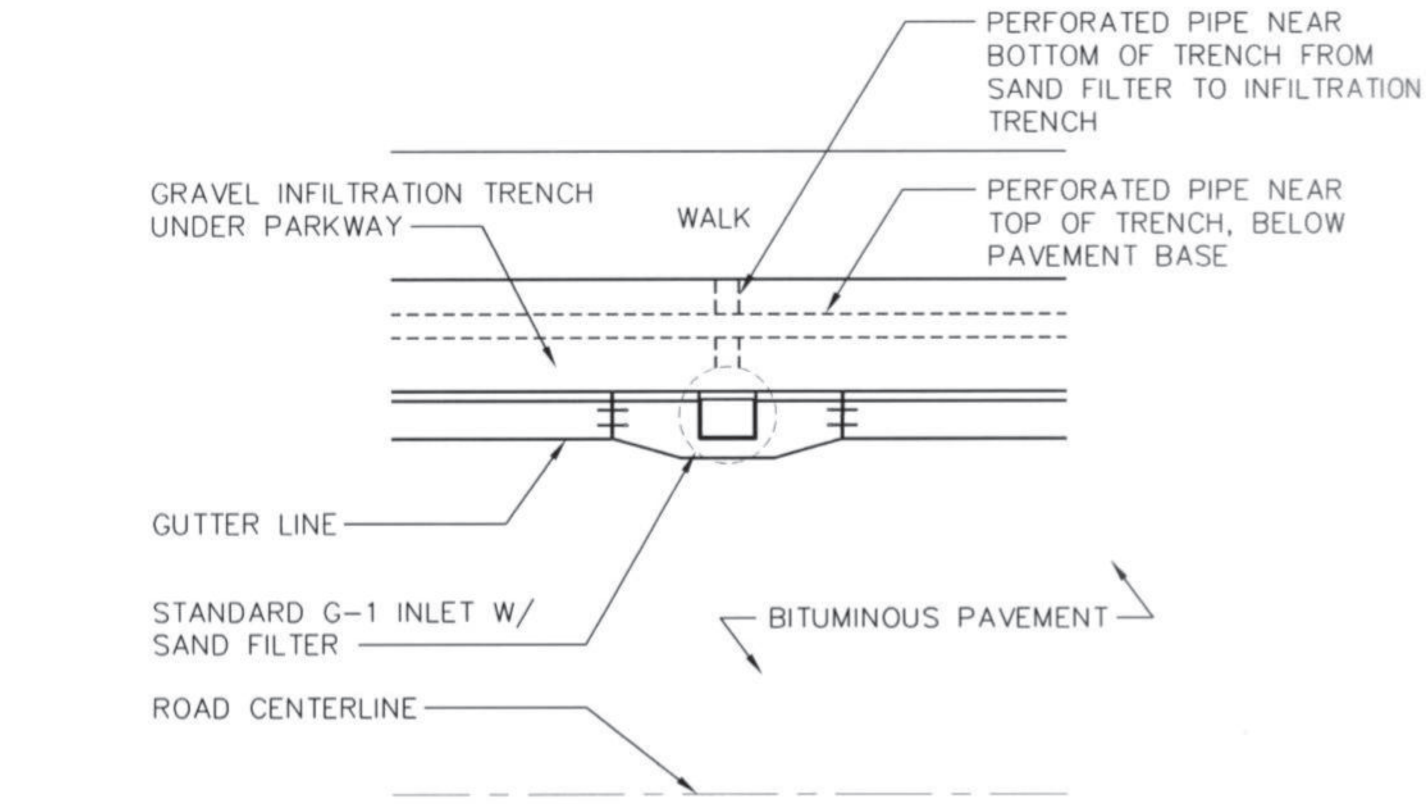
1) DISCONNECT DOWNSPOUT AND SUMP PUMP DISCHARGE PIPES FROM BOTH THE RAVINE SYSTEM AND THE STREET/STORM SEWER SYSTEM. REROUTE PIPES TO INDIVIDUAL INFILTRATION AND/OR DETENTION PRACTICES SUCH AS RAIN GARDENS, CISTERNS, VEGETATIVE BUFFER STRIPS WITH LEVEL SPEADERS, OR RAINBARRELS.

2) PROHIBIT DUMPING OF GRASS CLIPPINGS, LEAVES, OR OTHER NATURAL OR MAN-MADE DEBRIS INTO THE RAVINE SYSTEM. SUCH DUMPING MAY DAMAGE UNDERLYING VEGETATION OR PREVENT THE RE-ESTABLISHMENT OF VEGETATION.

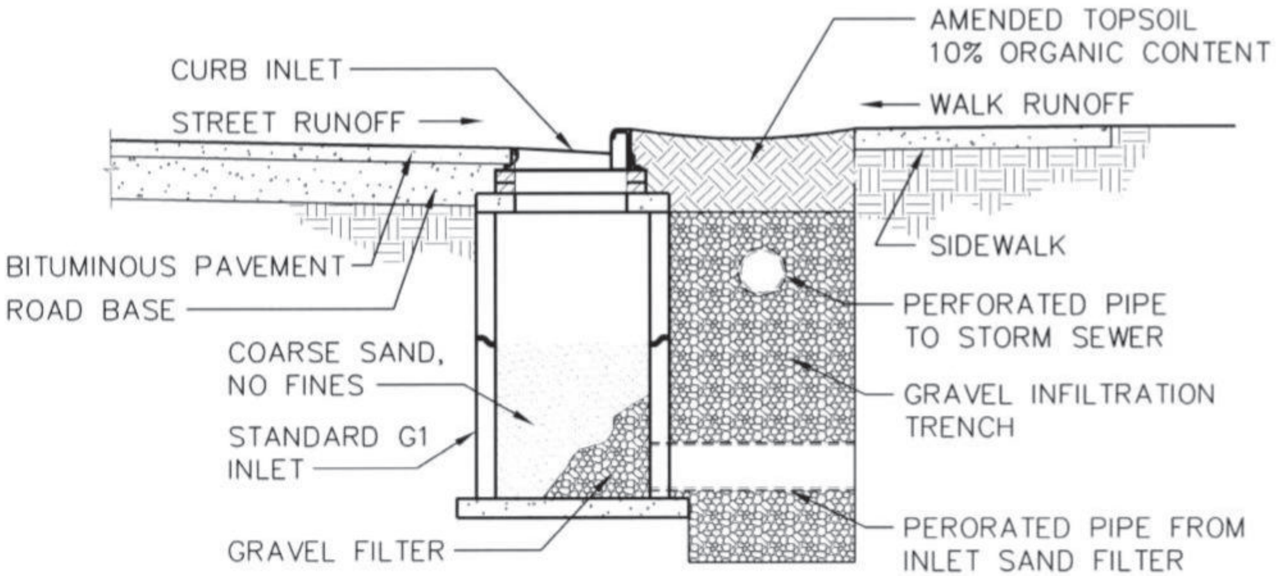
3) RAVINE FLOWLINE RESTORATION MAY BE NEEDED THROUGHOUT THE PILOT WATERSHED AREA. HIGH PRIORITY AREAS ARE DESIGNATED ON THE MAP. THESE ARE AREAS THAT THE MOST SEVERE "ACTIVE" EROSION WAS NOTED DURING THE FIELD INVESTIGATION. IF THESE AREAS ARE NOT STABILIZED, DAMAGE TO ADJACENT PROPERTY IS LIKELY TO RESULT.

4) SLOPE VEGETATIVE RESTORATION IS NEEDED THROUGH OUT THE PILOT WATERSHED AREA. PRIORITY AREAS ARE ABOVE THOSE RAVINE FLOWLINES DESIGNATED FOR RAVINE FLOWLINE RESTORATION (HIGHEST PRIORITY).

FIGURE 5
MOSSVILLE BLUFFS RESTORATION CONCEPT PLAN



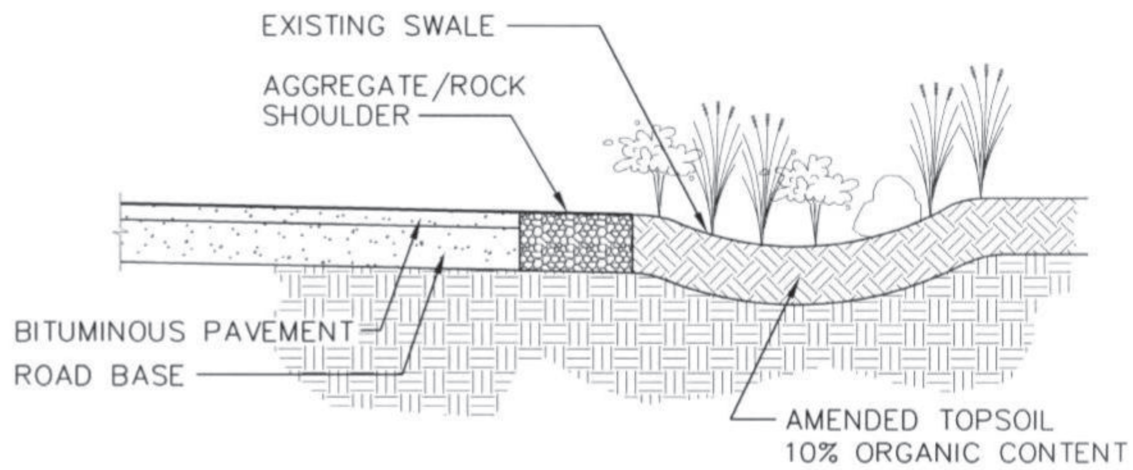
PLAN



SECTION

1/2 **INFILTRATION TRENCH**

SCALE: NOT TO SCALE



2/2 **RAINWATER GARDEN**

SCALE: NOT TO SCALE

FIGURE 5
MOSSVILLE BLUFFS RESTORATION CONCEPT PLAN

Table 2. Mossville Bluffs Watershed Restoration Concept Plan
Infiltration Trench Design for a 1-year Frequency Storm Event

Concept Plan Area based on	800	LF of roadway
Width of Pavement and Sidewalks	45	ft
Width of Vegetated Area	8	ft
Drainage Area (A), acres	0.97	
Infiltration Rate, in/hr	0.6	from USGS Soil Survey
Factor of Safety	2	
Release Rate, in/hr	0.3	Infiltration Rate divided by Factor of Safety
Width of Infiltration Trench, ft.	3	
Area of Infiltration Trench,sq.ft.	3840	equals 80% length of roadway times trench width times 2 (one on each side of roadway)
Release Rate, cfs	0.03	equals Release Rate times the Area of Infiltration

	Drainage Area, A (acres)	Rational Runoff Coeffient, C	
Perv =	0.15	0.17	
Imperv =	0.83	0.90	
Total =	0.98	0.79	Weighted Runoff Coefficient

Storm Duration, t (min.)	Weighted Runoff Coefficient, C	1-year Rainfall Intensity, i1 (In/Hr.)	Drainage Area, A (acres)	Inflow Rate, Qi=Ci1A (cfs)	Release Rate, Qo, (cfs)	Storage Rate, Qi-Qo (cfs)	Storage Required, (Qi-Qo)*t*60 (cf)	Req'd. Trench Vol. (Assume 40% porosity)	Trench Depth, ft
5	0.79	3.600	0.98	2.79	0.03	2.76	830	2075	0.5
10	0.79	3.000	0.98	2.32	0.03	2.29	1370	3425	0.9
15	0.79	2.720	0.98	2.11	0.03	2.08	1870	4675	1.2
20	0.79	2.289	0.98	1.77	0.03	1.74	2090	5225	1.4
25	0.79	2.033	0.98	1.57	0.03	1.54	2310	5775	1.5
30	0.79	1.860	0.98	1.44	0.03	1.41	2540	6350	1.7
35	0.79	1.666	0.98	1.29	0.03	1.26	2650	6625	1.7
40	0.79	1.520	0.98	1.18	0.03	1.15	2760	6900	1.8
45	0.79	1.407	0.98	1.09	0.03	1.06	2860	7150	1.9
50	0.79	1.316	0.98	1.02	0.03	0.99	2970	7425	1.9
55	0.79	1.241	0.98	0.96	0.03	0.93	3070	7675	2.0
60	0.79	1.180	0.98	0.91	0.03	0.88	3170	7925	2.1
90	0.79	0.887	0.98	0.69	0.03	0.66	3560	8900	2.3
120	0.79	0.740	0.98	0.57	0.03	0.54	3890	9725	2.5
180	0.79	0.537	0.98	0.42	0.03	0.39	4210	10525	2.7
240	0.79	0.426	0.98	0.33	0.03	0.30	4320	10800	2.8
300	0.79	0.359	0.98	0.28	0.03	0.25	4500	11250	2.9
360	0.79	0.315	0.98	0.24	0.03	0.21	4540	11350	3.0
420	0.79	0.277	0.98	0.21	0.03	0.18	4540	11350	3.0
480	0.79	0.248	0.98	0.19	0.03	0.16	4610	11525	3.0
540	0.79	0.226	0.98	0.17	0.03	0.14	4540	11350	3.0
600	0.79	0.208	0.98	0.16	0.03	0.13	4680	11700	3.0
720	0.79	0.181	0.98	0.14	0.03	0.11	4750	11875	3.1
1080	0.79	0.127	0.98	0.10	0.03	0.07	4540	11350	3.0
1440	0.79	0.105	0.98	0.08	0.03	0.05	4320	10800	2.8

Rainfall data from I.S.W.S. Bulletin-70, for Central Illinois

Table 3. Mossville Bluffs Watershed Restoration Concept Plan
Infiltration Trench Design for a 2-year Frequency Storm Event

Concept Plan Area based on	800	LF of roadway
Width of Pavement and Sidewalks	45	ft
Width of Vegetated Area	8	ft
Drainage Area (A), acres	0.97	
Infiltration Rate, in/hr	0.6	from USGS Soil Survey
Factor of Safety	2	
Release Rate, in/hr	0.3	Infiltration Rate divided by Factor of Safety
Width of Infiltration Trench, ft.	3	
Area of Infiltration Trench,sq.ft.	3840	equals 80% length of roadway times trench width times 2 (one on each side of roadway)
Release Rate, cfs	0.03	equals Release Rate times the Area of Infiltration

	Drainage Area, A (acres)	Rational Runoff Coeffient, C	
Perv =	0.15	0.17	
Imperv =	0.83	0.90	
Total =	0.98	0.79	Weighted Runoff Coefficient

Storm Duration, t (min.)	Weighted Runoff Coefficient, C	2-year Rainfall Intensity, i2 (In/Hr.)	Drainage Area, A (acres)	Inflow Rate, Qi=Ci2A (cfs)	Release Rate, Qo, (cfs)	Storage Rate, Qi-Qo (cfs)	Storage Required, (Qi-Qo)*t*60 (cf)	Req'd. Trench Vol. (Assume 40% porosity)	Trench Depth, ft
5	0.79	4.320	0.98	3.34	0.03	3.31	990	2475	0.6
10	0.79	3.960	0.98	3.07	0.03	3.04	1820	4550	1.2
15	0.79	3.240	0.98	2.51	0.03	2.48	2230	5575	1.5
20	0.79	2.739	0.98	2.12	0.03	2.09	2510	6275	1.6
25	0.79	2.441	0.98	1.89	0.03	1.86	2790	6975	1.8
30	0.79	2.240	0.98	1.73	0.03	1.70	3060	7650	2.0
35	0.79	2.006	0.98	1.55	0.03	1.52	3190	7975	2.1
40	0.79	1.830	0.98	1.42	0.03	1.39	3340	8350	2.2
45	0.79	1.693	0.98	1.31	0.03	1.28	3460	8650	2.3
50	0.79	1.584	0.98	1.23	0.03	1.20	3600	9000	2.3
55	0.79	1.495	0.98	1.16	0.03	1.13	3730	9325	2.4
60	0.79	1.420	0.98	1.10	0.03	1.07	3850	9625	2.5
90	0.79	1.067	0.98	0.83	0.03	0.80	4320	10800	2.8
120	0.79	0.890	0.98	0.69	0.03	0.66	4750	11875	3.1
180	0.79	0.643	0.98	0.50	0.03	0.47	5080	12700	3.3
240	0.79	0.510	0.98	0.39	0.03	0.36	5180	12950	3.4
300	0.79	0.430	0.98	0.33	0.03	0.30	5400	13500	3.5
360	0.79	0.377	0.98	0.29	0.03	0.26	5620	14050	3.7
420	0.79	0.331	0.98	0.26	0.03	0.23	5800	14500	3.8
480	0.79	0.298	0.98	0.23	0.03	0.20	5760	14400	3.8
540	0.79	0.271	0.98	0.21	0.03	0.18	5830	14575	3.8
600	0.79	0.250	0.98	0.19	0.03	0.16	5760	14400	3.8
720	0.79	0.218	0.98	0.17	0.03	0.14	6050	15125	3.9
1080	0.79	0.153	0.98	0.12	0.03	0.09	5830	14575	3.8
1440	0.79	0.126	0.98	0.10	0.03	0.07	6050	15125	3.9

Rainfall data from I.S.W.S. Bulletin-70, for Central Illinois

Appendix B - Code & Ordinance Summary

Appendix B - Summary of Codes and Ordinances and Recommended Actions

Item	Topic	Document Type	City Requirements	County Requirements	Reference	Recommended Action
1	Public Ways	Code	Public ways to be kept free of encumbrances.		City of Peoria (City of Peoria) Municipal Code Section 26-11	none
2	Driveway - Residential					
	Widths	Code	12' for single & 20' double or joint		City of Peoria Municipal Code Sec. 26-208 b.1	none
	Material	Code	Approach shall be either 6" rock base w/ 1.5" bituminous surface, or 6" Portland cement concrete.		City of Peoria Municipal Code Sec. 26-208 b.4	Allow (encourage) permeable or porous pavers
3	Driveway - Non-residential					
	Widths	Code	Not to exceed 30' with some exceptions		City of Peoria Municipal Code Sec. 26-209 c.1(a,b,c)	none
	# Drives/single parcel	Code	1 for frontage <= 65', 1-two way or 2-one ways for frontage >65' but <125', 2-two ways for frontage >125' but <200', 1 additional two way permitted for each additional 300' for frontage >200'		City of Peoria Municipal Code Sec. 26-209 c.5 (a,b,c,d)	none
	Material	Code	Approach shall be Portland cement concrete 6" min. depth at gutter line, shall be faced w/ raised vertical. Lip of not less than 1 5/8", which shall be rounded off in finishing		City of Peoria Municipal Code Sec. 26-209 c.6	Allow (encourage) permeable or porous pavers
4	Weeds	Code				
	Defined	Code	Defined: all noxious vegetation and all grasses, annual plants and vegetation other than trees or shrubs which exceed a height or length of ten inches; provided, however, this term shall not included cultivated flowers and gardens.		City of Peoria Municipal Code Sec. 13-1 Definitions	Allow use of native grasses and flowers in lawn areas and buffers
	Ruling	Code	All weeds are hereby declared to be public nuisance.		City of Peoria Municipal Code Sec. 13-76	none
	Growth	Code	It shall be unlawful for any owner or person in control of any real property to permit the growth of weeds.		City of Peoria Municipal Code Sec. 13-77a	none
5	Sewage	Code	No person shall discharge or cause to be discharged any sewage or industrial wastewater into any connection with any sewer or drain designated by the director, for the exclusive conveyance of stormwater.		City of Peoria Municipal Code Sec. 31-33	none
6	Downspout Connections	Code	No person shall connect any downspout, footing tile, septic tank, or cesspool to the building sewer, nor shall any other source of storm or groundwater be permitted into the sanitary sewers.		City of Peoria Municipal Code Sec. 31-56	none
7	Streets					
	Freeway	Code	Right-of-way = 200'-250', Pavement width = 52'-76', lane width = 12', median width = 26', min. return radii = N/A, and parking is prohibited.		City of Peoria Municipal Code Section 5-102	none
	Expressway	Code	Right-of-way = 150'-200'', Pavement width = 52'-76', lane width = 12', median width = 22', min. return radii = N/A, and parking is prohibited.		City of Peoria Municipal Code Section 5-102	none

Appendix B - Summary of Codes and Ordinances and Recommended Actions

Item	Topic	Document Type	City Requirements	County Requirements	Reference	Recommended Action
	Primary Arterial	Code	Right-of-way = 100', Pavement width = 52', lane width = 4'-22' (22' req'd for channalization), median width = 26', min. return radii = N/A, and parking is prohibited if possible.		City of Peoria Municipal Code Section 5-102	none
	Secondary Arterial	Code	Right-of-way = 100', Pavement width = 48', lane width = 12', median width = 4', min. return radii = 30', and parking is prohibited if possible.		City of Peoria Municipal Code Section 5-102	none
	Commercial Collectors	Code	Right-of-way = 80', Pavement width = 44', lane width = 11'-12' (two 12' driving lanes & two 10' parking lanes or four 11' driving lanes), median width = 0, min. return radii = 30', and parking is dependent upon conditions.	ROW Residential: 60'; Non-Residential: 60' Surface Width Residential: 26', Non-Residential: 36'.	City of Peoria Municipal Code Section 5-102; County of Peoria Subdivision Ordinance Section 20-5-11.H.3 Table 5-2	none
	Industrial Collectors	Code	Right-of-way = 80', Pavement width = 44', lane width = 11'-12' (two 12' driving lanes & two 10' parking lanes or four 11' driving lanes), median width = 0, min. return radii = 30', and parking is dependent upon conditions.	ROW Residential: 60'; Non-Residential: 60' Surface Width Residential: 26', Non-Residential: 36'.	City of Peoria Municipal Code Section 5-102; County of Peoria Subdivision Ordinance Section 20-5-11.H.3 Table 5-2	none
	Residential Collectors	Code	Right-of-way = 65', Pavement width = 44', lane width = 11'-12' (two 12' driving lanes & two 10' parking lanes or four 11' driving lanes), median width = 0, min. return radii = 25', and parking is dependent upon conditions.	ROW Residential: 60'; Non-Residential: 60' Surface Width Residential: 26', Non-Residential: 36'.	City of Peoria Municipal Code Section 5-102; County of Peoria Subdivision Ordinance Section 20-5-11.H.3 Table 5-2	none
	Local	Code	Right-of-way = 55', Pavement width = 34', lane width = 11', median width = 0, min. return radii = 20', and parking is permitted.	ROW Residential: 54'; Non-Residential: 60' Surface Width Residential: 24', Non-Residential: 30'.	City of Peoria Municipal Code Section 5-102; County of Peoria Subdivision Ordinance Section 20-5-11.H.3 Table 5-2	Allow as part of a P.U.D with open space: $\geq$ 22' width without parking and $\geq$ 28' width with parking one side
	Private	Code	Right-of-way = N/A, Pavement width = 22', lane width = 11', median width = 0, min. return radii = 20', and parking is prohibited.	ROW Residential: 25'; Non-Residential: not permitted Surface Width Residential: 18', Non-Residential: Not-Permitted.	City of Peoria Municipal Code Section 5-102; County of Peoria Subdivision Ordinance Section 20-5-11.H.3 Table 5-2	none
	State	Ordinance		ROW and Surface Width to be determined by IDOT or County Engineer.	County of Peoria Subdivision Ordinance Section 20-5-11.H.3 Table 5-2	none
	County Primary	Ordinance		ROW and Surface Width to be determined by IDOT or County Engineer.	County of Peoria Subdivision Ordinance Section 20-5-11.H.3 Table 5-2	none

Appendix B - Summary of Codes and Ordinances and Recommended Actions

Item	Topic	Document Type	City Requirements	County Requirements	Reference	Recommended Action
	County Non-Primary	Ordinance		ROW and Surface Width to be determined by IDOT or County Engineer.	County of Peoria Subdivision Ordinance Section 20-5-11.H.3 Table 5-2	none
	Alley	Ordinance		ROW Residential: 17'; Non-Residential: 25'; Surface Width Residential: 15', Non-Residential: 20'.	County of Peoria Subdivision Ordinance Section 20-5-11.H.3 Table 5-2	Allow as part of a P.U.D with open space: residential alley ≥ 15'
8	Culs-de-sac					
	Local Res./private Street	Code	Dead-end streets no more than 400' long and must have an 80' roadway diameter turn-around and 100' diameter ROW.	Temporary turnaround shall be in the shape of a "T" or "Y" and shall measure 60' x 24'; ROW Residential: 50'; Non-Residential: 60': Surface Width Residential: 24', Non-Residential: 30'.	City of Peoria Municipal Code Section 5-102 C.1; County of Peoria Section 20-5-11.b.2.c,d; County of Peoria Subdivision Ordinance Section 20-5-11.H.3 Table 5-2	Allow as part of a P.U.D.:vegetated island
	Minor Residential Street	Code	100' diameter ROW with 80' diameter pavement or a 20' x 25' turnaround.	Temporary turnaround shall be in the shape of a "T" or "Y" and shall measure 60' x 24'	City of Peoria Municipal Code Section 5-102 C.1; County of Peoria Section 20-5-11.b.2.c,d	Allow as part of a P.U.D.: vegetated island
9	Sidewalks					
	Industrial Zoned Areas	Code	No sidewalks req'd. on local streets. Sidewalks are req'd. on thoroughfares on both sides of the urban/rural section street.		City of Peoria Municipal Code Section 5-102 J.1	Allow wider sidewalk on one side only to accommodate pedestrian/bicycle traffic
	Res./comm. Zoned Areas	Code	Sidewalks are req'd. on both sides of local roads and thoroughfares, one foot from the property line for urban section roadways. For rural section roads the sidewalk must be placed outside the swale (ditch) with additional ROW dedicated if req'd.		City of Peoria Municipal Code Section 5-102 J.2	Allow as part of P.U.D.: allow alternate multi-use paths in lieu of one or both sidewalks
	Developed Areas	Code	Undeveloped parcels within built-up areas where a majority of the property adjacent thereto do no have sidewalks along the thoroughfare, as determined by the city.		City of Peoria Municipal Code Section 5-102 J.3	none
	Widths	Code	Concrete sidewalks of at least 5' in width, 4" thick and 6" thick at driveways shall be constructed on both sides of each street 12" from the right of way.	Sidewalks req'd both sides of all streets in a residential subdivision containing lots having an area of less than 1/2 acre. Sidewalks req'd on only one side of every street in a res. Subdivision containing lots having an area between 1/2 and 1 acre. Sidewalks are not required in a residential subdivision containing lots having an area greater than one acre. Sidewalks will be a minimum of 4' in width and located a minimum of 1' inside the ROW line.	City of Peoria Municipal Code Section 6-103: County of Peoria Subdivision Ordinance Section 20-5-12.E.1.a,b,c,d	Allow (encourage) permeable or porous pavers

Appendix B - Summary of Codes and Ordinances and Recommended Actions

Item	Topic	Document Type	City Requirements	County Requirements	Reference	Recommended Action
10	Curb and Gutters	Code	Curb and gutters shall be constructed along all dedicated streets. The developer shall have an option to construct curbs and gutters along private streets.		City of Peoria Municipal Code Section 5-102 K	Allow as part of a P.U.D.: overland drainage systems
11	Drainage Easement	Code	Where subdivisions abut or include a creek or tributaries thereto, a drainage easement shall be dedicated to the City of Peoria for drainage and future improvements of such watercourse. An access easement will also be granted to the City of Peoria for maintenance.		City of Peoria Municipal Code Section 5-205	none
12	Drainage Plan	Code	Prior to approval by the City of Peoria of construction plans for public improvements in a subdivision within the city's jurisdiction, the owner shall prepare a drainage plan of the area covered by the subdivision plat.		City of Peoria Municipal Code Section 5-206	none
13	Surface Water Drainage	Code	Shall be provided by storm sewers or drainage courses adequate to drain surface water from the development and protect roadway pavements. Existing water courses shall be maintained and no development is permitted which would restrict the flow in such a watercourse		City of Peoria Municipal Code Section 6-106	Allow (encourage) alternate ground cover including native grasses and forbs.
14	Req'd. Landscaped Yards	Code	A landscaped perimeter yard outside of the street ROW of at least 25' in depth, exclusive of driveways, shall surround every retail service area; except that on side yards and rear yards a decorative screen of a minimum of 4' in height may be substituted.		City of Peoria Municipal Code Section 8-404	none
15	Common Open Space					
	Defined	Code	Permanent open space shall be defined as parks, playgrounds, landscaped green space not including schools, community centers or other similar areas in public ownership or areas covered by an open space easement		City of Peoria Zoning Ordinance Section 2.15. L.5.a	none
	Designated	Code	Must provide for permanent landscaped open space equivalent to the following: Planned residential = 35%, planned commercial = 10%, planned office = 25%, and planned industrial = 15%.		City of Peoria Zoning Ordinance Section 2.15. L.5.b	none
16	Setback Regulations	Ordinance	State and county designated highways and primary thoroughfares as indicated on the official thoroughfare map of the City of Peoria: all buildings 100' from the centerline or 25' from the ROW, whichever may be greater.		City of Peoria Zoning Ordinance Section 3.1 f.11	none
17	Lot Size Requirements					
	A1 Agricultural District	Ordinance	All lots within the A1 District:10 acres.		City of Peoria Zoning Ordinance Section 7.2.d	none

Appendix B - Summary of Codes and Ordinances and Recommended Actions

Item	Topic	Document Type	City Requirements	County Requirements	Reference	Recommended Action
	RE Estate Residence District	Ordinance	Minimum Lot Area: 87,120 sq. ft (2 acres).		City of Peoria Zoning Ordinance Section 7.3.d	Allow as part of P.U.D. with open space.: 1 dwelling unit per 2 acres: with minimum lot - 15,000 sq. ft. and minimum lot width at building - 80'
	R1 Single-Family Residence District	Ordinance	Minimum Lot Area: 21,780 sq. ft. with minimum lot width: 80', 100' on corner lots.		City of Peoria Zoning Ordinance Section 7.4.d	Allow as part of P.U.D. with open space.: Minimum street frontage - 20', minimum lot width at building - 80'
	R2 Single-Family Residence District	Ordinance	Minimum Lot Area: 10,890 sq. ft. with minimum lot width: 70', 95' on corner lots.		City of Peoria Zoning Ordinance Section 7.5.d	Allow as part of P.U.D. with open space.: Minimum street frontage - 20', minimum lot width at building - 80'
	R3 Single-Family Residence District	Ordinance	Minimum Lot Area: 6,000 sq. ft. with minimum lot width: 40', Residential cluster development: 2 acres, residential cluster dwelling unit: 8,700 sq. ft.		City of Peoria Zoning Ordinance Section 7.6.d	Allow as part of P.U.D. with open space.: Minimum lot width at building - 50'
	R4 Single-Family Residence District	Ordinance	Minimum Lot Area: 3,750 sq. ft. with minimum lot width: 37'.		City of Peoria Zoning Ordinance Section 7.7.d	none
	R5 Residential Cluster Development District	Ordinance	Minimum Lot Area: 7,500 sq. ft. with minimum lot width: 22' or 90' per structure, Residential cluster development: 2 acres, minimum lot area per dwelling unit: 3,600 sq. ft.		City of Peoria Zoning Ordinance Section 7.8.d	Allow as part of P.U.D. with open space.: 1 dwelling unit per 60,000 sq. ft.: with minimum lot - 7,500 sq. ft., minimum lot frontage - 20', minimum lot width at building - 80'
	R6 Multi-Family Residence District	Ordinance	Minimum lot size: 7,500 sq. ft. with minimum lot area per dwelling unit: 2,900 sq. ft.		City of Peoria Zoning Ordinance Section 7.9.d	none
	R7 Multi-Family Residence District	Ordinance	Minimum lot size: 7,500 sq. ft. with minimum lot area per dwelling unit: 2,170 sq. ft.		City of Peoria Zoning Ordinance Section 7.10.d	none
	R8 Multi-Family Residence District	Ordinance	Minimum lot size: 7,500 sq. ft. with minimum lot area per dwelling unit: 1,089 sq. ft.		City of Peoria Zoning Ordinance Section 7.11.d	none
	B1 Central Business District	Ordinance	There are no minimum lot area or width requirements for B1 District.		City of Peoria Zoning Ordinance Section 8.6	none
	C1 General Commercial District	Ordinance	Minimum lot size: none, maximum lot size: 8-acres, min/max lot width: none.		City of Peoria Zoning Ordinance Section 9.6.d.1,2,3,4	none

Appendix B - Summary of Codes and Ordinances and Recommended Actions

Item	Topic	Document Type	City Requirements	County Requirements	Reference	Recommended Action
	C2 Large Scale Commercial	Ordinance	Minimum Lot Area: 50,000 sq. ft. with minimum lot width = none.		City of Peoria Zoning Ordinance Section 9.7.e.1,2,3	none
	O1 Arterial Office District	Ordinance	Standard and Planned Unit Development has no lot area and width requirements.		City of Peoria Zoning Ordinance Section 10.2.e	none
	O2 Exclusive Office Park District	Ordinance	Standard Lot: 2-acres; may be subdivided into smaller lots.		City of Peoria Zoning Ordinance Section 10.3.e	none
	I1 Industrial/Business Park District	Ordinance	Standard Development Parcel: Lot Area - 1/2 acre, min. lot width - 100'		City of Peoria Zoning Ordinance Section 11.3.e	none
	I3 General Industrial District	Ordinance	Standard Lot: min. Lot area/width: none, Planned Unit Development: min. Lot area 10acres, min. Lot width = none.		City of Peoria Zoning Ordinance Section 11.5.e	none
18	Yard Requirements					
	A1 Agricultural District	Ordinance	No buildings except roadside stands shall be constructed within 50' of any property line.		City of Peoria Zoning Ordinance Section 7.2.e	none
	RE Estate Residence District	Ordinance	Principal Structure (front yard-50', interior side yard-20', corner side yard-50', & rear yard 50') Accessory Structures/uses (front yard-50', interior side yard-20', corner side yard-30', & rear yard 3')		City of Peoria Zoning Ordinance Section 7.3.e	Allow as part of P.U.D. with open space.: front yard - 20', rear yard - 40', side yard - 5' with 30' separation between dwellings
	R1 Single-Family Residence District	Ordinance	Principal Structure (front yard-35', interior side yard-12', corner side yard-15', & rear yard 25') Accessory Structures/uses (front yard-35', interior side yard-12', corner side yard-15', & rear yard 3')		City of Peoria Zoning Ordinance Section 7.4.e	Allow as part of P.U.D. with open space.: front yard - 20', rear yard - 40', side yard - 5' with 30' separation between dwellings
	R2 Single-Family Residence District	Ordinance	Principal Structure (front yard-25', interior side yard-8', corner side yard-10', & rear yard 25') Accessory Structures/uses (front yard-25', interior side yard-8', corner side yard-10', & rear yard 3') Accessory Structures/uses in rear yards (front yard-n/a, interior side yard-1.5', corner side yard-10', & rear yard 1.5')		City of Peoria Zoning Ordinance Section 7.5.e	Allow as part of P.U.D. with open space.: front yard - 20', rear yard - 40', side yard - 5' with 25' separation between dwellings
	R3 Single-Family Residence District	Ordinance	Principal Structure (front yard-25', interior side yard-5', corner side yard-10', & rear yard 25') Accessory Structures/uses (front yard-25', interior side yard-6', corner side yard-10', & rear yard 3') Accessory Structures/uses in rear yards (front yard-n/a, interior side yard-1.5', corner side yard-10', & rear yard 1.5')		City of Peoria Zoning Ordinance Section 7.6.e	Allow as part of P.U.D. with open space.: front yard - 15', rear yard - 30', side yard - 5' with 20' separation between dwellings

Appendix B - Summary of Codes and Ordinances and Recommended Actions

Item	Topic	Document Type	City Requirements	County Requirements	Reference	Recommended Action
	R4 Single-Family Residence District	Ordinance	Principal Structure (front yard-15', interior side yard-4', corner side yard-8', & rear yard 25') Accessory Structures/uses (front yard-15', interior side yard-4', corner side yard-8', & rear yard 3') Accessory Structures/uses in rear yards (front yard-n/a, interior side yard-1.5', corner side yard-10', & rear yard 1.5')		City of Peoria Zoning Ordinance Section 7.7.e	none
	R5 Residential Cluster Development District	Ordinance	Individual Dwelling Units within the Principal Structure/use (front yard-25', interior side yard-0', corner side yard-10', & rear yard 30') Accessory Structures/uses (front yard-25', interior side yard-0', corner side yard-10', & rear yard 3') Transitional Buffer Yard Adjacent to Single-Family, at property line of Development (front yard-n/a, interior side yard-10% of lot width, corner side yard-n/a', & rear yard-10% of lot depth)		City of Peoria Zoning Ordinance Section 7.8.e	Allow as part of P.U.D. with open space.: front yard - 20', rear yard - 40', side yard - 5' with 25' separation between dwellings
	R6 Multi-Family Residence District	Ordinance	Principal Structure (front yard-30', interior side yard-10', corner side yard-12', & rear yard 25') Accessory Structures/uses (front yard-30', interior side yard-10', corner side yard-12', & rear yard 3') Transitional Buffer Yard Adjacent to Single-Family (front yard-n/a, interior side yard-10% of lot width, corner side yard-n/a', & rear yard-10% of lot depth)		City of Peoria Zoning Ordinance Section 7.9.e	
	R7 Multi-Family Residence District	Ordinance	Principal Structure (front yard-25', interior side yard-6', corner side yard-10', & rear yard 30') Accessory Structures/uses (front yard-25', interior side yard-6', corner side yard-10', & rear yard 3') Transitional Buffer Yard Adjacent to Single-Family (front yard-n/a, interior side yard-10% of lot width, corner side yard-n/a', & rear yard-10% of lot depth)		City of Peoria Zoning Ordinance Section 7.10.e	
	R8 Multi-Family Residence District	Ordinance	Principal Structure (front yard-15', interior side yard-6', corner side yard-10', & rear yard 30') Accessory Structures/uses (front yard-15', interior side yard-6', corner side yard-10', & rear yard 3') Transitional Buffer Yard Adjacent to Single-Family (front yard-n/a, interior side yard-10% of lot width, corner side yard-n/a', & rear yard-10% of lot depth)		City of Peoria Zoning Ordinance Section 7.11.d	
	B1 Central Business District	Ordinance	There are no yards required in the B1 district.		City of Peoria Zoning Ordinance Section 8.7	
	C1 General Commercial District	Ordinance	Front and corner side yard: a minimum front yard of 20', or the average setback of the 2 principal structures on the adjoining parcels, whichever is less. Abutting Residential Transitional Buffer: where a lot abuts the side or rear line of a residential lot the side or rear yard shall be 10% of the lot width/length; however, no TBY shall be less than 10' nor be required to be greater than 25'.		City of Peoria Zoning Ordinance Section 9.6.d.6,7	

Appendix B - Summary of Codes and Ordinances and Recommended Actions

Item	Topic	Document Type	City Requirements	County Requirements	Reference	Recommended Action
	C2 Large Scale Commercial	Ordinance	Front and corner side yard: a minimum front yard of 20', or the average setback of the 2 principal structures on the adjoining parcels, whichever is less. Abutting Residential Transitional Buffer: where a C2 lot abuts the side or rear line of a residential lot the side or rear yard shall be 10% of the lot width/length; however, no TBY shall be less than 10' nor be required to be greater than 25'. Building setback: min. setbacks are required from all property lines and are to be a min. width of 5% of the average width or depth of the lot for the related front, rear or side property lines not to exceed a maximum of 20'.		City of Peoria Zoning Ordinance Section 9.7.e.4	
	O1 Arterial Office District	Ordinance	Building (front yard-10% of parcel depth, interior side yard-10', & rear yard 20') Parking (front yard-15', interior side yard-6', & rear yard 10') Abutting Residential Transitional Buffer: where a O1 lot abuts the side or rear line of a residential lot the side or rear yard shall be 10% of the lot width/length or 10', whichever is greater; however, no TBY shall be less than 10' nor be required to be greater than 25'.		City of Peoria Zoning Ordinance Section 10.2.f	
	O2 Exclusive Office Park District	Ordinance	Building (front yard-50', interior side yard-30', & rear yard 30') Parking (front yard-25', interior side yard-15', & rear yard 15') Abutting Residential : where a O2 lot abuts the side or rear line of a residential lot; the interior side and rear yard requirements shall be the greater of the aforementioned or the required transitional buffer yard requirements of the side or rear yard shall be 10% of the lot width/length or 10', whichever is greater; however, no TBY shall be less than 10' nor be required to be greater than 25'.		City of Peoria Zoning Ordinance Section 10.3.f	
	I1 Industrial/Business Park District	Ordinance	Building (front yard-25', interior side yard-20', & rear yard 20') Parking (front yard-prohibited, interior side yard-10', & rear yard 10') Transitional Buffer Yard Requirements: Nonresidential land uses abutting or across an alley from residential zoning uses shall be required to provide a min. transitional yard equal to 10% of the average width or depth of a lot adjacent to the residential zoning lot. The min transitional buffer yard required shall be 10' in width and the max shall be 25'.		City of Peoria Zoning Ordinance Section 11.3.f	

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Item	Topic	Document Type	City Requirements	County Requirements	Reference	Recommended Action
	I3 General Industrial District	Ordinance	Building (front & corner side yard: Average of existing on block, or no setback required if no structures on block, interior side yard-n/a, & rear yard N/A) Transitional Buffer Yard Requirements: Nonresidential land uses abutting or across an alley from residential zoning uses shall be required to provide a min. transitional yard equal to 10% of the average width or depth of a lot adjacent to the residential zoning lot. The min transitional buffer yard required shall be 10' in width and the max shall be 25'.		City of Peoria Zoning Ordinance Section 11.5.f.g	
19	Lot Size Requirements					
	A1 Agriculture Preservation	Ordinance		Lot area: 40 acres, Lot Width: 200'	County of Peoria Zoning Ordinance Table 7-1	none
	A2 Agriculture	Ordinance		Lot Area: 25 acres, Lot width: 200'	County of Peoria Zoning Ordinance Table 7-1	none
	RR Rural Residential	Ordinance		Lot area: 1 acre, Lot width: 150'	County of Peoria Zoning Ordinance Table 7-1	none
	R1 Low Density Residential	Ordinance		Lot area: 1/2 acre, Lot width 125 septic/100 sewer	County of Peoria Zoning Ordinance Table 7-1	Allow as part of P.U.D. with open space.: Lot size - 15,000 sq. ft.; Minimum street frontage - 20', minimum lot width at building - 80'
	R2 Medium Density Residential	Ordinance		Single Family dwellings: Lot area 1/2 acre septic/1/4 acre sewer; lot width 100 septic/80 sewer; Two Family Dwellings: Lot area 0.59 acre septic/0.34 sewer; lot width 100 septic/80 sewer; Nonresidential Uses: Lot area 1/2 acre septic/1/4 acre sewer; lot width 100 septic/80 sewer.	County of Peoria Zoning Ordinance Table 7-1	Allow as part of P.U.D. with open space.: Lot size - 10,000 sq. ft.; Minimum street frontage - 20', minimum lot width at building - 80'
	R3 High Density, Multi-Family Res.	Ordinance		Single Family dwellings: Lot area 1/2 acre septic/0.14 acre sewer; lot width 100 septic/50 sewer; Multiple Family Dwellings: Lot area 0.57 acre septic/0.21 sewer; lot width 100 septic/50 sewer; Nonresidential Uses: Lot area 1/2 acre septic/0.14 acre sewer; lot width 100 septic/50 sewer.	County of Peoria Zoning Ordinance Table 7-1	none
	C1 Neighborhood Commercial	Ordinance		Nonresidential Uses: Lot area 0.14 acres, lot width 60'; Residential Uses: Lot area 0.14 acres, lot width 60'	County of Peoria Zoning Ordinance Table 7-1	none
	C2 General Commercial	Ordinance		Other Uses: 0.23 acres, lot width 80'.	County of Peoria Zoning Ordinance Table 7-1	none
	C3 Regional Commercial	Ordinance		Planned Development, nonresidential Lot area 10 acres.	County of Peoria Zoning Ordinance Table 7-1	none
	I1 Light Industrial	Ordinance		Other Uses: 0.46 acres, lot width 100'.	County of Peoria Zoning Ordinance Table 7-1	none
	I2 Heavy Industrial	Ordinance		Other Uses: 0.46 acres, lot width 100'.	County of Peoria Zoning Ordinance Table 7-1	none

Appendix B - Summary of Codes and Ordinances and Recommended Actions

Item	Topic	Document Type	City Requirements	County Requirements	Reference	Recommended Action
20	Impervious Lot Coverage's					
	A1 Agriculture Preservation	Ordinance		10%	County of Peoria Zoning Ordinance Table 7-1	none
	A2 Agriculture	Ordinance		10%	County of Peoria Zoning Ordinance Table 7-1	none
	RR Rural Residential	Ordinance		20%	County of Peoria Zoning Ordinance Table 7-1	none
	R1 Low Density Residential	Ordinance		30%	County of Peoria Zoning Ordinance Table 7-1	Allow as part of P.U.D. with open space.: 30%
	R2 Medium Density Residential	Ordinance		40%	County of Peoria Zoning Ordinance Table 7-1	Allow as part of P.U.D. with open space.: 25%
	R3 High Density, Multi-Family Res.	Ordinance		Multiple & Single Family Dwellings 50%, Nonresidential Uses 60%	County of Peoria Zoning Ordinance Table 7-1	none
	C1 Neighborhood Commercial	Ordinance		Nonresidential Uses 80%, Residential Uses 65%	County of Peoria Zoning Ordinance Table 7-1	none
	C2 General Commercial	Ordinance		80%	County of Peoria Zoning Ordinance Table 7-1	none
	C3 Regional Commercial	Ordinance		75%	County of Peoria Zoning Ordinance Table 7-1	none
	I1 Light Industrial	Ordinance		75%	County of Peoria Zoning Ordinance Table 7-1	none
	I2 Heavy Industrial	Ordinance		75%	County of Peoria Zoning Ordinance Table 7-1	none
21	Front Yard Setbacks					
	A1 Agriculture Preservation Measured from ROW C/L ; ROW Line	Ordinance		Non-Residential State: 160'/75', County Primary 140'/100', County Non-Primary 125'/65', Collector 95'/65', Local -/50' Resident Uses: State: 135'/75', County Primary 115'/75', County Non-Primary 100'/40', Collector 70'/40', Local -/25' Telecommunications Facilities State: -/15', County Primary -/15', County Non-Primary -/15', Collector -/15', Local -/15'	County of Peoria Zoning Ordinance Table 7-1	none
	A2 Agriculture Measured from ROW C/L ; ROW Line	Ordinance		Non-Residential State: 160'/75', County Primary 140'/100', County Non-Primary 125'/65', Collector 95'/65', Local -/50' Resident Uses: State: 135'/75', County Primary 115'/75', County Non-Primary 100'/40', Collector 70'/40', Local -/25' Telecommunications Facilities State: -/15', County Primary -/15', County Non-Primary -/15', Collector -/15', Local -/15'	County of Peoria Zoning Ordinance Table 7-1	none
	RR Rural Residential Measured from ROW C/L ; ROW Line	Ordinance		Non-Residential State: 160'/75', County Primary 140'/100', County Non-Primary 125'/65', Collector 95'/65', Local -/50' Resident Uses: State: 135'/75', County Primary 115'/75', County Non-Primary 100'/40', Collector 70'/40', Local -/25' Telecommunications Facilities State: -/15', County Primary -/15', County Non-Primary -/15', Collector -/15', Local -/15'	County of Peoria Zoning Ordinance Table 7-1	none

Appendix B - Summary of Codes and Ordinances and Recommended Actions

Item	Topic	Document Type	City Requirements	County Requirements	Reference	Recommended Action
	R1 Low Density Residential Measured from ROW C/L ; ROW Line	Ordinance		Non-Residential State: 160'/75', County Primary 140'/100', County Non-Primary 125'/65', Collector 95'/65', Local -/50' Resident Uses: State: 135'/75', County Primary 115'/75', County Non-Primary 100'/40', Collector 70'/40', Local -/25' Telecommunications Facilities State: -/15', County Primary -/15', County Non-Primary -/15', Collector -/15', Local -/15'	County of Peoria Zoning Ordinance Table 7-1	Allow as part of P.U.D. with open space.: Residential front yard - 20', rear yard - 40', side yard - 5' with 30' separation between dwellings
	R2 Medium Density Residential Measured from ROW C/L ; ROW Line	Ordinance		Non-Residential State: 160'/75', County Primary 140'/100', County Non-Primary 125'/65', Collector 95'/65', Local -/50' Resident Uses: State: 135'/75', County Primary 115'/75', County Non-Primary 100'/40', Collector 70'/40', Local -/25' Telecommunications Facilities State: -/15', County Primary -/15', County Non-Primary -/15', Collector -/15', Local -/15'	County of Peoria Zoning Ordinance Table 7-1	Allow as part of P.U.D. with open space.: Residential front yard - 20', rear yard - 40', side yard - 5' with 25' separation between dwellings
	R3 High Density, Multi-Family Res. Measured from ROW C/L ; ROW Line	Ordinance		Non-Residential State: 160'/75', County Primary 140'/100', County Non-Primary 125'/65', Collector 95'/65', Local -/50' Resident Uses: State: 135'/75', County Primary 115'/75', County Non-Primary 100'/40', Collector 70'/40', Local -/25' Telecommunications Facilities State: -/15', County Primary -/15', County Non-Primary -/15', Collector -/15', Local -/15'	County of Peoria Zoning Ordinance Table 7-1	none
	C1 Neighborhood Commercial Measured from ROW C/L ; ROW Line	Ordinance		Non-Residential State: 100'/25', County Primary 100'/25', County Non-Primary 60'/25', Collector 60'/25', Local -/25' Resident Uses: State: 135'/75', County Primary 115'/75', County Non-Primary 100'/40', Collector 70'/40', Local -/25' Telecommunications Facilities State: -/15', County Primary -/15', County Non-Primary -/15', Collector -/15', Local -/15'	County of Peoria Zoning Ordinance Table 7-1	none
	C2 General Commercial Measured from ROW C/L ; ROW Line	Ordinance		Non-Residential State: 160'/75', County Primary 140'/100', County Non-Primary 125'/65', Collector 110'/75', Local -/25' Telecommunications Facilities State: -/15', County Primary -/15', County Non-Primary -/15', Collector -/15', Local -/15'	County of Peoria Zoning Ordinance Table 7-1	none
	C3 Regional Commercial Measured from ROW C/L ; ROW Line	Ordinance		Non-Residential State: -/300', County Primary -/300', County Non-Primary -/200', Collector -/200', Local 60/25' Telecommunications Facilities State: -/15', County Primary -/15', County Non-Primary -/15', Collector -/15', Local -/15'	County of Peoria Zoning Ordinance Table 7-1	none
	I1 Light Industrial Measured from ROW C/L ; ROW Line	Ordinance		Non-Residential State: -/50', County Primary -/40', County Non-Primary -/30', Collector -/30', Local -/30' Telecommunications Facilities State: -/15', County Primary -/15', County Non-Primary -/15', Collector -/15', Local -/15'	County of Peoria Zoning Ordinance Table 7-1	none

Appendix B - Summary of Codes and Ordinances and Recommended Actions

Item	Topic	Document Type	City Requirements	County Requirements	Reference	Recommended Action
	I2 Heavy Industrial Measured from ROW C/L ; ROW Line	Ordinance		Non-Residential State: -/50', County Primary -/40', County Non-Primary -/30', Collector -/30', Local -/30' Telecommunications Facilities State: -/15', County Primary -/15', County Non-Primary -/15', Collector -/15', Local -/15'	County of Peoria Zoning Ordinance Table 7-1	none
22	Off-Street Parking	Ordinance	Size of Parking stalls: Except for parallel parking spaces, each req'd space shall be at least 9' in width & 18' in length. Handicapped parking: 16' in width and 18' in length.		City of Peoria Zoning Ordinance Section 15.2.a.3,4	none
23	Off-Street Parking Schedule					
	Apartment Hotel	Ordinance	One space per unit.		City of Peoria Zoning Ordinance Section 15.2.b.1	
	Bed & Breakfast	Ordinance	Two for the operator and one space per quest room.		City of Peoria Zoning Ordinance Section 15.2.b.1	
	Boarding House, Dormitory, Fraternity, Lodging House, Rooming House	Ordinance	One space per sleeping acc.	1 per sleeping room.	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-4	
	Convalescent Home, Nursing Home, Elderly Housing	Ordinance	One space per three residents plus one space per employee.	Congregate elderly housing: 0.5 per resident + 1 per staff person. Nursing homes: 0.25 per resident at maximum capacity + 1 per staff person.	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-4	
	Hotel/Motel	Ordinance	One and one-quarter spaces per guest room plus twelve spaces per 1,000 sq. ft. for convention facilities.	1 per sleeping room and 1 per employee.	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-4	
	Mobile Home Park	Ordinance	One and one-quarter spaces per unit.	2 per unit + 1 per 2 homes	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-4	
	Multi-Family	Ordinance	Two spaces per unit.	Dwellings, detached: 2 per unit; Dwellings, attached: 2 per dwelling unit + 0.5 per bedroom over 2 bedrooms	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-4	
	Single & Two Family	Ordinance	Two spaces per unit.		City of Peoria Zoning Ordinance Section 15.2.b.1	none
	Group Family	Ordinance	One space for each resident.		City of Peoria Zoning Ordinance Section 15.2.b.1	

Appendix B - Summary of Codes and Ordinances and Recommended Actions

Item	Topic	Document Type	City Requirements	County Requirements	Reference	Recommended Action
	Family Care Facility and Group Care Facility	Ordinance	One space per employee plus one parking space per resident.		City of Peoria Zoning Ordinance Section 15.2.b.1	Reduce to 3 per 1000 GFA
	ATM	Ordinance	Six stacking spaces for one ATM on a site and eight stacking spaces for two ATMs on a site.		City of Peoria Zoning Ordinance Section 15.2.b.1	
	Auto Service	Ordinance	Three spaces per service bay.	1 per employee + 1 per 600 sq. ft.	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-4	
	Car Wash	Ordinance	Four stacked spaces per bay or stall, fifteen stacking spaces for automated bay or stall plus one per employee that works on site.	4 stacking spaces per stall + 1 per employee.	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-4	
	Drive Through Facility, non ATM	Ordinance	Eight stacking spaces for the first window, plus two stacking spaces for each additional window in addition to the required facility parking.	3 stacking spaces per window.	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-4	
	Durable Goods, Furniture, Appliances, Etc.	Ordinance	Two spaces per 1,000 sq. ft. gross floor area.	1 per 600 sq. ft. GFA.	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-4	
	Eating/Drinking	Ordinance	Twelve spaces per 1,000 feet gross floor area.	1 per 100 sq. ft.	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-4	
	Retail, freestanding	Ordinance	Four spaces per 1,000 sq. ft. gross floor area.	1 per 200 sq. ft. Roadside Stands: 3 per est.	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-4	
	Shopping Center	Ordinance	A min. of 4 spaces per 1,000 sq. ft of GLA for GLA of 25,000 to 400,000; and 4.5 to 5.0 spaces in a linear progression, for center from 400,000 to 600,000 GLA; and 5.0 per 1,000 GLA for over 600,000.	1 per 200 sq. ft. of gross leasable area.	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-4	
	Wholesale	Ordinance	Two spaces per 1000 GFA up to 10,000, plus 1/2 per 1000 GFA for the remaining space.	1 per 1000 sq. ft.	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-4	

Appendix B - Summary of Codes and Ordinances and Recommended Actions

Item	Topic	Document Type	City Requirements	County Requirements	Reference	Recommended Action
	Beauty/Barbershop	Ordinance	Three spaces per chair.	2 per chair	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-4	
	Funeral Services	Ordinance	One space per 50 sq. ft. public access rooms plus one per vehicle used in connection with the enterprise.	1 per 200 sq. ft.	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-4	
	Financial	Ordinance	Four spaces per 1000 GFA.	6 per inside customer service window + 1 per employee.	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-4	Reduce to 3 per 1000 GFA
	Gym/Health Club	Ordinance	Five spaces per 1000 GFA plus additional for outdoor accessory uses based on their requirements.	1 per employee + 1 per 200 sq. ft. of floor space.	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-4	
	Hospital	Ordinance	Two spaces per bed plus outpatient area calculated at medical/dental rate.	1 per each 2 hospital beds + 1 per each full-time employee + 1 per doctor.	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-4	
	Medical/Dental	Ordinance	Six spaces per 1000 sq. ft.	1 per each employee and doctor + 1 per 200 sq. ft.	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-4	Reduce to 3 per 1000 GFA
	Business and Professional Office	Ordinance	Four spaces per 1000 GFA.	1 per 300 sq. ft. Professional/medical: 1 per 200 sq. ft. (5 space min.)	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-4	Reduce to 3 per 1000 GFA
	Personal Services	Ordinance	Three spaces per 1000 GFA	1 per 200 sq. ft.	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-4	
	Religious Institutional	Ordinance	One space per four seats.	1 per 100 sq. ft.	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-4	
	College/University	Ordinance	One space per two employees plus one space per four students.	1 per classroom + 1 per 3 students.	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-4	

Appendix B - Summary of Codes and Ordinances and Recommended Actions

Item	Topic	Document Type	City Requirements	County Requirements	Reference	Recommended Action
	Dance/Music/Vocational/ Trade	Ordinance	One space per employee plus two spaces for each three students based on max. number of students attending at one time.		City of Peoria Zoning Ordinance Section 15.2.b.1	
	Day Care/Nursery	Ordinance	Four spaces per 1000 GFA.	Day Care Centers: 1 per 300 sq. ft. Day Care Homes: 3 per home.	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-4	
	K-9th Grades	Ordinance	One space per employee plus four spaces for visitors.	1.5 per classroom	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-4	
	Library	Ordinance	Three spaces per 1000 GFA	1 per 200 sq. ft. (includes art galleries)	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-4	
	Senior High School	Ordinance	One space per employee plus one space per eight students.	1 per classroom + 1 per 5 students.	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-4	
	Amusement Establishment	Ordinance	One space per three persons capacity plus one space per employee.		City of Peoria Zoning Ordinance Section 15.2.b.1	
	Arena/Stadium	Ordinance	One space per four seats.	Spaces equal in number to 33% of the capacity in persons.	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-4	
	Bowling Alley	Ordinance	Five spaces per lane.	4 per lane	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-4	
	Club/Lodge	Ordinance	Seven spaces per 1000 GFA.	1 per 3 seats of meeting space.	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-4	
	Cultural Institution	Ordinance	One space per 400 GFA.	1 per 1000 sq. ft.	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-4	

Appendix B - Summary of Codes and Ordinances and Recommended Actions

Item	Topic	Document Type	City Requirements	County Requirements	Reference	Recommended Action
	Golf Course	Ordinance	60 spaces per 9 holes.	6 per green + 1 per employee.	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-4	
	Swimming Pool	Ordinance	One for every 15 sq. ft. of shallow water (5' or less) or wading area per bather; and 25 sq. ft. of deep water per bather; and for every 50 sq. ft. of deck.	1 per 75 sq. ft. of water area.	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-4	
	Tennis Court	Ordinance	Four spaces per court.	3 per court.	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-4	
	Theater	Ordinance	One space per four seats.	1 per 3 seats, or spaces equal in number to 33% of the capacity in persons.	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-4	
	Manufacturing/Utility	Ordinance	One space per two employees plus one space per company vehicle.	Light Industry/assembly: 2 per 1000 sq. ft. or 1 per each employee on the largest shift, whichever is greater. Manufacturing: 1.25 per 1000 sq. ft. or 1 per each 0.75 employee on largest shift, whichever is greater.	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-4	
	Research and Development	Ordinance	Four spaces per 1000 GFA.		City of Peoria Zoning Ordinance Section 15.2.b.1	
	Warehouse	Ordinance	Two spaces per 1000 GFA up to 10,000, plus 1/2 per 1000 GFA for the remaining space.		City of Peoria Zoning Ordinance Section 15.2.b.1	
	Airport	Ordinance	3/4 space per airplane tie-down plus one space for each three passengers whose departure originates from the facility.		City of Peoria Zoning Ordinance Section 15.2.b.1	
	Bus Facility	Ordinance	One space per two employees plus one space per bus.	1 per 600 sq. ft. GFA.	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-4	
	Commuter Train/Bus Station	Ordinance	Two spaces per three passengers whose departure originates from the facility.		City of Peoria Zoning Ordinance Section 15.2.b.1	
	Radio/TV Studio	Ordinance	Four spaces per one 1000 sq. ft.		City of Peoria Zoning Ordinance Section 15.2.b.1	
	Animal Hospitals, boarding & pounds	Ordinance		1 per 300 sq. ft.	County of Peoria Zoning Ordinance Table 7-4	
	Automobile Sales	Ordinance		1 per 500 sq. ft. of enclosed sales space + 1 per 3000 sq. ft. of exterior/outdoor display/sales space + 1.5 for each service bay.	County of Peoria Zoning Ordinance Table 7-4	

Appendix B - Summary of Codes and Ordinances and Recommended Actions

Item	Topic	Document Type	City Requirements	County Requirements	Reference	Recommended Action
	Automobile Service Stations	Ordinance		2 per station + 4 per service bay	County of Peoria Zoning Ordinance Table 7-4	
	Cemeteries	Ordinance		1 per each full time employee + required spaces for offices.	County of Peoria Zoning Ordinance Table 7-4	
	Community centers	Ordinance		1 per 300 sq. ft.	County of Peoria Zoning Ordinance Table 7-4	
	Conference Center/meeting room	Ordinance		1 per 4 seats or 1 per 100 sq. ft. of meeting area, whichever greater.	County of Peoria Zoning Ordinance Table 7-4	
	Contractors or construction offices	Ordinance		1 per 300 sq. ft.	County of Peoria Zoning Ordinance Table 7-4	
	Convenience stores	Ordinance		1 per 150 sq. ft	County of Peoria Zoning Ordinance Table 7-4	
	Dry Cleaning & Laundry processing stations	Ordinance		1 per 500 sq. ft.	County of Peoria Zoning Ordinance Table 7-4	
	Excavating Services	Ordinance		1 per employee	County of Peoria Zoning Ordinance Table 7-4	
	Food Processing Plants	Ordinance		1 per employee	County of Peoria Zoning Ordinance Table 7-4	
	Gas Station Convenience Store	Ordinance		2 per fueling station + 1 per 500 sq. ft. of interior GFA.	County of Peoria Zoning Ordinance Table 7-4	
	Golf Driving Ranges	Ordinance		1 per tee + 1 per employee.	County of Peoria Zoning Ordinance Table 7-4	
	Fire & Police Stations	Ordinance		1 per 500 sq. ft.	County of Peoria Zoning Ordinance Table 7-4	
	Post Offices	Ordinance		2 per station + 4 per service bay	County of Peoria Zoning Ordinance Table 7-4	
	Ball-Fields and picnic areas	Ordinance		10 per acre.	County of Peoria Zoning Ordinance Table 7-4	
	Marinas	Ordinance		1 per employee + 1 per 3 boats	County of Peoria Zoning Ordinance Table 7-4	
	Laundry (coin operated)	Ordinance		1 per 2 machines.	County of Peoria Zoning Ordinance Table 7-4	
	Greenhouses, commercial	Ordinance		1 per 400 sq. ft.	County of Peoria Zoning Ordinance Table 7-4	
	Petroleum Storage Facilities	Ordinance		1 per employee.	County of Peoria Zoning Ordinance Table 7-4	
	Printing, publishing or Photography est.	Ordinance		1 per 400 sq. ft.	County of Peoria Zoning Ordinance Table 7-4	
	Private Horse Stables	Ordinance		1 per each full-time employee plus 1 per every 3 horses.	County of Peoria Zoning Ordinance Table 7-4	
	Residential Care Homes	Ordinance		0.25 per resident plus 1 per staff person.	County of Peoria Zoning Ordinance Table 7-4	
	Restaurants-Drive in	Ordinance		3 per cashier station + 1 per 100 sq. ft.	County of Peoria Zoning Ordinance Table 7-4	
	Zoo	Ordinance		1 per 2000 sq. ft. of lot area	County of Peoria Zoning Ordinance Table 7-4	
24	Handicapped Parking Stall Requirements					

Appendix B - Summary of Codes and Ordinances and Recommended Actions

Item	Topic	Document Type	City Requirements	County Requirements	Reference	Recommended Action
	Total Off Street Parking Spaces Required 1 to 20	Ordinance	Required Minimum Number of Accessible Parking Spaces is 1.	Required Minimum Number of Accessible Parking Spaces is 1.	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-5	none
	Total Off Street Parking Spaces Required 21 to 50	Ordinance	Required Minimum Number of Accessible Parking Spaces is 2	Required Minimum Number of Accessible Parking Spaces is 2	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-5	none
	Total Off Street Parking Spaces Required 51 to 75	Ordinance	Required Minimum Number of Accessible Parking Spaces is 3.	Required Minimum Number of Accessible Parking Spaces is 3.	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-5	none
	Total Off Street Parking Spaces Required 76 to 100	Ordinance	Required Minimum Number of Accessible Parking Spaces is 4.	Required Minimum Number of Accessible Parking Spaces is 4.	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-5	none
	Total Off Street Parking Spaces Required 101 to 150	Ordinance	Required Minimum Number of Accessible Parking Spaces is 5.	Required Minimum Number of Accessible Parking Spaces is 5.	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-5	none
	Total Off Street Parking Spaces Required 151 to 200	Ordinance	Required Minimum Number of Accessible Parking Spaces is 6.	Required Minimum Number of Accessible Parking Spaces is 6.	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-5	none
	Total Off Street Parking Spaces Required 201 to 300	Ordinance	Required Minimum Number of Accessible Parking Spaces is 7.	Required Minimum Number of Accessible Parking Spaces is 7.	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-5	none
	Total Off Street Parking Spaces Required 301 to 400	Ordinance	Required Minimum Number of Accessible Parking Spaces is 8.	Required Minimum Number of Accessible Parking Spaces is 8.	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-5	none
	Total Off Street Parking Spaces Required 401 to 500	Ordinance	Required Minimum Number of Accessible Parking Spaces is 9.	Required Minimum Number of Accessible Parking Spaces is 9.	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-5	none
	Total Off Street Parking Spaces Required 501 to 1000	Ordinance	Required Minimum Number of Accessible Parking Spaces is 2% of total number.	Required Minimum Number of Accessible Parking Spaces is 2% of total number.	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-5	none

Appendix B - Summary of Codes and Ordinances and Recommended Actions

Item	Topic	Document Type	City Requirements	County Requirements	Reference	Recommended Action
	Total Off Street Parking Spaces Required over 1000	Ordinance	Required Minimum Number of Accessible Parking Spaces is 20 plus 1 for each 100 spaces over 1000 spaces.	Required Minimum Number of Accessible Parking Spaces is 20 plus 1 for each 100 spaces over 1000 spaces.	City of Peoria Zoning Ordinance Section 15.2.b.1 County of Peoria Zoning Ordinance Table 7-5	none
25	Landscaping and Screening					
	Purpose Statement	Ordinance	To aid in stabilizing the City's ecological balance by contributing to the process of air purification, oxygen regeneration, ground water recharge, and stormwater runoff retardation, while at the same time aiding in noise, glare, wind, and heat abatement. To preserve and protect the unique identity and environment of the City of Peoria and preserve the economic base attracted to the City of Peoria by such factors.		City of Peoria Zoning Ordinance Section 16.1.b,f	
	Parking Lot Landscaping	Ordinance	One-half of required points shall consist of trees and one-half of required points shall consist of shrubs. Parking Lot islands shall be curbed with concrete or equivalent material.		City of Peoria Zoning Ordinance Section 16.1.b,f	Give point values for alternate planting materials including native grasses and forbs. Allow (encourage) depressed islands without curbs or with curb cuts to use for drainage systems.
	Ground Cover Requirements	Ordinance	All yards shall be planted and maintained with a vegetative ground cover such as sod or seed.		City of Peoria Zoning Ordinance Section 16.4.f.1	
	Mulching Requirements	Ordinance	All required shrubs and trees shall be mulched and maintained with shredded hardwood bark, cypress, or gravel mulch.		City of Peoria Zoning Ordinance Section 16.4.f.2	Allow (encourage) alternate ground cover including native grasses and forbs.
26	Suitability of Land for Subdivision Development	Ordinance		Land unsuitable for subdivision development due to draining, flood hazard area, topography, or other conditions constituting a danger to health, life and property shall not be approved for subdivision development unless the subdivider presents evidences or data to the Plat Officer, establishing methods proposed to meet any such conditions are adequate to avoid any danger to health, life, or property.	County of Peoria Subdivision Ordinance Section 20-3-2	
27	Ditches and Swales	Ordinance		With grades of 4% or less, seeded and covered with mulch or erosion blanket; with grades between 4 and 8%, sod channels and ditch checks and may be req'd to be lined with rock rip-rap; with grades 8% or greater, rip-rap.	County of Peoria Subdivision Ordinance Section 20-5-16.D.1,2,3	Allow (encourage) alternate ground cover including native grasses and forbs.
28	Open Space Requirements					

Appendix B - Summary of Codes and Ordinances and Recommended Actions

Item	Topic	Document Type	City Requirements	County Requirements	Reference	Recommended Action
	Residential 1-15 acres	Ordinance		5% proposed	County of Peoria Subdivision Ordinance Section 20-5-16.Table 6-1	
	Residential 16-40 acres	Ordinance		10% proposed	County of Peoria Subdivision Ordinance Section 20-5-16.Table 6-1	
	Residential 41-80 acres	Ordinance		15% proposed	County of Peoria Subdivision Ordinance Section 20-5-16.Table 6-1	
	Residential 81+ acres	Ordinance		20% proposed	County of Peoria Subdivision Ordinance Section 20-5-16.Table 6-1	
	Non-Residential 1-40 acres	Ordinance		10% proposed	County of Peoria Subdivision Ordinance Section 20-5-16.Table 6-1	
	Non-Residential 41+ acres	Ordinance		20% proposed	County of Peoria Subdivision Ordinance Section 20-5-16.Table 6-1	
	Mixed-Use 1-40 acres	Ordinance		10% proposed	County of Peoria Subdivision Ordinance Section 20-5-16.Table 6-1	
	Mixed-Use 41+ acres	Ordinance		20% proposed	County of Peoria Subdivision Ordinance Section 20-5-16.Table 6-1	
29	Storm Water					
	Applicability	Ordinance	Commercial, institutional, mulit-family, industrial, or subdivision with greater than 1/2 acre disturbance and net increase of impervious area greater than 1/2 acre.	Commercial, institutional, mulit-family, industrial, or subdivision with greater than 1/2 acre disturbance and net increase of impervious area greater than 1/2 acre.	Erosion, Sediment, and Storm Water Control Ordinance: City of Peoria Sections 9.5-76 and 9.5-77(4); Peoria County Sections 7.5-66 and 7.5-66(1)d.	
	Requirements	Ordinance	Post-project runoff rate for the 2- and 25-year, 24-hour storms must be equal to or less than the pre-project runoff rate or cropland equivalent (CN=75,n = 0.17), whichever is less. Analysis based on SCS Methodology.	Post-project runoff rate for the 2- and 25-year, 24-hour storms must be equal to or less than the pre-project runoff rate. Analysis based on SCS Methodology.	Erosion, Sediment, and Storm Water Control Ordinance: City of Peoria Section 9.5-29(b); Peoria County Section 7.5-63(b)	
	Additional Requirements: retrofitting	Ordinance	Same requirements as above however full or partial exemptions may be granted upon request.		Erosion, Sediment, and Storm Water Control Ordinance: City of Peoria Section 9.5-31	

Appendix B - Summary of Codes and Ordinances and Recommended Actions

Item	Topic	Document Type	City Requirements	County Requirements	Reference	Recommended Action
	Additional Requirements: for sites with less than 1/2 acre net increase in impervious area	Staff Policy	Maximum release rate for the site is equal to CIA (I = 4 in/hr; C = .35), rational method.		Department letter	
30	Erosion Control					
	Applicability	Ordinance	All single family residences plus all sites with greater than 5000 sq ft. disturbance, excluding normal agricultural practices, routine maintenance of roadways and utilities.	All single and two-family residences plus all sites with greater than 5000 sq ft. disturbance, excluding normal agricultural practices, routine maintenance of roadways and utilities.	Erosion, Sediment, and Storm Water Control Ordinance: City of Peoria Section 9.5-28; Peoria County Section 7.5-62.	
	Control Measures	Ordinance	Temporary and Permanent control measures are required to prevent sediment from leaving the site for a 5-year storm. Design standards IL EPA Urban Manual.	Temporary and Permanent control measures are required to prevent sediment from leaving the site for a 5-year storm. Design standards IL EPA Urban Manual.	Erosion, Sediment, and Storm Water Control Ordinance: City of Peoria Section 9.5-29; Peoria County Section 7.5-63(a)	
	Permanent Ground Cover	Ordinance	See City of Peoria Zoning Ordinance No. 14160, Section 1	All distrurbed areas must have permanent ground cover within six months of project completion, or within six months of occupancy.	Erosion, Sediment, and Storm Water Control Ordinance: Peoria County Sections 7.5-65(5) and 7.5-66(6)	
31	Burning					
	Applicability	Code	No person shall kindle or maintain any outside fire in the city or permit or authorize any such fire either on private or public premises unless such fire is contained in an approved incinerator.		City of Peoria Municipal Code Section 11-161	Allow controlled burning for landscape management

Appendix C - Watershed Data

Aerial Photo

Watershed Map

Elevation Analysis

Slope Analysis

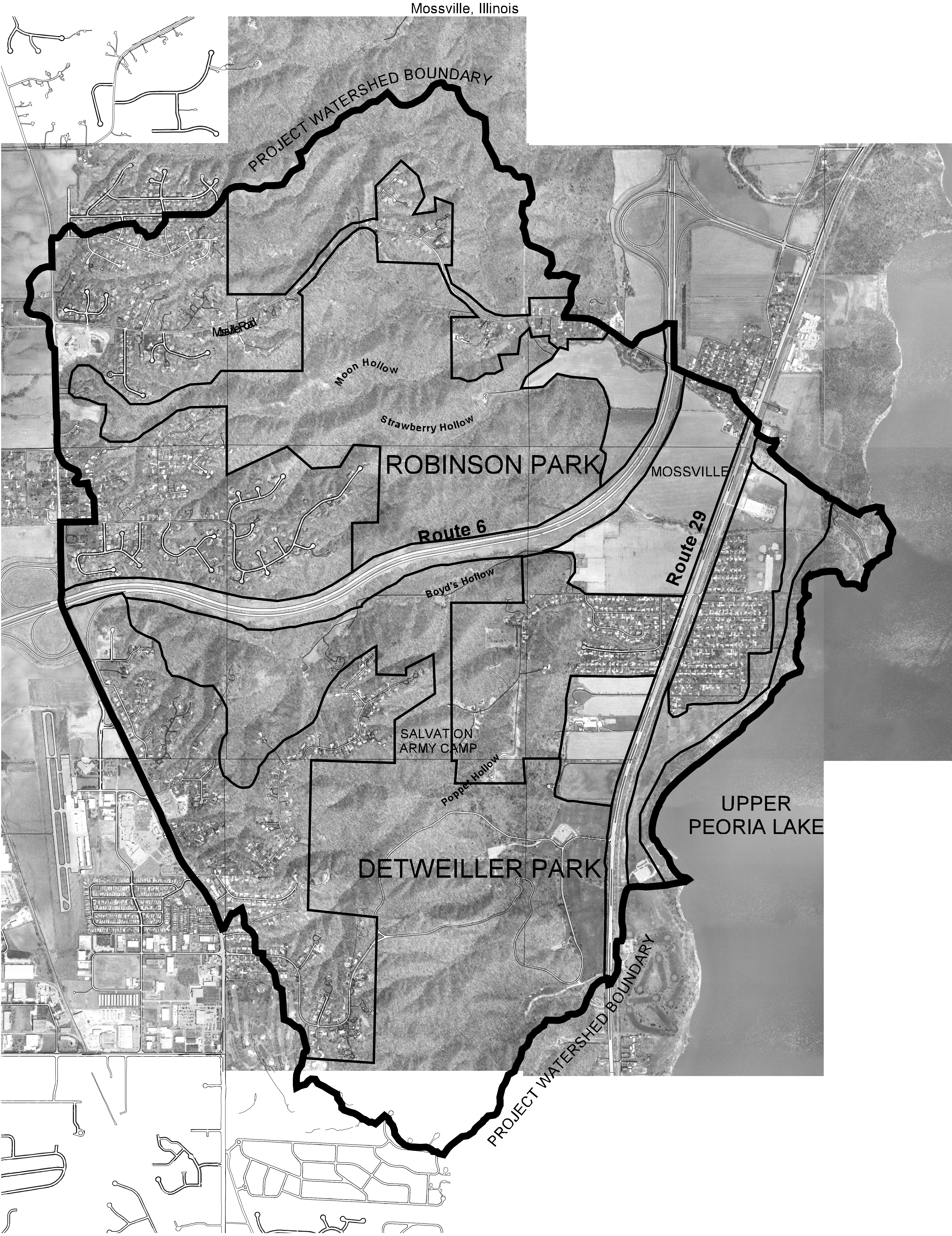
Vegetative Cover & Plant Species List

Land Use Map

Soils Map & Soils Descriptions

Mossville Bluffs Area Watershed Plan

Mossville, Illinois



Project Number: 00076.00

Date: 08.01.02

Scale: 1 : 1,000 approx.

500 0 500 1000 Feet

Client:
Tri-County Regional Planning Commision
City of Peoria
Peoria County

Aerial Photo

Landscape Architecture
Community Planning
Ecological Restoration
Resource Management

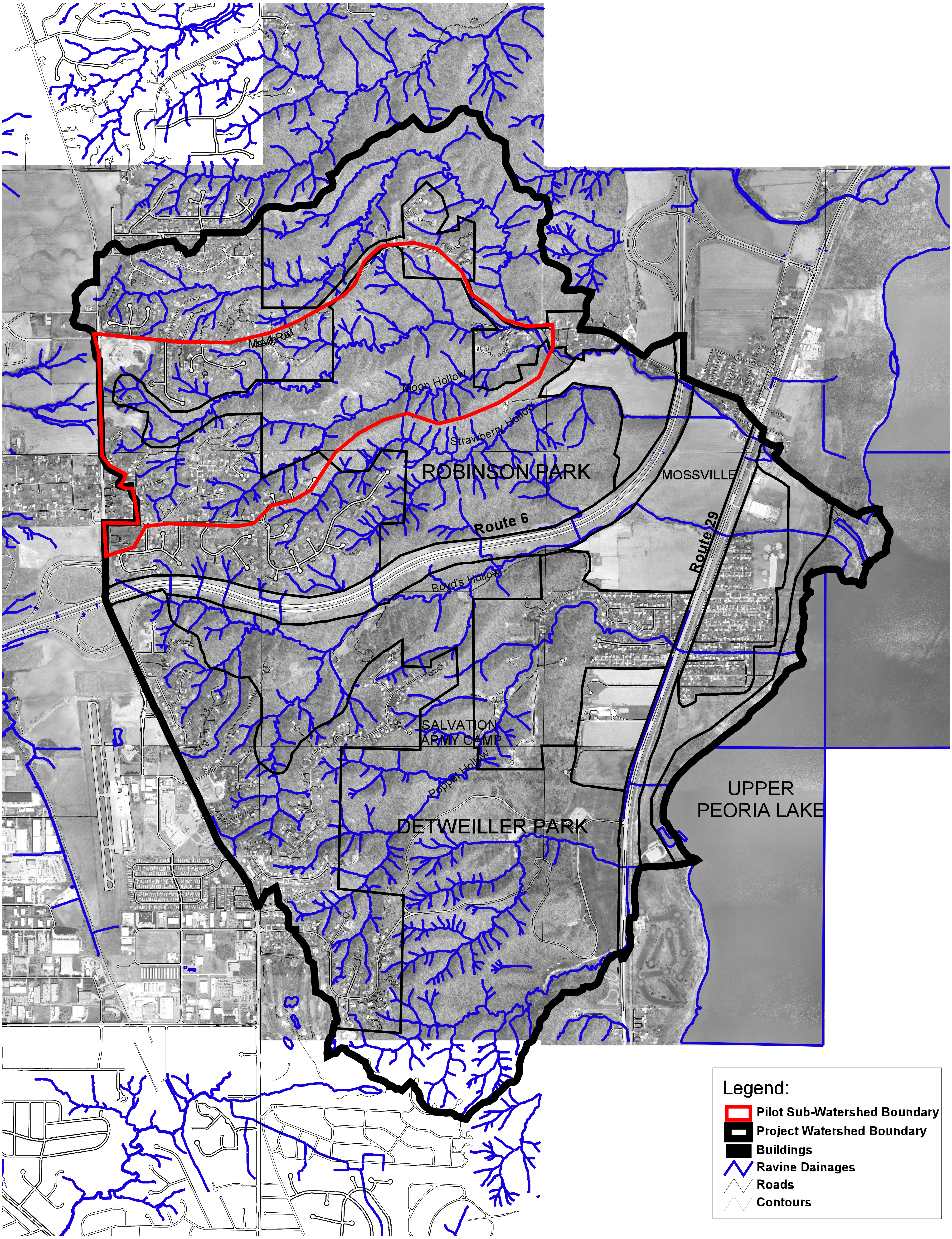
375 W. First Street
Elmhurst, Illinois 60126
630.559.2000 phone
630.559.2030 fax

CONSERVATION DESIGN FORUM

CLARK ENGINEERING

Mossville Bluffs Area Watershed Plan

Mossville, Illinois



N W E S

Scale: 1 : 1,000 approx.

500 0 500 1000 Feet

Project Number: 00076.00

Date: 08.01.02

Client:
Tri-County Regional Planning Commision
City of Peoria
Peoria County

Watershed Map

Landscape Architecture
Community Planning
Ecological Restoration
Resource Management

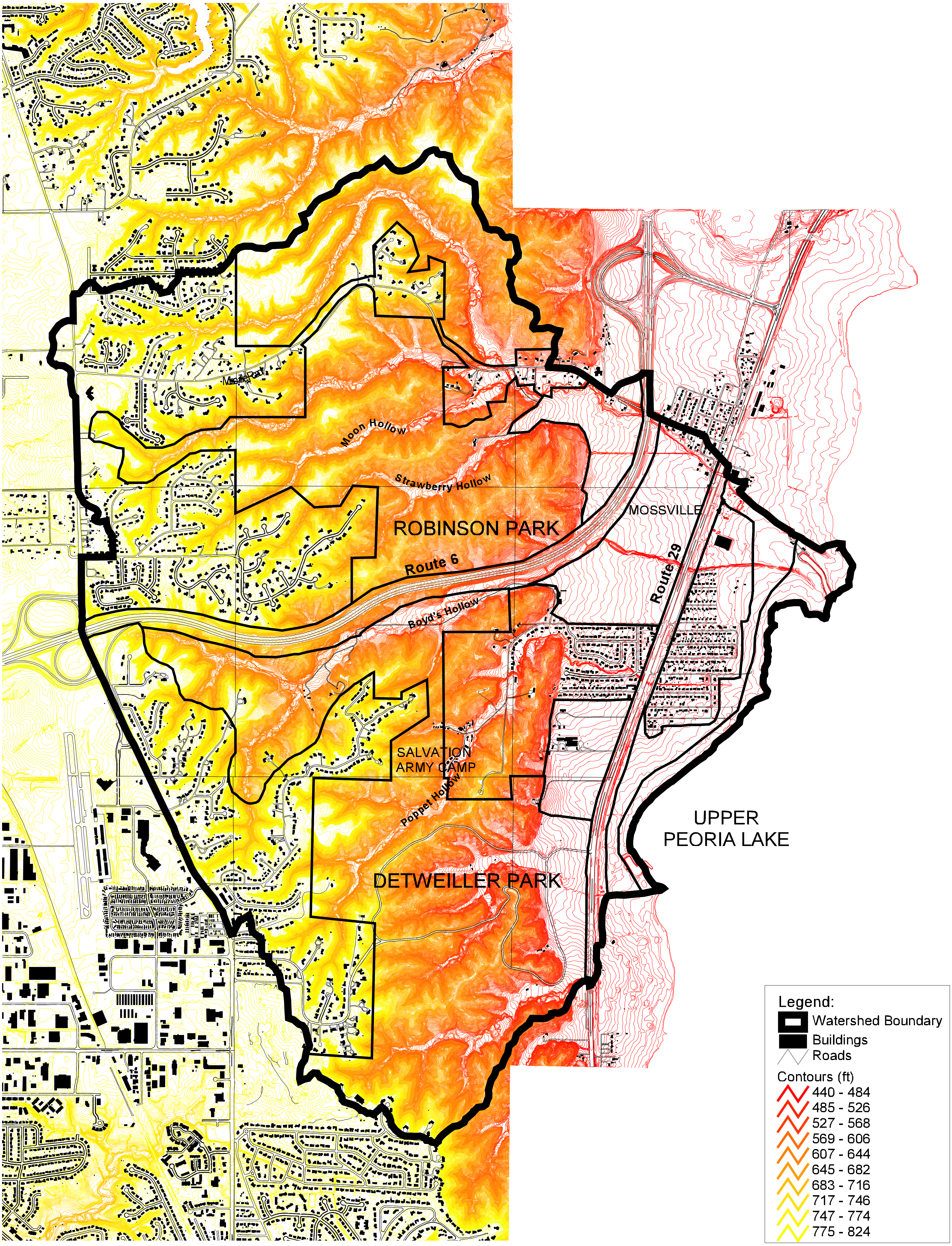
375 W. First Street
Elmhurst, Illinois 60126
630.559.2000 phone
630.559.2030 fax

CONSERVATION DESIGN FORUM

CLARK ENGINEERING

Mossville Bluffs Area Watershed Plan

Mossville, Illinois



Project Number: 00076.00

Date: 08.01.02

Scale: 1 : 1,000 approx.

500 0 500 1000 Feet

Client:
Tri-County Regional Planning Commision
City of Peoria
Peoria County

Elevation Map

Landscape Architecture
Community Planning
Ecological Restoration
Resource Management

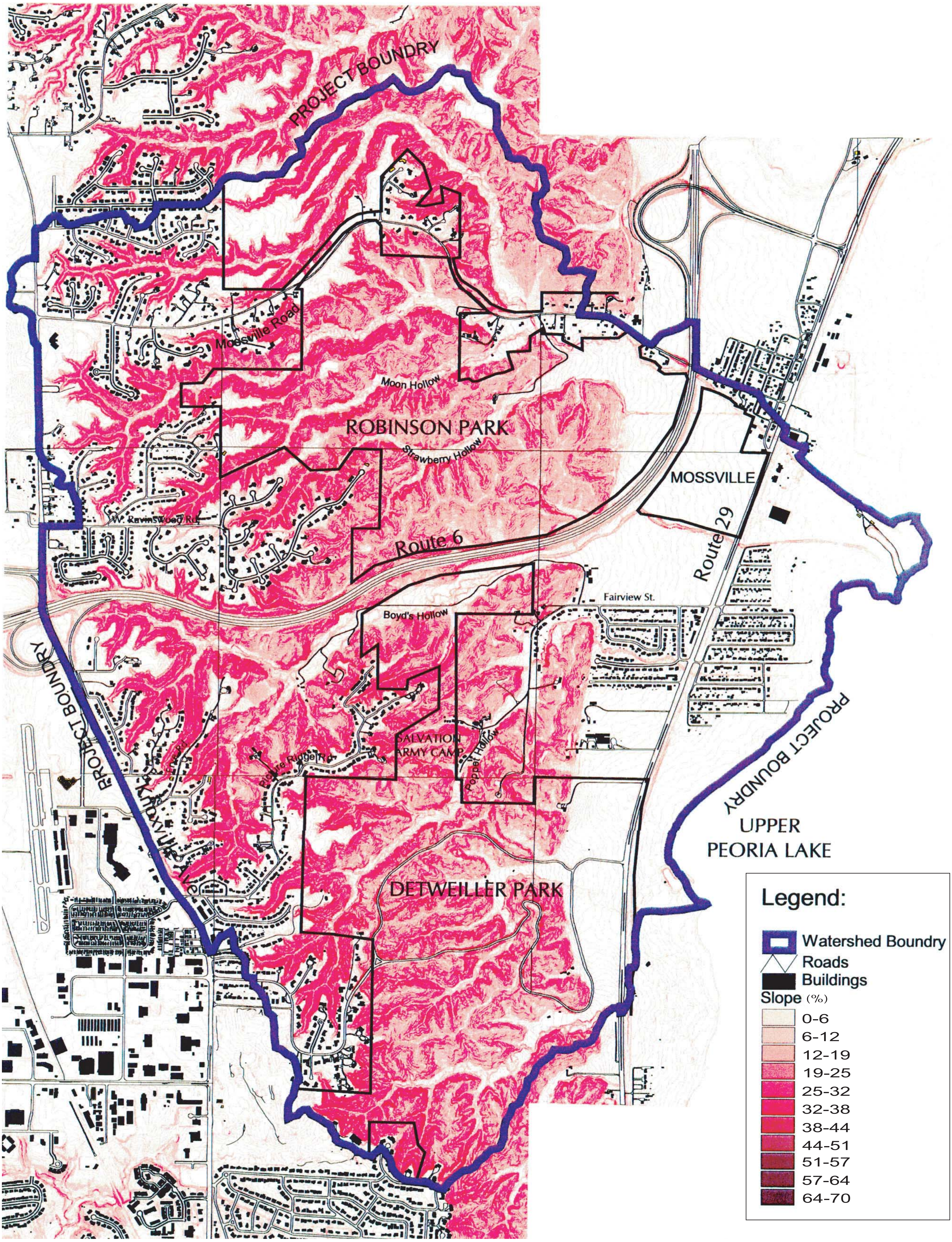
375 W. First Street
Elmhurst, Illinois 60126
630.559.2000 phone
630.559.2030 fax

CONSERVATION DESIGN FORUM

CLARK ENGINEERING

Mossville Bluffs Area Watershed Plan

Mossville, Illinois



N W E S

Scale: 1:1,800 approx.

500 0 500 1000 Feet

Project Number: 00076.00

Date: 08.01.02

Client:

Tri-Counry Regional Planning Commision
City of Peoria
Peoria County

Slope Analysis

Landscape Architecture
Community Planning
Ecological Restoration
Resource Management

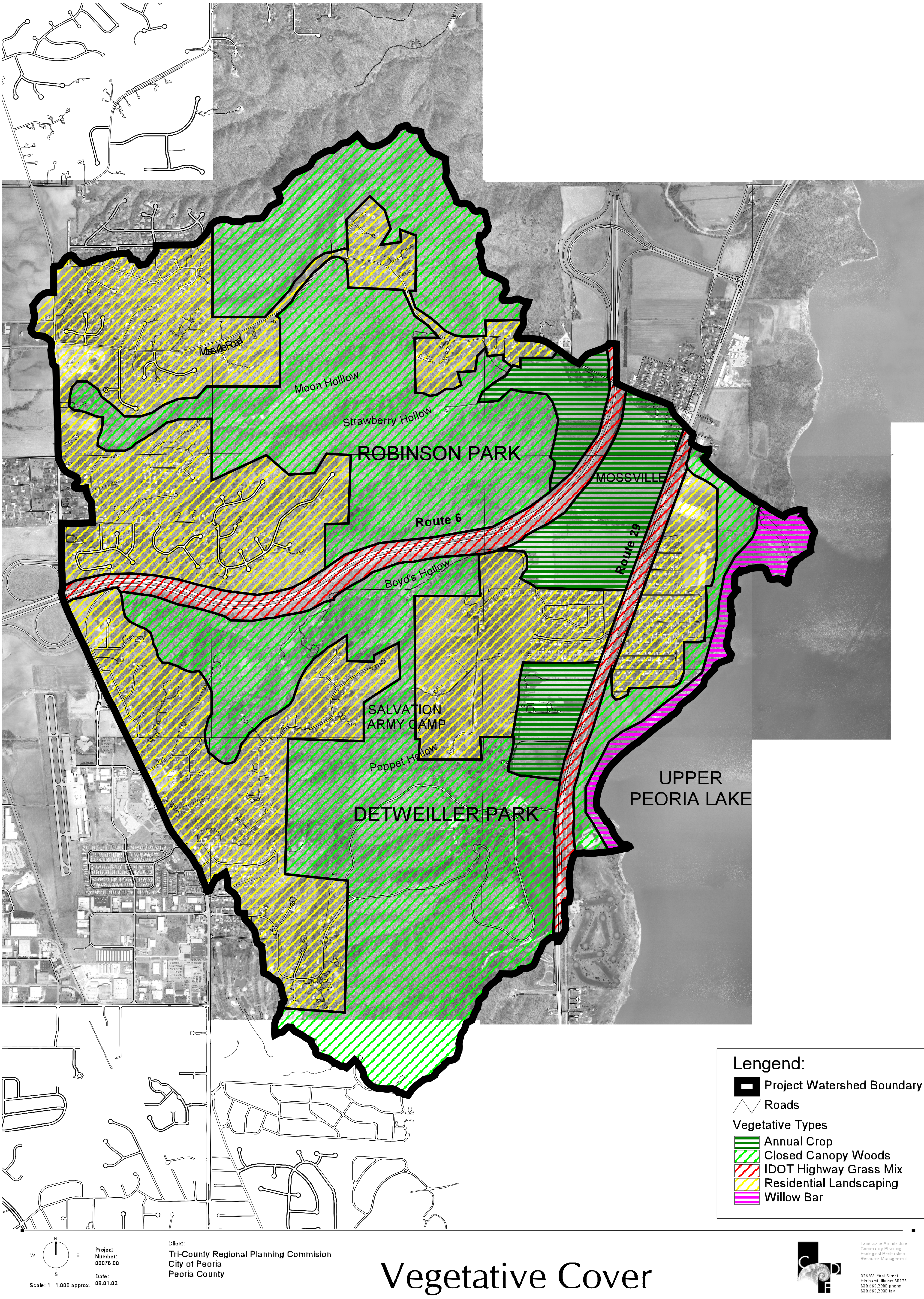
375 West First Street
Elmhurst, Illinois 60126
630.559.2006 phone
630.559.2030 fax

CONSERVATION DESIGN FORUM

CLARK ENGINEERING

Mossville Bluffs Area Watershed Plan

Mossville, Illinois



Project Number: 00076.00

Date: 08.01.02

Scale: 1 : 1,000 approx.

Client:
Tri-County Regional Planning Commision
City of Peoria
Peoria County

Vegetative Cover

Landscape Architecture
Community Planning
Ecological Restoration
Resource Management

375 W. First Street
Elmhurst, Illinois 60126
630.559.2000 phone
630.559.2030 fax

CONSERVATION DESIGN FORUM

CLARK ENGINEERING

Vegetated Cover & Plant Species List

Site: Mossville Bluffs

Locale: Peoria, Illinois

Date: April 22, 2002

By: Conservation Design Forum/Forest Park Nature Center

File: c:\fqa\studies\mossville.inv

INTRODUCTION - The following species were identified at Robinson and Detweiller Parks. This is a comprehensive list of species identified in the area. The non-native species are identified in ALL CAPS. Although this should not be considered a planting list, the native species listed below are a sample of species that may be used in a restoration.

In order to sustain a relative stable system (that can contain water) comprised of non-native species, significant maintenance (mowing, herbicide, etc.) and fossil fuel would be required. Or, this system would turn to shrubs and trees, which shade out groundcover, do not hold soil, and reduce the capacity for the soil to hold water. A well-maintained stable native landscape provides significant groundcover, and absorption and infiltration of stormwater, thereby reducing run-off and soil erosion. Fire is the most critical stewardship item to maintain a native landscape in perpetuity (which is much less expensive that maintenance to a non-native landscape!).

Restoration of native landscape will enhance water quality, reduce soil erosion and the hydrologic effects of surface water runoff, improve wildlife habitat, and increase the aesthetic quality of the area. When property restored, the existing habitat diversity contained throughout the property will afford a marvelous resource that offers a setting of rare, natural beauty, as well as cultural significance.

FLORISTIC QUALITY ASSESSMENT (FQA) - The FQA generates 2 fundamental products. The Mean C is the average coefficient of conservatism for a site; and, the floristic quality index (FQI) is a statistic derived by multiplying Mean C by the square root of the number of species inventoried. As management and time cause changes to take place, Mean C and FQI values will reflect the extent to which conservative species are being recruited and the floristic quality is improving. If an inventoried site has a large proportion of conservative plants, the Mean C is higher; in a degraded site, the Mean C will be lower. The presence of a large proportion of adventive (i.e., non-native) and non-conservative native species suggest that an area is degraded. The Mean C and FQI values for a sampling transect can be figured for the transect as a whole, and for the average quadrant.

In general, site inventories with Mean C and FQI values less than 3 and 20, respectively, as surveyed during the growing season, are degraded or derelict plant communities, or are very small habitat remnants. Site inventories with Mean C values approaching 3.5, and FQI values in the 20's through low 30's suffer from various kinds of disturbance, but have potential for habitat restoration and recovery; and, they generally have a more diverse component of conservative native species than could ever be recreated. When site inventories have Mean C values approaching 4.0 and FQI values in the upper 30's or higher, one can be confident there is sufficient native character present for the area to be at least regionally noteworthy-such landscapes are irreplaceable in terms of their unique composition of remnant biodiversity. Site inventories with Mean C and FQI values greater than 4.0 and 50, respectively, are unquestionably rare, highly significant natural areas of statewide importance.

With a Mean C value of 4.4 and an FQI value of 87.3, the Mossville Bluffs Watershed study area shines as a prime example of rare habitat of statewide importance. While it would be a tragedy not to take full advantage of the incredible opportunity to bring forth the biodiversity lying dormant within the Mossville Bluffs soils for the purpose of preserving biodiversity alone; *it is equally important to preserve and expand upon this opportunity to maintain a diversity of interpretations of how to steward the Natural Rainwater Management Model within the Mossville Bluffs Watershed.*

FLORISTIC QUALITY DATA						
402 NATIVE SPECIES	Native	402	90.5%	Adventive	42	9.5%
444 Total Species	Tree	46	10.4%	Tree	3	0.7%
4.4 NATIVE MEAN C	Shrub	27	6.1%	Shrub	6	1.4%
3.9 W/Adventives	W-Vine	8	1.8%	W-Vine	0	0.0%
87.3 NATIVE FQI	H-Vine	6	1.4%	H-Vine	0	0.0%
83.1 W/Adventives	P-Forb	207	46.6%	P-Forb	9	2.0%
1.9 NATIVE MEAN W	B-Forb	6	1.4%	B-Forb	7	1.6%
1.9 W/Adventives	A-Forb	32	7.2%	A-Forb	8	1.8%
AVG: Fac. Upland (+)	P-Grass	35	7.9%	P-Grass	6	1.4%
	A-Grass	4	0.9%	A-Grass	3	0.7%
	P-Sedge	23	5.2%	P-Sedge	0	0.0%
	A-Sedge	0	0.0%	A-Sedge	0	0.0%
	Fern	8	1.8%			

ACRONYM	C	SCIENTIFIC NAME	W	WETNESS	PHYSIOGNOMY	COMMON NAME
ABUTHE	0	ABUTILON THEOPHRASTI	4	FACU-	Ad A-Forb	BUTTONWEED
ACARHO	0	Acalypha rhomboidea	3	FACU	Nt A-Forb	THREE-SEEDED MERCURY
ACAVIR	2	Acalypha virginica	3	FACU	Nt A-Forb	THREE-SEEDED MERCURY
ACENEG	1	Acer negundo	-2	FACW-	Nt Tree	BOXELDER
ACENIG	6	Acer nigrum	5	UPL	Nt Tree	BLACK MAPLE
ACESAI	1	Acer saccharinum	-3	FACW	Nt Tree	SILVER MAPLE
ACESAU	4	Acer saccharum	3	FACU	Nt Tree	SUGAR MAPLE
ACHMIL	0	ACHILLEA MILLEFOLIUM	3	FACU	Ad P-Forb	COMMON MILFOIL
ACTPAC	7	Actaea pachypoda	5	UPL	Nt P-Forb	DOLL'S-EYES
ADIPED	6	Adiantum pedatum	1	FAC-	Nt Fern	MAIDENHAIR FERN
AESGLA	5	Aesculus glabra	-1	FAC+	Nt Tree	OHIO BUCKEYE
AGASKI	9	Agalinis skinneriana	5	UPL	Nt A-Forb	PALE FALSE FOXGLOVE
AGATEN	5	Agalinis tenuifolia	-3	FACW	Nt A-Forb	SLENDER FALSE FOXGLOVE
AGANEP	4	Agastache nepetoides	3	FACU	Nt P-Forb	YELLOW GIANT HYSSOP
AGASCR	5	Agastache scrophulariaefolia	5	UPL	Nt P-Forb	PURPLE GIANT HYSSOP
AGRGRY	3	Agrimonia gryposepala	2	FACU+	Nt P-Forb	TALL AGRIMONY
AGRPUB	4	Agrimonia pubescens	5	UPL	Nt P-Forb	SOFT AGRIMONY
AGRROS	4	Agrimonia rostellata	3	FACU	Nt P-Forb	WOODLAND AGRIMONY
AGRALA	0	Agrostis alba	-3	FACW	Nt P-Grass	RED TOP
AGRHYE	2	Agrostis hyemalis	1	FAC-	Nt P-Grass	HAIR GRASS
ALLPET	0	ALLIARIA PETIOLATA	0	FAC	Ad B-Forb	GARLIC MUSTARD
ALLCER	7	Allium cernuum	5	UPL	Nt P-Forb	NODDING WILD ONION
ALLTRI	7	Allium tricoccum	2	FACU+	Nt P-Forb	WILD LEEK
AMATUB	1	Amaranthus tuberculatus	-5	OBL	Nt A-Forb	TALL WATERHEMP
AMBART	0	Ambrosia artemisiifolia	3	FACU	Nt A-Forb	COMMON RAGWEED
AMBTRI	0	Ambrosia trifida	-1	FAC+	Nt A-Forb	GIANT RAGWEED
AMEARB	7	Amelanchier arborea	3	FACU	Nt Tree	JUNEBERRY
AMOCAN	8	Amorpha canescens	5	UPL	Nt Shrub	LEAD PLANT
AMOFRF	6	Amorpha fruticosa	-4	FACW+	Nt Shrub	FALSE INDIGO BUSH
AMPBRB	4	Amphicarpa bracteata	0	FAC	Nt H-Vine	HOG PEANUT
ANDGER	5	Andropogon gerardii	1	FAC-	Nt P-Grass	BIG BLUESTEM
ANECAN	4	Anemone canadensis	-3	FACW	Nt P-Forb	MEADOW ANEMONE
ANECYL	8	Anemone cylindrica	5	UPL	Nt P-Forb	CANDLE ANEMONE
ANEVIR	4	Anemone virginiana	5	UPL	Nt P-Forb	TALL ANEMONE
ANTPLA	4	Antennaria plantaginifolia	5	UPL	Nt P-Forb	PUSSY TOES
APOAND	6	Apocynum androsaemifolium	5	UPL	Nt P-Forb	SPREADING DOGBANE
APOCAN	2	Apocynum cannabinum	0	FAC	Nt P-Forb	DOGBANE
APOSIB	2	Apocynum sibiricum	-1	FAC+	Nt P-Forb	INDIAN HEMP
AQUCAN	5	Aquilegia canadensis	1	FAC-	Nt P-Forb	COLUMBINE
ARACAN	6	Arabis canadensis	5	UPL	Nt B-Forb	SICKLEPOD
ARALAE	4	Arabis laevigata	5	UPL	Nt B-Forb	SMOOTH ROCK RESS
ARANUD	7	Aralia nudicaulis	3	FACU	Nt Shrub	WILD SARSAPARILLA
ARARAC	8	Aralia racemosa	5	UPL	Nt P-Forb	AMERICAN SPIKENARD
ARCMIN	0	ARCTIUM MINUS	5	UPL	Ad B-Forb	COMMON BURDOCK
ARIDRA	4	Arisaema dracontium	-3	FACW	Nt P-Forb	GREEN DRAGON
ARITRI	4	Arisaema triphyllum	-2	FACW-	Nt P-Forb	INDIAN TURNIP
ARUDIO	7	Aruncus dioicus	3	FACU	Nt P-Forb	GOAT'S-BEARD
ASACAN	5	Asarum canadense	5	UPL	Nt P-Forb	CANADA WILD GINGER
ASCEXA	8	Asclepias exaltata	5	UPL	Nt P-Forb	POKE MILKWEED
ASCPUR	7	Asclepias purpurascens	3	FACU	Nt P-Forb	PURPLE MILKWEED
ASCQUA	6	Asclepias quadrifolia	5	UPL	Nt P-Forb	WHORLED MILKWEED
ASCSYR	0	Asclepias syriaca	5	UPL	Nt P-Forb	COMMON MILKWEED
ASCTUB	5	Asclepias tuberosa v. interior	5	UPL	Nt P-Forb	BUTTERFLYWEED
ASCVER	1	Asclepias verticillata	5	UPL	Nt P-Forb	HORSETAIL MILKWEED
ASCVIF	9	Asclepias viridiflora	5	UPL	Nt P-Forb	GREEN MILKWEED
ASITRI	4	Asimina triloba	0	FAC	Nt Tree	PAPAW

ASPOFF	0	ASPARAGUS OFFICINALIS	3	FACU	Ad	P-Forb	GARDEN ASPARAGUS
ASPPLA	4	Asplenium platyneuron	3	FACU	Nt	Fern	EBONY SPLEENWORT
ASTANO	8	Aster anomalus	5	UPL	Nt	P-Forb	BLUE ASTER
ASTAZU	7	Aster azureus	5	UPL	Nt	P-Forb	SKY-BLUE ASTER
ASTCOR	6	Aster cordifolius	5	UPL	Nt	P-Forb	HEART-LEAVED ASTER
ASTERI	4	Aster ericoides	4	FACU-	Nt	P-Forb	HEATH ASTER
ASTLAE	8	Aster laevis	5	UPL	Nt	P-Forb	SMOOTH BLUE ASTER
ASTLAT	2	Aster lateriflorus	-2	FACW-	Nt	P-Forb	SIDE-FLOWERING ASTER
ASTOBL	7	Aster oblongifolius	5	UPL	Nt	P-Forb	AROMATIC ASTER
ASTONT	4	Aster ontarionis	0	FAC	Nt	P-Forb	ONTARIO ASTER
ASTPIL	0	Aster pilosus	4	FACU-	Nt	P-Forb	HAIRY ASTER
ASTSAG	4	Aster sagittifolius	5	UPL	Nt	P-Forb	ARROW-LEAVED ASTER
ASTSCH	10	Aster schreberi	5	UPL	Nt	P-Forb	SMOOTH FORKED ASTER
ASTSER	9	Aster sericeus	5	UPL	Nt	P-Forb	SILKY ASTER
ASTSHO	6	Aster shortii	5	UPL	Nt	P-Forb	SHORT'S ASTER
ASTCAN	7	Astragalus canadensis	-1	FAC+	Nt	P-Forb	CANADIAN MILK VETCH
AURGRA	6	Aureolaria grandiflora v. pulchra	5	UPL	Nt	P-Forb	YELLOW FALSE FOXGLOVE
BAPLEL	9	Baptisia leucophaea	5	UPL	Nt	P-Forb	CREAM WILD INDIGO
BERTHU	0	BERBERIS THUNBERGII	4	FACU-	Ad	Shrub	JAPANESE BARBERRY
BIDCER	2	Bidens cernua	-5	OBL	Nt	A-Forb	NODDING BUR MARIGOLD
BIDFRO	1	Bidens frondosa	-3	FACW	Nt	A-Forb	COMMON BEGGAR'S TICKS
BLEHIR	5	Blephilia hirsuta	4	FACU-	Nt	P-Forb	WOOD MINT
BOLAST	5	Boltonia asteroides	-3	FACW	Nt	P-Forb	FALSE ASTER
BOTVIR	4	Botrychium virginianum	3	FACU	Nt	Fern	RATTLESNAKE FERN
BOUCUR	7	Bouteloua curtipendula	5	UPL	Nt	P-Grass	SIDE-OATS GRAMA
BRAERE	7	Brachyelytrum erectum	5	UPL	Nt	P-Grass	LONG-AWNED WOOD GRASS
BRIEUP	6	Brickellia eupatorioides	5	UPL	Nt	P-Forb	FALSE BONESET
BROKAL	10	Bromus kalmii	0	FAC	Nt	P-Grass	PRAIRIE BROME
BROPUR	7	Bromus purgans	-2	FACW-	Nt	P-Grass	EAR-LEAVED BROME
BROTEC	0	BROMUS TECTORUM	5	UPL	Ad	A-Grass	CHEAT GRASS
CACATR	5	Cacalia atriplicifolia	5	UPL	Nt	P-Forb	PALE INDIAN PLANTAIN
CAMAME	4	Campanula americana	0	FAC	Nt	A-Forb	AMERICAN BELLFLOWER
CXALBU	7	Carex albursina	5	UPL	Nt	P-Sedge	BLUNT-SCALED WOOD SEDGE
CXBLAN	2	Carex blanda	0	FAC	Nt	P-Sedge	COMMON WOOD SEDGE
CXCEPP	3	Carex cephalophora	3	FACU	Nt	P-Sedge	SHORT-HEADED BRACTED SEDGE
CXDAVI	3	Carex davisii	-1	FAC+	Nt	P-Sedge	AWNED GRACEFUL SEDGE
CXEMOR	6	Carex emoryi	-5	OBL	Nt	P-Sedge	RIVERBANK SEDGE
CXGRNG	2	Carex granularis	-4	FACW+	Nt	P-Sedge	PALE SEDGE
CXGRIS	3	Carex grisea	5	UPL	Nt	P-Sedge	WOOD GRAY SEDGE
CXHIRS	5	Carex hirsutella	4	FACU-	Nt	P-Sedge	HAIRY GREEN SEDGE
CXHIRT	6	Carex hirtifolia	5	UPL	Nt	P-Sedge	HAIRY WOOD SEDGE
CXHITC	10	Carex hitchcockiana	5	UPL	Nt	P-Sedge	HAIRY GRAY SEDGE
CXJAME	4	Carex jamesii	5	UPL	Nt	P-Sedge	GRASS SEDGE
CXLAEC	10	Carex laeviconica	-5	OBL	Nt	P-Sedge	LONG-TOOTHED LAKE SEDGE
CXLEAV	2	Carex leavenworthii	5	UPL	Nt	P-Sedge	DWARF BRACTED SEDGE
CXMEAD	6	Carex meadii	4	FACU-	Nt	P-Sedge	MEAD'S STIFF SEDGE
CXMUHM	5	Carex muhlenbergii	5	UPL	Nt	P-Sedge	SAND BRACTED SEDGE
CXOLIC	5	Carex oligocarpa	5	UPL	Nt	P-Sedge	FEW-FRUITED GRAY SEDGE
CXPENP	5	Carex pensylvanica	5	UPL	Nt	P-Sedge	PENNSYLVANIA OAK SEDGE
CXROSE	5	Carex rosea	5	UPL	Nt	P-Sedge	CURLY-STYLED WOOD SEDGE
CXTETA	5	Carex tetanica	-3	FACW	Nt	P-Sedge	COMMON STIFF SEDGE
CARCAL	6	Carpinus caroliniana	0	FAC	Nt	Tree	BLUE BEECH
CARCOR	4	Carya cordiformis	0	FAC	Nt	Tree	BITTERNUT HICKORY
CAROVT	4	Carya ovata	3	FACU	Nt	Tree	SHAGBARK HICKORY
CARTOM	6	Carya tomentosa	5	UPL	Nt	Tree	MOCKERNUT HICKORY
CASFAS	1	Cassia fasciculata	4	FACU-	Nt	A-Forb	GOLDEN CASSIA
CATSPE	0	Catalpa speciosa	3	FACU	Nt	Tree	CIGAR TREE
CAUTHA	8	Caulophyllum thalictroides	5	UPL	Nt	P-Forb	BLUE COHOSH
CEAAME	8	Ceanothus americanus	5	UPL	Nt	Shrub	NEW JERSEY TEA
CELSCA	2	Celastrus scandens	3	FACU	Nt	W-Vine	CLIMBING BITTERSWEET
CELOCC	3	Celtis occidentalis	1	FAC-	Nt	Tree	HACKBERRY
CERCAN	3	Cercis canadensis	3	FACU	Nt	Tree	EASTERN REDBUD
CHASUP	0	Chamaesyce supina	5	UPL	Nt	A-Forb	SPOTTED CREEPING SPURGE
CHEGLB	7	Chelone glabra	-5	OBL	Nt	P-Forb	WHITE TURTLEHEAD
CHEALB	0	CHENOPODIUM ALBUM	1	FAC-	Ad	A-Forb	LAMB'S QUARTERS
CINARU	5	Cinna arundinacea	-3	FACW	Nt	P-Grass	COMMON WOOD REED
CIRLUT	2	Circaea lutetiana v. canadensis	3	FACU	Nt	P-Forb	ENCHANTER'S NIGHTSHADE
CIRALT	3	Cirsium altissimum	5	UPL	Nt	P-Forb	TALL THISTLE
CLAVIR	1	Claytonia virginica	3	FACU	Nt	P-Forb	SPRING BEAUTY
CLEVIR	3	Clematis virginiana	0	FAC	Nt	W-Vine	VIRGIN'S BOWER
COMUMB	6	Comandra umbellata	3	FACU	Nt	P-Forb	BASTARD TOAD-FLAX

COMCOM	0	COMMELINA COMMUNIS	0	FAC	Ad A-Forb	COMMON DAY FLOWER
CONCAN	0	Conyza canadensis	1	FAC-	Nt A-Forb	HORSEWEED
CORMAC	8	Corallorhiza maculata	4	FACU-	Nt P-Forb	SPOTTED CORAL ROOT
CORPAL	6	Coreopsis palmata	5	UPL	Nt P-Forb	PRAIRIE COREOPSIS
CORTRP	4	Coreopsis tripteris	0	FAC	Nt P-Forb	TALL COREOPSIS
CORALT	7	Cornus alternifolia	5	UPL	Nt Tree	ALTERNATE-LEAVED DOGWOOD
CORDRU	2	Cornus drummondii	0	FAC	Nt Shrub	ROUGH-LEAVED DOGWOOD
CORRAC	2	Cornus racemosa	-2	FACW-	Nt Shrub	GRAY DOGWOOD
CORAME	4	Corylus americana	0	FAC	Nt Shrub	AMERICAN FILBERT
CRAMOL	2	Crataegus mollis	-2	FACW-	Nt Tree	DOWNY HAWTHORN
CRAPRU	3	Crataegus pruinosa	5	UPL	Nt Tree	FROSTED HAWTHORN
CRYCAN	1	Cryptotaenia canadensis	0	FAC	Nt P-Forb	HONEWORT
CUSCEP	5	Cuscuta cephalanthi	5	UPL	Nt A-Forb	BUTTONBUSH DODDER
CYPESC	0	Cyperus esculentus	-3	FACW	Nt P-Sedge	FIELD NUT SEDGE
CYPSTR	0	Cyperus strigosus	-3	FACW	Nt P-Sedge	LONGL-SCALED NUT SEDGE
CYSPRO	4	Cystopteris protrusa	3	FACU	Nt Fern	HYBRID FRAGILE FERN
DALCAN	9	Dalea candida	5	UPL	Nt P-Forb	WHITE PRAIRIE CLOVER
DALPUR	8	Dalea purpurea	5	UPL	Nt P-Forb	PURPLE PRAIRIE CLOVER
DANSPI	3	Danthonia spicata	5	UPL	Nt P-Grass	POVERTY OAT GRASS
DAUCAR	0	DAUCUS CAROTA	4	FACU-	Ad B-Forb	QUEEN ANNE'S LACE
DENLAC	4	Dentaria laciniata	4	FACU	Nt P-Forb	TOOTHWORT
DESCAS	4	Desmodium canescens	5	UPL	Nt P-Forb	HOARY TICK TREFOIL
DESGLA	3	Desmodium glabellum	3	FACU	Nt P-Forb	SMOOTH TICK TREFOIL
DESGLU	3	Desmodium glutinosum	5	UPL	Nt P-Forb	POINTED TICK TREFOIL
DESILE	5	Desmodium illinoense	5	UPL	Nt P-Forb	ILLINOIS TICK TREFOIL
DESNUD	5	Desmodium nudiflorum	5	UPL	Nt P-Forb	BARE-STEMMED TICK TREFOIL
DESPAN	2	Desmodium paniculatum	3	FACU	Nt P-Forb	PANICLED TICK TREFOIL
DIAARM	0	DIANTHUS ARMERIA	5	UPL	Ad A-Forb	DEPTFORD PINK
DIAAME	7	Diarrhena americana	-3	FACW	Nt P-Grass	BEAK GRASS
DICCAN	7	Dicentra canadensis	5	UPL	Nt P-Forb	SQUIRREL CORN
DICCUC	5	Dicentra cucullaria	5	UPL	Nt P-Forb	DUTCHMAN'S BREECHES
DIOQUA	5	Dioscorea quaternata	3	FACU	Nt H-Vine	WILD YAM
DRYINT	7	Dryopteris intermedia	0	FAC	Nt Fern	COMMON WOOD FERN
ECHPAL	7	Echinacea pallida	5	UPL	Nt P-Forb	PALE PURPLE CONEFLOWER
ECHPUR	6	Echinacea purpurea	5	UPL	Nt P-Forb	BROAD-LEAVED PURPLE CONEFLOWER
ECHCRU	0	ECHINOCHLOA CRUSGALLI	-3	FACW	Ad A-Grass	BARNYARD GRASS
ECHLOB	4	Echinocystis lobata	-2	FACW-	Nt H-Vine	WILD CUCUMBER
ELAUMB	0	ELAEAGNUS UMBELLATA	5	UPL	Ad Shrub	AUTUMN OLIVE
ELEERY	3	Eleocharis erythropoda	-5	OBL	Nt P-Sedge	RED-ROOTED SPIKE RUSH
ELLNYC	1	Ellisia nyctelea	-1	FAC+	Nt A-Forb	AUNT LUCY
ELYCAN	4	Elymus canadensis	1	FAC-	Nt P-Grass	CANADA WILD RYE
ELYHYS	5	Elymus hystrix	5	UPL	Nt P-Grass	BOTTLEBRUSH GRASS
ELYVIL	4	Elymus villosus	3	FACU	Nt P-Grass	SILKY WILD RYE
ELYVIR	4	Elymus virginicus	-2	FACW-	Nt P-Grass	VIRGINIA WILD RYE
EQUARV	0	Equisetum arvense	0	FAC	Nt Fern	COMMON HORSETAIL
ERIANN	1	Erigeron annuus	1	FAC-	Nt B-Forb	ANNUAL FLEABANE
ERIPHI	3	Erigeron philadelphicus	-3	FACW	Nt P-Forb	MARSH FLEABANE
ERISTR	2	Erigeron strigosus	1	FAC-	Nt P-Forb	DAISY FLEABANE
ERYALB	4	Erythronium albidum	5	UPL	Nt P-Forb	WHITE ADDER'S TONGUE
EUPALT	2	Eupatorium altissimum	3	FACU	Nt P-Forb	TALL BONESET
EUPMAC	5	Eupatorium maculatum	-5	OBL	Nt P-Forb	SPOTTED JOE PYE WEED
EUPPER	4	Eupatorium perfoliatum	-4	FACW+	Nt P-Forb	COMMON BONESET
EUPRUG	2	Eupatorium rugosum	3	FACU	Nt P-Forb	WHITE SNAKEROOT
EUPSER	1	Eupatorium serotinum	-1	FAC+	Nt P-Forb	LATE BONESET
EUPSES	8	Eupatorium sessilifolium	5	UPL	Nt P-Forb	UPLAND BONESET
EUPCOR	3	Euphorbia corollata	5	UPL	Nt P-Forb	FLOWERING SPURGE
FESARU	0	FESTUCA ARUNDINACEA	2	FACU+	Ad P-Grass	TALL FESCUE
FESOBT	5	Festuca obtusa	2	FACU+	Nt P-Grass	NODDING FESCUE
FESPRA	0	FESTUCA PRATENSIS	4	FACU-	Ad P-Grass	MEADOW FESCUE
FRAVIR	2	Fragaria virginiana	1	FAC-	Nt P-Forb	WILD STRAWBERRY
FRAAMC	4	Fraxinus americana	3	FACU	Nt Tree	WHITE ASH
FRAPES	2	Fraxinus pennsylvanica v. subintegerrima	-3	FACW	Nt Tree	GREEN ASH
FRAQUA	6	Fraxinus quadrangulata	5	UPL	Nt Tree	BLUE ASH
GALAPA	0	Galium aparine	3	FACU	Nt A-Forb	ANNUAL BEDSTRAW
GALCIR	4	Galium circaezans	4	FACU-	Nt P-Forb	WILD LICORICE
GALCON	4	Galium concinnum	3	FACU	Nt P-Forb	SHINING BEDSTRAW
GALTRO	4	Galium triflorum	2	FACU+	Nt P-Forb	SWEET-SCENTED BEDSTRAW
GENPUB	9	Gentiana puberulenta	3	FACU	Nt P-Forb	DOWNY GENTIAN
GENQUI	7	Gentianella quinquefolia v. occidentalis	0	FAC	Nt A-Forb	STIFF GENTIAN
GERMAC	4	Geranium maculatum	3	FACU	Nt P-Forb	WILD GERANIUM
GEUCAN	2	Geum canadense	0	FAC	Nt P-Forb	WHITE AVENS

GLEHED	0	GLECHOMA HEDERACEA	3	FACU	Ad P-Forb	GROUND IVY
GLETRI	2	Gleditsia triacanthos	0	FAC	Nt Tree	HONEY LOCUST
GLYSTR	4	Glyceria striata	-5	OBL	Nt P-Grass	FOWL MANNA GRASS
GYMDIO	6	Gymnocladus dioica	5	UPL	Nt Tree	KENTUCKY COFFEE TREE
HACVIR	1	Hackelia virginiana	1	FAC-	Nt P-Forb	STICKSEED
HAMVIR	8	Hamamelis virginiana	3	FACU	Nt Shrub	WITCH HAZEL
HELAUT	3	Helenium autumnale	-4	FACW+	Nt P-Forb	SNEEZEWEED
HELDIV	5	Helianthus divaricatus	5	UPL	Nt P-Forb	WOODLAND SUNFLOWER
HELGRO	2	Helianthus grosseserratus	-2	FACW-	Nt P-Forb	SAWTOOTH SUNFLOWER
HELHIR	5	Helianthus hirsutus	5	UPL	Nt P-Forb	BRISTLY SUNFLOWER
HELOCC	7	Helianthus occidentalis	4	FACU-	Nt P-Forb	WESTERN SUNFLOWER
HELSTR	3	Helianthus strumosus	5	UPL	Nt P-Forb	PALE-LEAVED SUNFLOWER
HELTUB	3	Helianthus tuberosus	0	FAC	Nt P-Forb	JERUSALEM ARTICHOKE
HELHEL	4	Heliopsis helianthoides	5	UPL	Nt P-Forb	FALSE SUNFLOWER
HEPNOA	7	Hepatica nobilis v. acuta	5	UPL	Nt P-Forb	SHARP-LOBED HEPATICA
HERLAN	6	Heracleum lanatum	-3	FACW	Nt P-Forb	COW PARSNIP
HEURIC	7	Heuchera richardsonii v. grayana	1	FAC-	Nt P-Forb	PRAIRIE ALUMROOT
HIBLAE	4	Hibiscus laevis	-5	OBL	Nt P-Forb	HALBERD-LEAVED ROSE MALLOW
HIESCA	5	Hieracium scabrum	5	UPL	Nt P-Forb	ROUGH HAWKWEED
HYBCON	7	Hybanthus concolor	2	FACU+	Nt P-Forb	GREEN VIOLET
HYDARB	6	Hydrangea arborescens	4	FACU-	Nt Shrub	WILD HYDRANGEA
HYDCAS	7	Hydrastis canadensis	5	UPL	Nt P-Forb	GOLDEN SEAL
HYDAPP	6	Hydrophyllum appendiculatum	5	UPL	Nt P-Forb	GREAT WATERLEAF
HYDVIR	5	Hydrophyllum virginianum	-2	FACW-	Nt P-Forb	VIRGINIA WATERLEAF
HYPSPH	5	Hypericum sphaerocarpum	3	FACU	Nt P-Forb	ROUND-FRUITED ST. JOHN'S WORT
HYPHIR	6	Hypoxis hirsuta	0	FAC	Nt P-Forb	YELLOW STAR GRASS
IMPCAP	2	Impatiens capensis	-3	FACW	Nt A-Forb	SPOTTED TOUCH-ME-NOT
IMPPAL	4	Impatiens pallida	-3	FACW	Nt A-Forb	PALE TOUCH-ME-NOT
IPOPAN	2	Ipomoea pandurata	3	FACU	Nt P-Forb	WILD SWEET POTATO
IRISHR	5	Iris shrevei	-5	OBL	Nt P-Forb	SOUTHERN BLUE FLAG
JEFDIP	10	Jeffersonia diphylla	5	UPL	Nt P-Forb	TWINLEAF
JUGCIN	7	Juglans cinerea	2	FACU+	Nt Tree	BUTTERNUT
JUGNIG	4	Juglans nigra	3	FACU	Nt Tree	BLACK WALNUT
JUNTEN	0	Juncus tenuis	0	FAC	Nt P-Forb	PATH RUSH
JUNVIR	1	Juniperus virginiana	3	FACU	Nt Tree	EASTERN RED CEDAR
KRIBIF	5	Krigia biflora	3	FACU	Nt P-Forb	FALSE DANDELOIN
LACCAN	1	Lactuca canadensis	2	FACU+	Nt B-Forb	WILD LETTUCE
LAPCAN	2	Laportea canadensis	-3	FACW	Nt P-Forb	CANADA WOOD NETTLE
LECTEN	6	Lechea tenuifolia	5	UPL	Nt P-Forb	NARROW-LEAVED PINWEED
LEEORY	3	Leersia oryzoides	-5	OBL	Nt P-Grass	RICE CUT GRASS
LEEVIR	4	Leersia virginica	-3	FACW	Nt P-Grass	WHITE GRASS
LESVIO	5	Lespedeza violacea	5	UPL	Nt P-Forb	VIOLET BUSH CLOVER
LESVIR	5	Lespedeza virginica	5	UPL	Nt P-Forb	SLENDER BUSH CLOVER
LIAASP	7	Liatris aspera	5	UPL	Nt P-Forb	ROUGH BLAZING STAR
LIACYL	8	Liatris cylindracea	5	UPL	Nt P-Forb	CYLINDRICAL BLAZING STAR
LILMIC	6	Lilium michiganense	-1	FAC+	Nt P-Forb	MICHIGAN LILY
LINSUL	8	Linum sulcatum	5	UPL	Nt P-Forb	GROOVED YELLOW FLAX
LIPLIL	4	Liparis liliifolia	4	FACU-	Nt P-Forb	PURPLE TWAYBLADE
LITCAN	6	Lithospermum canescens	5	UPL	Nt P-Forb	HOARY PUCCOON
LITCAR	7	Lithospermum caroliniense	5	UPL	Nt P-Forb	HAIRY PUCCOON
LOBCAR	6	Lobelia cardinalis	-5	OBL	Nt P-Forb	CARDINAL FLOWER
LOBINF	4	Lobelia inflata	4	FACU-	Nt A-Forb	INDIAN TOBACCO
LOBSIP	4	Lobelia siphilitica	-4	FACW+	Nt P-Forb	GREAT BLUE LOBELIA
LONMAA	0	LONICERA MAACKII	5	UPL	Ad Shrub	AMUR HONEYSUCKLE
LONTAT	0	LONICERA TATARICA	3	FACU	Ad Shrub	TARTARIAN HONEYSUCKLE
LOTCOR	0	LOTUS CORNICULATUS	1	FAC-	Ad P-Forb	BIRDSFOOT TREFOIL
LYCAME	3	Lycopus americanus	-5	OBL	Nt P-Forb	COMMON WATER HOREHOUND
LYCVIR	5	Lycopus virginicus	-5	OBL	Nt P-Forb	BUGLE WEED
LYSCIL	4	Lysimachia ciliata	-3	FACW	Nt P-Forb	FRINGED LOOSESTRIFE
LYSNUM	0	LYSIMACHIA NUMMULARIA	-4	FACW+	Ad P-Forb	MONEYWORT
LYTALA	5	Lythrum alatum	-5	OBL	Nt P-Forb	WINGED LOOSESTRIFE
MACPOM	0	MACLURA POMIFERA	3	FACU	Ad Tree	HEDGE APPLE
MALIOE	3	Malus ioensis	5	UPL	Nt Tree	IOWA CRAB
MELALB	0	MELILOTUS ALBA	3	FACU	Ad B-Forb	WHITE SWEET CLOVER
MENCAN	4	Menispermum canadense	-1	FAC+	Nt W-Vine	MOONSEED
MERVIR	5	Mertensia virginica	-3	FACW	Nt P-Forb	VIRGINIA BLUEBELLS
MITDIP	9	Mitella diphylla	2	FACU+	Nt P-Forb	BISHOP'S CAP
MOLVER	0	MOLLUGO VERTICILLATA	0	FAC	Ad A-Forb	CARPET WEED
MONFIS	4	Monarda fistulosa	3	FACU	Nt P-Forb	WILD BERGAMOT
MONHYP	8	Monotropa hypopithys	5	UPL	Nt P-Forb	PINESAP
MONUNI	8	Monotropa uniflora	3	FACU	Nt P-Forb	INDIAN PIPE

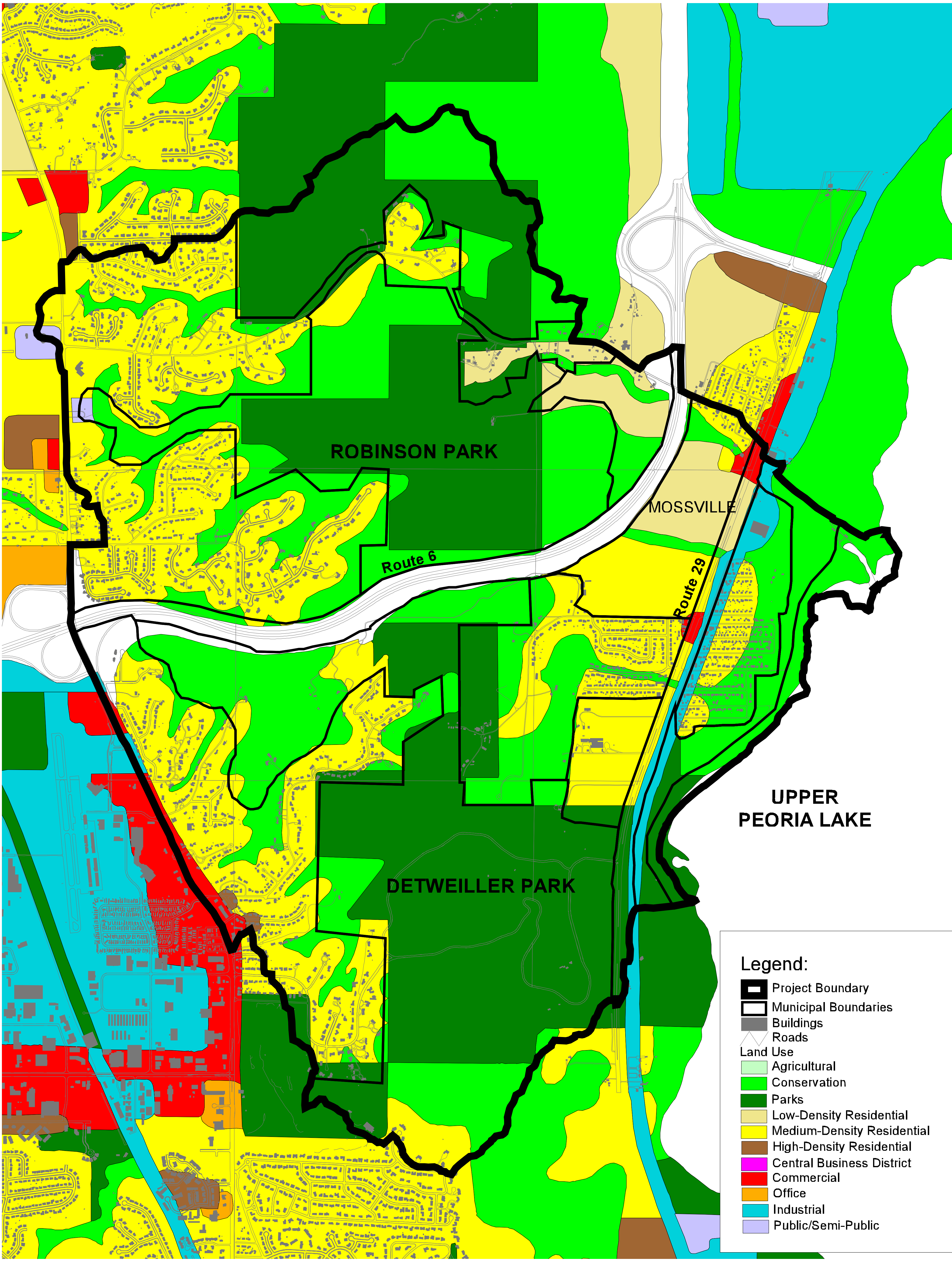
MORALB	0	MORUS ALBA	0	FAC	Ad	Tree	WHITE MULBERRY
MORRUB	4	Morus rubra	1	FAC-	Nt	Tree	RED MULBERRY
MUHSOB	5	Muhlenbergia sobolifera	5	UPL	Nt	P-Grass	ROCK SATIN GRASS
MUHTEN	6	Muhlenbergia tenuiflora	5	UPL	Nt	P-Grass	SLENDER SATIN GRASS
NEPCAT	0	NEPETA CATARIA	1	FAC-	Ad	P-Forb	CATNIP
OENBIB	1	Oenothera biennis	3	FACU	Nt	B-Forb	COMMON EVENING PRIMROSE
OROUNI	8	Orobanche uniflora	5	UPL	Nt	P-Forb	CANCER-ROOT
OSMCLI	3	Osmorhiza claytonii	4	FACU-	Nt	P-Forb	HAIRY SWEET CICELY
OSMLON	3	Osmorhiza longistylis	4	FACU-	Nt	P-Forb	ANISE ROOT
OSTVIR	4	Ostrya virginiana	4	FACU-	Nt	Tree	HOP HORNBEAM
OXASTR	0	Oxalis stricta	3	FACU	Nt	P-Forb	TALL WOOD SORREL
OXAVIO	5	Oxalis violacea	5	UPL	Nt	P-Forb	VIOLET WOOD SORREL
PANQUI	7	Panax quinquefolius	5	UPL	Nt	P-Forb	GINSENG
PANCAP	0	Panicum capillare	0	FAC	Nt	A-Grass	OLD WITCH GRASS
PANCLA	4	Panicum clandestinum	-3	FACW	Nt	P-Grass	DEER-TONGUE GRASS
PANDII	0	Panicum dichotomiflorum	-2	FACW-	Nt	A-Grass	FALL PANICUM
PANIMP	2	Panicum implicatum	0	FAC	Nt	P-Grass	OLD FIELD PANIC GRASS
PANLAT	5	Panicum latifolium	3	FACU	Nt	P-Grass	BROAD-LEAVED PANIC GRASS
PANLEI	7	Panicum leibergii	2	FACU+	Nt	P-Grass	PRAIRIE PANIC GRASS
PANLIE	7	Panicum linearifolium	5	UPL	Nt	P-Grass	SLENDER-LEAVED PANIC GRASS
PANOLS	3	Panicum oligosanthes v. scribnerianum	3	FACU	Nt	P-Grass	SCRIBNER'S PANIC GRASS
PANVIV	5	Panicum villosissimum	5	UPL	Nt	P-Grass	WHITE-HAIRED PANIC GRASS
PANVIR	4	Panicum virgatum	-1	FAC+	Nt	P-Grass	PRAIRIE SWITCH GRASS
PARPEN	2	Parietaria pensylvanica	3	FACU	Nt	A-Forb	PENNSYLVANIA PELLITORY
PARCAN	5	Paronychia canadensis	5	UPL	Nt	A-Forb	TALL FORKED CHICKWEED
PARQUI	2	Parthenocissus quinquefolia	1	FAC-	Nt	W-Vine	VIRGINIA CREEPER
PASSAT	0	PASTINACA SATIVA	5	UPL	Ad	B-Forb	WILD PARSNIP
PHAARU	0	PHALARIS ARUNDINACEA	-4	FACW+	Ad	P-Grass	REED CANARY GRASS
PHEHEX	7	Phegopteris hexagonoptera	1	FAC-	Nt	Fern	BROAD BEECH FERN
PHLDIV	5	Phlox divaricata	3	FACU	Nt	P-Forb	BLUE PHLOX
PHLPIP	7	Phlox pilosa	1	FAC-	Nt	P-Forb	SAND PRAIRIE PHLOX
PHRLEP	4	Phryma leptostachya	5	UPL	Nt	P-Forb	LOPSEED
PHYLAC	1	Phyla lanceolata	-5	OBL	Nt	P-Forb	FOG FRUIT
PHYSUB	0	Physalis subglabrata	5	UPL	Nt	P-Forb	SMOOTH GROUND CHERRY
PHYVIG	3	Physalis virginiana	5	UPL	Nt	P-Forb	LANCE-LEAVED GROUND CHERRY
PHYVIN	6	Physostegia virginiana	-3	FACW	Nt	P-Forb	OBEDIENT PLANT
PHYAME	1	Phytolacca americana	1	FAC-	Nt	P-Forb	POKEWEED
PILPUM	3	Pilea pumila	-3	FACW	Nt	A-Forb	CANADA CLEARWEED
PLAMAJ	0	PLANTAGO MAJOR	-1	FAC+	Ad	P-Forb	COMMON PLANTAIN
PLARUG	0	Plantago rugelii	0	FAC	Nt	A-Forb	RED-STALKED PLANTAIN
PLAOCC	3	Platanus occidentalis	-3	FACW	Nt	Tree	BUTTONWOOD
POACOM	0	POA COMPRESSA	2	FACU+	Ad	P-Grass	CANADIAN BLUE GRASS
POANEM	0	POA NEMORALIS	0	FAC	Ad	P-Grass	WOODLAND BLUE GRASS
POAPRA	0	POA PRATENSIS	1	FAC-	Ad	P-Grass	KENTUCKY BLUE GRASS
POASYL	5	Poa sylvestris	0	FAC	Nt	P-Grass	WOODLAND BLUE GRASS
PODPEL	4	Podophyllum peltatum	3	FACU	Nt	P-Forb	MAY APPLE
POLSEN	7	Polygala senega	3	FACU	Nt	P-Forb	SENECA SNAKEROOT
POLVER	5	Polygala verticillata v. isocycla	5	UPL	Nt	A-Forb	WHORLED MILKWORT
POLCOM	4	Polygonatum commutatum	3	FACU	Nt	P-Forb	GREAT SOLOMON SEAL
POLCES	0	POLYGONUM CESPITOSUM v. LONGISETUM	5	UPL	Ad	A-Forb	CREEPING SMARTWEED
POLLAP	0	Polygonum lapathifolium	-4	FACW+	Nt	A-Forb	CURTTOP LADY'S THUMB
POLSCN	2	Polygonum scandens	0	FAC	Nt	H-Vine	CLIMBING FALSE BUCKWHEAT
POLVIG	3	Polygonum virginianum	0	FAC	Nt	P-Forb	VIRGINIA KNOTWEED
POLACR	5	Polystichum acrostichoides	5	UPL	Nt	Fern	CHRISTMAS FERN
POLNUT	8	Polytaenia nuttallii	5	UPL	Nt	P-Forb	PRAIRIE PARSLEY
POPDEL	2	Populus deltoides	-1	FAC+	Nt	Tree	EASTERN COTTONWOOD
POPGRA	4	Populus grandidentata	3	FACU	Nt	Tree	BIG-TOOTH ASPEN
POTSIM	3	Potentilla simplex	4	FACU-	Nt	P-Forb	COMMON CINQUEFOIL
PREALB	5	Prenanthes alba	3	FACU	Nt	P-Forb	LION'S FOOT
PRUVUV	0	PRUNELLA VULGARIS	0	FAC	Ad	P-Forb	LAWN PRUNELLA
PRUAML	3	Prunus americana v. lanata	5	UPL	Nt	Tree	WILD PLUM
PRUSER	1	Prunus serotina	3	FACU	Nt	Tree	WILD BLACK CHERRY
PRUVIR	3	Prunus virginiana	1	FAC-	Nt	Shrub	COMMON CHOKE CHERRY
PSOTEN	8	Psoralea tenuiflora	5	UPL	Nt	P-Forb	SCURFY-PEA
PTETRT	4	Ptelea trifoliata	2	FACU+	Nt	Shrub	WAFER ASH
PYCPIL	6	Pycnanthemum pilosum	5	UPL	Nt	P-Forb	HAIRY MOUNTAIN MINT
PYRCOM	0	PYRUS COMMUNIS	5	UPL	Ad	Tree	PEAR
QUEALB	5	Quercus alba	3	FACU	Nt	Tree	WHITE OAK
QUEIMB	2	Quercus imbricaria	1	FAC-	Nt	Tree	JACK OAK
QUEMAC	5	Quercus macrocarpa	1	FAC-	Nt	Tree	BURR OAK
QUEPRA	5	Quercus prinoides v. acuminata	4	FACU-	Nt	Tree	CHINKAPIN OAK

QUERUB	5	Quercus rubra	3	FACU	Nt	Tree	NORTHERN RED OAK
QUEVEL	5	Quercus velutina	5	UPL	Nt	Tree	BLACK OAK
RANABO	1	Ranunculus abortivus	-2	FACW-	Nt	A-Forb	LITTLE-LEAF BUTTERCUP
RANHIS	5	Ranunculus hispidus	0	FAC	Nt	P-Forb	ROUGH BUTTERCUP
RANREC	5	Ranunculus recurvatus	-3	FACW	Nt	A-Forb	HOOKED BUTTERCUP
RANSES	4	Ranunculus septentrionalis	-4	FACW+	Nt	P-Forb	SWAMP BUTTERCUP
RATPIN	4	Ratibida pinnata	5	UPL	Nt	P-Forb	YELLOW CONEFLOWER
RHACAT	0	RHAMNUS CATHARTICA	3	FACU	Ad	Shrub	COMMON BUCKTHORN
RHUARM	4	Rhus aromatica	5	UPL	Nt	Shrub	AROMATIC SUMAC
RHUGLA	1	Rhus glabra	5	UPL	Nt	Shrub	SMOOTH SUMAC
RIBMIS	2	Ribes missouriense	5	UPL	Nt	Shrub	MISSOURI GOOSEBERRY
ROBPSE	1	Robinia pseudo-acacia	4	FACU-	Nt	Tree	BLACK LOCUST
RORISF	4	Rorippa palustris v. fernaldiana	-5	OBL	Nt	A-Forb	MARSH YELLOW CRESS
ROSCAR	4	Rosa carolina	4	FACU-	Nt	Shrub	PASTURE ROSE
ROSMUL	0	ROSA MULTIFLORA	3	FACU	Ad	Shrub	JAPANESE ROSE
ROSSUF	5	Rosa suffulta	5	UPL	Nt	Shrub	SUNSHINE ROSE
RUBALL	2	Rubus allegheniensis	2	FACU+	Nt	Shrub	COMMON BLACKBERRY
RUBENS	7	Rubus enslenii	5	UPL	Nt	Shrub	ARCHING DEWBERRY
RUBOCC	2	Rubus occidentalis	3	FACU	Nt	Shrub	BLACK RASPBERRY
RUBPEN	2	Rubus pensylvanicus	1	FAC-	Nt	Shrub	YANKEE BLACKBERRY
RUDHIR	2	Rudbeckia hirta	3	FACU	Nt	P-Forb	BLACK-EYED SUSAN
RUDTRI	3	Rudbeckia triloba	1	FAC-	Nt	A-Forb	BROWN-EYED SUSAN
RUEHUH	3	Ruellia humilis	4	FACU-	Nt	P-Forb	HAIRY RUELLIA
RUMCRP	0	RUMEX CRISPUS	-1	FAC+	Ad	P-Forb	CURLY DOCK
SALAMY	4	Salix amygdaloides	-3	FACW	Nt	Tree	PEACH-LEAVED WILLOW
SALEXI	1	Salix exigua	-5	OBL	Nt	Shrub	SANDBAR WILLOW
SALNIG	3	Salix nigra	-5	OBL	Nt	Tree	BLACK WILLOW
SAMCAN	2	Sambucus canadensis	4	FACU-	Nt	Shrub	COMMON ELDER
SANCAD	5	Sanguinaria canadensis	4	FACU-	Nt	P-Forb	BLOODROOT
SANCAS	4	Sanicula canadensis	2	FACU+	Nt	B-Forb	CANADIAN BLACK SNAKEROOT
SANGRE	2	Sanicula gregaria	-1	FAC+	Nt	P-Forb	CLUSTERED BLACK SNAKEROOT
SANMAR	6	Sanicula marilandica	5	UPL	Nt	P-Forb	BLACK SNAKEROOT
SASALB	2	Sassafras albidum	3	FACU	Nt	Tree	SASSAFRAS
SCHSCO	5	Schizachyrium scoparium	4	FACU-	Nt	P-Grass	LITTLE BLUESTEM
SCIPEN	3	Scirpus pendulus	-5	OBL	Nt	P-Sedge	RED BULRUSH
SCLANN	0	SCLERANTHUS ANNUUS	3	FACU	Ad	A-Forb	KNAWEL
SCRMAR	4	Scrophularia marilandica	4	FACU-	Nt	P-Forb	LATE FIGWORT
SCUOVA	5	Scutellaria ovata	3	FACU	Nt	P-Forb	HEART-LEAVED SKULLCAP
SCUPAR	6	Scutellaria parvula	3	FACU	Nt	P-Forb	SMALL SKULLCAP
SENPLA	6	Senecio plattensis	4	FACU-	Nt	P-Forb	PRAIRIE RAGWORT
SETVIV	0	SETARIA VIRIDIS	5	UPL	Ad	A-Grass	GREEN FOXTAIL
SICANG	3	Sicyos angulatus	-2	FACW-	Nt	H-Vine	BUR CUCUMBER
SILINT	5	Silphium integrifolium	5	UPL	Nt	P-Forb	ROSIN WEED
SILPER	4	Silphium perfoliatum	-2	FACW-	Nt	P-Forb	CUP PLANT
SISANG	5	Sisyrinchium angustifolium	-2	FACW-	Nt	P-Forb	STOUT BLUE-EYED GRASS
SISCAM	6	Sisyrinchium campestre	5	UPL	Nt	P-Forb	PRAIRIE BLUE-EYED GRASS
SMIRAC	4	Smilacina racemosa	3	FACU	Nt	P-Forb	FEATHERY FALSE SOLOMON SEAL
SMIECI	5	Smilax ecirrhata	5	UPL	Nt	P-Forb	UPRIGHT CARRION FLOWER
SMIHIS	3	Smilax hispida	0	FAC	Nt	W-Vine	BRISTLY GREEN BRIER
SMILAS	4	Smilax lasioneuron	5	UPL	Nt	H-Vine	COMMON CARRION FLOWER
SOLCAE	7	Solidago caesia	3	FACU	Nt	P-Forb	BLUESTEM GOLDENROD
SOLCAN	1	Solidago canadensis	3	FACU	Nt	P-Forb	CANADA GOLDENROD
SOLFLE	6	Solidago flexicaulis	3	FACU	Nt	P-Forb	BROAD-LEAVED GOLDENROD
SOLGIG	3	Solidago gigantea	-3	FACW	Nt	P-Forb	LATE GOLDENROD
SOLMIS	4	Solidago missouriensis	5	UPL	Nt	P-Forb	MISSOURI GOLDENROD
SOLNEM	3	Solidago nemoralis	5	UPL	Nt	P-Forb	OLD FIELD GOLDENROD
SOLRIG	4	Solidago rigida	4	FACU-	Nt	P-Forb	RIGID GOLDENROD
SOLULM	5	Solidago ulmifolia	5	UPL	Nt	P-Forb	ELM-LEAVED GOLDENROD
SONASP	0	SONCHUS ASPER	0	FAC	Ad	A-Forb	PRICKLY SOW THISTLE
SORNUT	4	Sorghastrum nutans	2	FACU+	Nt	P-Grass	INDIAN GRASS
SPAPEC	4	Spartina pectinata	-4	FACW+	Nt	P-Grass	PRAIRIE CORD GRASS
SPHOBO	5	Sphenopholis obtusata	0	FAC	Nt	P-Grass	PRAIRIE WEDGE GRASS
SPICER	4	Spiranthes cernua	-2	FACW-	Nt	P-Forb	NODDING LADIES' TRESSES
SPOASP	3	Sporobolus asper	5	UPL	Nt	P-Grass	ROUGH DROPSEED
SPOHET	9	Sporobolus heterolepis	4	FACU-	Nt	P-Grass	NORTHERN DROP SEED
SPONEG	1	Sporobolus neglectus	5	UPL	Nt	A-Grass	SMALL RUSH GRASS
STATEH	5	Stachys tenuifolia v. hispida	-5	OBL	Nt	P-Forb	MARSH HEDGE NETTLE
STATRI	5	Staphylea trifolia	0	FAC	Nt	Shrub	BLADDERNUT
TAEINT	7	Taenidia integerrima	5	UPL	Nt	P-Forb	YELLOW PIMPERNEL
TEUCAB	3	Teucrium canadense v. boreale	-2	FACW-	Nt	P-Forb	GRAY GERMANDER
TEUCAV	3	Teucrium canadense v. virginicum	-2	FACW-	Nt	P-Forb	AMERICAN GERMANDER

THADAD	5	Thalictrum dasycarpum	-2	FACW-	Nt	P-Forb	PURPLE MEADOW RUE
TILAME	5	Tilia americana	3	FACU	Nt	Tree	AMERICAN LINDEN
TOXRAD	1	Toxicodendron radicans	3	FACU	Nt	W-Vine	POISON IVY
TRAOHI	3	Tradescantia ohiensis	2	FACU+	Nt	P-Forb	COMMON SPIDERWORT
TRADUB	0	TRAGOPOGON DUBIUS	5	UPL	Ad	B-Forb	SAND GOAT'S BEARD
TRIFLE	7	Trillium flexipes	1	FAC-	Nt	P-Forb	DECLINED TRILLIUM
TRINIV	8	Trillium nivale	5	UPL	Nt	P-Forb	SNOW TRILLIUM
TRIREC	5	Trillium recurvatum	4	FACU-	Nt	P-Forb	RED TRILLIUM
TRIPEP	2	Triodanis perfoliata	0	FAC	Nt	A-Forb	VENUS'S LOOKING GLASS
ULMAME	5	Ulmus americana	-2	FACW-	Nt	Tree	AMERICAN ELM
ULMRUB	3	Ulmus rubra	0	FAC	Nt	Tree	SLIPPERY ELM
URTDIO	2	Urtica dioica	-1	FAC+	Nt	P-Forb	TALL NETTLE
UVUGRA	7	Uvularia grandiflora	5	UPL	Nt	P-Forb	BELLWORT
VERTHA	0	VERBASCUM THAPSUS	5	UPL	Ad	B-Forb	WOOLLY MULLEIN
VERURT	3	Verbena urticifolia	-1	FAC+	Nt	P-Forb	WHITE VERVIAN
VERALT	4	Verbesina alternifolia	-3	FACW	Nt	P-Forb	WINGSTEM
VERBAL	5	Vernonia baldwinii	5	UPL	Nt	P-Forb	BALDWIN'S IRONWEED
VERFAS	5	Vernonia fasciculata	-3	FACW	Nt	P-Forb	COMMON IRONWEED
VERGIG	4	Vernonia gigantea	0	FAC	Nt	P-Forb	TALL IRON WEED
VIBPRU	4	Viburnum prunifolium	3	FACU	Nt	Shrub	BLACK HAW
VIBRAF	6	Viburnum rafinesquianum	5	UPL	Nt	Shrub	DOWNY ARROWWOOD
VIBTRI	10	Viburnum trilobum	5	UPL	Nt	Shrub	HIGHBUSH CRANBERRY
VIOOBL	9	Viola obliqua	-5	OBL	Nt	P-Forb	MARSH BLUE VIOLET
VIOPET	7	Viola pedata	5	UPL	Nt	P-Forb	BIRD'S FOOT VIOLET
VIOPUP	7	Viola pubescens	4	FACU-	Nt	P-Forb	DOWNY YELLOW VIOLET
VIOSOR	3	Viola sororia	1	FAC-	Nt	P-Forb	WOOLLY BLUE VIOLET
VIOTRL	5	Viola triloba	5	UPL	Nt	P-Forb	CLEFT VIOLET
VITRIP	2	Vitis riparia	-2	FACW-	Nt	W-Vine	RIVERVBANK GRAPE
VITVUL	4	Vitis vulpina	-2	FACW-	Nt	W-Vine	FROST GRAPE
VULOCT	2	Vulpia octoflora	-2	FACW-	Nt	A-Grass	SIX WEEKS FESCUE
XANSTR	0	Xanthium strumarium	0	FAC	Nt	A-Forb	COCKLEBUR
ZANAME	4	Zanthoxylum americanum	5	UPL	Nt	Shrub	PRICKLY ASH
ZIZAUR	6	Zizia aurea	-1	FAC+	Nt	P-Forb	GOLDEN ALEXANDERS

Mossville Bluffs Area Watershed Plan

Mossville, Illinois



N
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Scale: 1 : 1,000 approx.

500 0 500 1000 Feet

Project Number: 00076.00

Date: 08.01.02

Client:
Tri-County Regional Planning Commision
City of Peoria
Peoria County

Land Use Map

Landscape Architecture
Community Planning
Ecological Restoration
Resource Management

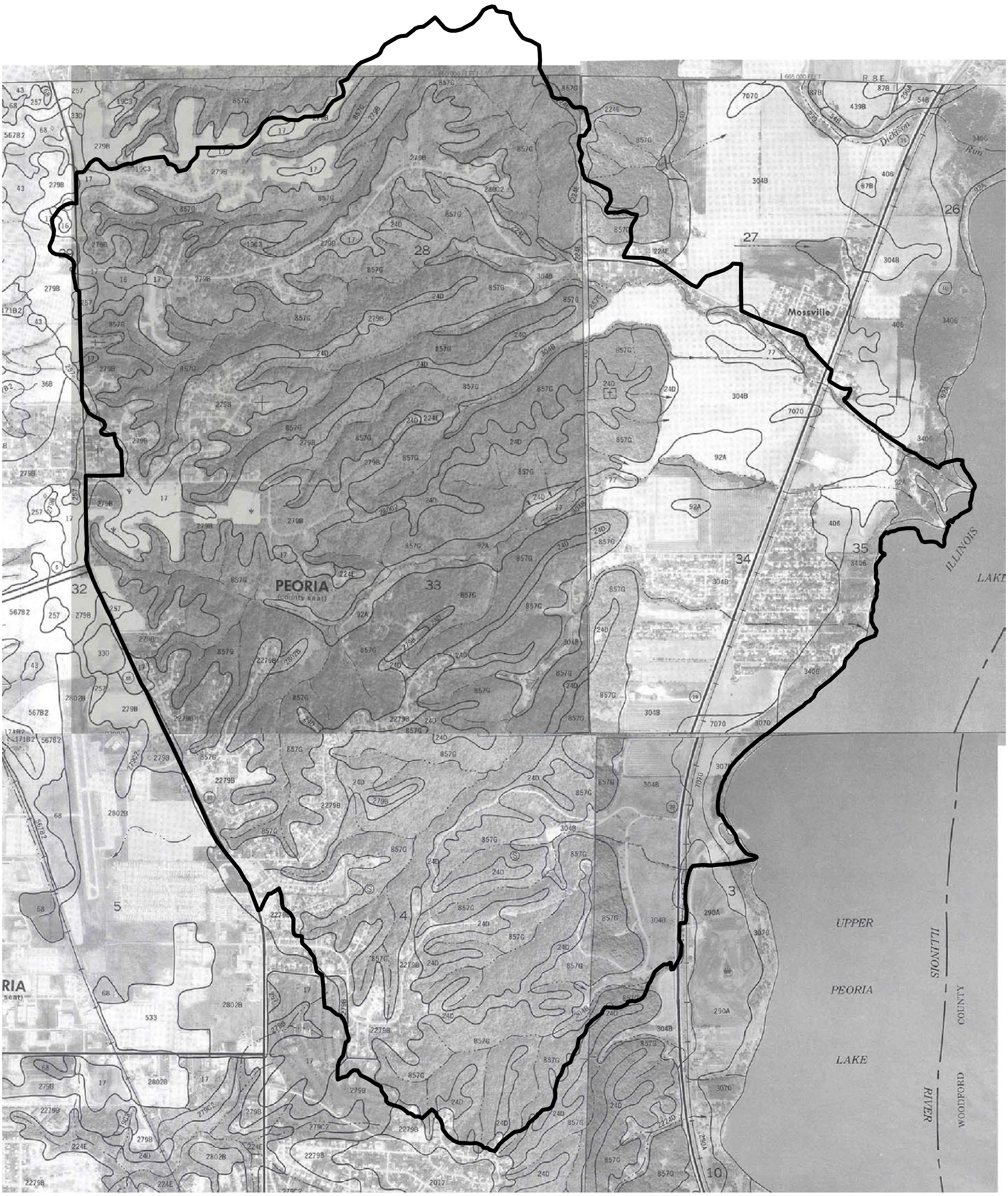
375 W. First Street
Elmhurst, Illinois 60126
630.559.2000 phone
630.559.2030 fax

CONSERVATION DESIGN FORUM

CLARK ENGINEERING

Mossville Bluffs Area Watershed Plan

Mossville, Illinois



Key:

17 Keomah silt loam
19 Sylvan silty clay loam
24 Dodge silt loam
92 Sarpy loamy sand
224 Strawn silty loam
279 Rozetta silt loam
280 Fayette silt loam
290 Warsaw silt loam
304 Landes loam
2017 Keomah-Urban land complex
2224 Strawn-Urnam land complex
2279 Rozetta-Urban land complex
2802 Orthents-Urban land complex
3070 Beaucoup silty clay loam, frequently flooded
3406 Paxico silt loam, frequently flooded
7070 Beaucoup silty clay loam, rarely flooded

Souce: Soil Survey of Peoria County, Illinois, 1984, USDA Soil Conservation Service

Scale: 1" = 1800' approx.

500 0 500 1000 feet

Project Number: 00076.00

Date: 08.01.02

Client:
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City of Peoria
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Soils Map

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Soils Descriptions

(Major Soil Types for the Mossville Bluffs Watershed)

Hickory-Strawn-Marseilles Association

Strongly sloping to very steep, well drained and moderately well drained, silty and loamy soils; formed mainly in glacial till or in material weathered from shale.

This association consists of soils on side slopes and foot slopes bordering stream valleys in the uplands. Small drainage ways and the adjacent larger flood plains are in some areas.

This association makes up about 15 percent of the county. It is about 38 percent Hickory soils, 22 percent Strawn soils, 20 percent Marseilles soils, and 20 percent minor soils.

The moderately steep to very steep, well-drained Hickory soils are on side slopes and foot slopes. They formed in glacial till or in loess over glacial till. Typically, the surface layer is dark grayish brown, friable loam or silt loam about 3 inches thick. The subsurface layer is brown, very friable loam about 4 inches thick. The subsoil extends to a depth of more than 60 inches. The upper part is yellowish brown, friable clay loam. The next part is yellowish brown, firm clay loam. The lower part is light olive brown, friable loam.

The very steep, well-drained Strawn soils are on side slopes. They formed in glacial till. Typically, the surface layer is very dark grayish brown, very friable silt loam about 5 inches thick. It is silty clay loam in severely eroded areas. The subsoil is about 19 inches thick. The upper part is brown and dark brown, friable silty clay loam. The lower part is brown, calcareous, friable clay loam. The underlying material to a depth of 60 inches or more is brown, calcareous, friable loam.

The moderately steep to very steep, moderately deep, moderately well drained Marseilles soils are on side slopes and foot slopes. They formed in shale residuum mantled with loess. Typically, the surface layer is dark brown, friable silt loam about 6 inches thick. The subsurface layer is brown, friable silt loam about 4 inches thick. The subsoil is firm silty clay loam about 29 inches thick. The upper part is yellowish brown. The next part is yellowish brown and mottled. The lower part is olive and mottled. Light olive brown, soft shale is at a depth of about 39 inches.

Minor in this association are the Alivin, Dodge, Dorchester, Elco, Fayette, Hennepin, Lawson, and Sylvan soils. The well drained Alvin, Dodge and Fayette soils, the moderately well drained Elco soils, and the well drained and moderately well drained Sylavan soils are on side slopes and narrow ridges, generally above the major soils. The well-drained Dorchester and somewhat poorly drained Lawson soils are in areas below the major soils. The well-drained Hennepin soils are in areas closely intermingled with very steep Strawn soils.

Most areas of this association are used for woodland. Some moderately steep areas are used for pasture. The soils are moderately suited to woodland. Available water capacity is high in the Hickory soils and moderate in the Strawn and Marseilles soils. The main management needs are measures that control water erosion in disturbed areas and measures that protect the woodland from fire and grazing.

857G—Strawn-Hennepin loams, 30-60 percent slopes. These very steep, well drained soils are on side slopes in the uplands. The Strawn soil is on the upper or less sloping parts of the side slopes, and the Hennepin soil is on the lower or more sloping parts. Individual areas are long and narrow or irregularly shaped and range from 5 to 4,7000 acres in size. They are about 45 to 60 percent Strawn soil and 25 to 40 percent Hennepin soil. The two soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Strawn soil has a surface layer of very dark grayish brown, friable loam about 4 inches thick. The subsurface layer is brown, friable loam about 4 inches thick. The subsoil is brown, firm clay loam about 18 inches think. It is calcareous in the lower part. The underlying material to a depth of 60 inches is brown, calcareous, very firm clay loam. In some areas, the subsoil is thicker and carbonates are below a depth of 30 inches. In other areas the slope is less than 30 percent.

Typically, the Hennepin soil has a surface layer of very dark grayish brown, calcareous, friable loam about 4 inches thick. The subsoil is brown, calcareous, friable loam about 12 inches thick. The underlying material to a depth of 60 inches is brown, calcareous, firm loam. In places the slope is more than 60 percent.

Water and air move through the upper part of the Strawn soil at a moderate rate and through the lower part at a moderately slow rate. They move through the Hennepin soil at a moderately slow rate. Surface runoff is rapid on both soils. Available water capacity is moderate. Organic matter content is moderately low. The shrink-swell potential is moderate in the Strawn soil and low in the Hennepin soil. The potential for frost action is moderate in both soils.

Most areas are used as woodland. Some areas are used for residential development. These soils are generally unsuited to cultivated crops, pasture, and hay and to dwellings and septic tank absorption fields because of the slope. They are moderately suited to woodland.

2017—Keomah-Urban land complex. This map unit consists of a nearly level, somewhat poorly drained Keomah soil intermingled with areas of Urban land. It is on smooth flats. Individual areas are polygonal or irregularly shaped and range from 40 to 400 acres in size. They are about 50 to 80 percent Keomah soil and 15 to 45 percent Urban land. The Kelmah soil and Urban land occur as areas so intricately mixed that mapping them separately is not practical.

Typically, the surface layer of the Keomah soil is dark gray, very friable silt loam about 7 inches thick. The subsurface layer is grayish brown loam about 14 inches thick. The subsoil is friable silty clay loam about 25 inches thick. The upper part is dark yellowish brown. The lower part is grayish brown. The underlying material to a depth of 60 inches is mottled light brownish gray and yellowish brown, friable silt loam. Some low areas and some areas adjacent to developments have been filled or leveled during construction. In places the slope is more than 2 percent.

The Urban land is covered by streets, parking lots, buildings, and other structures that so obscure the soils that identification of the soil series is not possible.

Included in this map unit are small areas of the poorly drained Rushville soils. These soils are subject to ponding and are in shallow depressions below the Keomah soil. They make up 5 to 10 percent of the unit.

Water and air move through the upper part of the Keomah soil at a moderate rate and through the lower part at a slow or moderately slow rate. The seasonal high water table is 2 to 4 feet below the surface during spring. Surface runoff is slow on the Keomah soil and rapid on the Urban land. Available water capacity is high in the Keomah soil. Organic matter content is moderately low. The shrink-swell potential and the potential for frost action are high.

304B—Landes laom, 1 to 5 percent slopes. This gently sloping, well-drained soil is on low stream terraces, natural levees, and the higher parts of flood plains. It is subject to rare flooding. Individual areas are irregular in shape and range from 3 to 1,600 acres in size.

Typically, the surface layer is very dark brown, friable loam about 8 inches thick. The subsurface layer is dark brown, friable loam about 5 inches thick. The subsoil is about 25 inches thick. It is dark brown and calcareous. The upper part is friable loam. The lower part is friable and very friable fine sandy loam. The underlying material to a depth of 60 inches is dark brown, calcareous, stratified, very friable sandy loam and loamy sand. In some areas the surface layer contains more sand or gravel. In other areas the subsoil contains more clay.

Included with this soil in mapping are small areas of the poorly drained Beaucoup, somewhat poorly drained Paxico soils, and well drained Worthen soils. Beaucoup and Paxico soils are in shallow depressions below the Landes soil. Worthen soils contain less sand than the Landes soil. They are in landscape positions similar to those of the Landes soil or are in shallow depressions below the Landes soil. Included soils make up 5 to 15 percent of the unit.

Water and air move through the upper part of the Landes soil at a moderate or moderately rapid rate and through the lower part at a rapid rate. Surface runoff is slow. Available water capacity is moderate. Organic matter content is moderately low. The shrink-sell potential is low, and the potential for frost action is moderate.

In most areas this soil is cultivated. It is well suited to cultivated crops, pasture, hay, and woodland. It generally is unsuitable as a site for dwellings and septic tank absorption fields because of the hazard of flooding and poor filtering capacity, which can result in the pollution of ground water.

Water and air move through the Fayette soil at a moderate rate. Surface runoff is rapid. Available water capacity is high. Organic matter content is moderately low. The shrink-swell potential is moderate, and the potential for frost action is high.

Most areas are used as pasture. Some areas are used as woodland. This soil is well suited to pasture, hay, and woodland. It generally is unsuited to cultivated crops and to dwellings and septic tank absorption fields.

24D--Dodge silt loam, 10 to 18 percent slopes. This strongly sloping, well drained soil is on shoulder slopes and side slopes in the uplands. Individual areas are irregular in shape and range from 3 to 100 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 3 inches thick. The subsurface layer is brown and yellowish brown, friable silt loam about 9 inches thick. They subsoil is about 20 inches thick. The upper part is yellowish brown, firm silty clay loam. The lower part is brown, very firm clay loam. The underlying material to a depth of 60 inches is yellowish brown, calcareous, very firm loam. In some areas the subsoil is thicker. In others areas the upper part of the subsoil has more sand.

Water and air move through this soil at a moderate rate. Surface runoff is rapid. Available water capacity is high. Organic matter is moderate. The shrink-swell potential also is moderate, and the potential for frost action is high.

Most areas are used as woodland. Some areas are used as cropland. This soil is well suited to woodland and to habitat for woodland wildlife. It is poorly suited to cultivated crops. It is moderately suited to pasture and hay and to dwellings and septic tank absorption fields.

If this soil is used as woodland, plant competition is a management concern. It hinders the growth of desirable seedlings. The competition in openings where timber has been harvested can be controlled by chemical or mechanical means. Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Measures that protect the woodland from fire are needed.

If this soil is used as a site for swellings, the slope and the shrink-swell potential are limitations. Cutting and filling help to overcome the slope. Extending foundation footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.

The moderate permeability and the slope are limitations if this soil is used as a site for septic tank absorption fields. Increasing the size of the absorption field or replacing the soil with more permeable material helps to overcome the moderate permeability. Installing the filter lines on the contour or cutting filling help to overcome the slope.

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