



City of Highland, Illinois RESOURCE PLAN

Southwestern Illinois Resource Conservation & Development
2009



The City of Highland, Illinois, and its surrounding 1.5 mile development regulation authority buffer, contains a wide variety of valuable natural and cultural resources. The area consists of significant water resources, prime agricultural soils, floodplains, steep slopes, forested riparian corridors, bottomland hardwood forests and wetlands.

The major resources assets are:

- 786 acres of surface water
- 20 miles of major streams
- 1,109 acres of wetlands
- 5,325 acres of prime farmland
- 2,700 acres of forest cover
- 9 publicly accessible parks

The major resource issues are:

- 641 acres of impaired surface water
- 9.7 miles of impaired streams
- 6,179 acres of highly erodible soils
- Suburban development not contiguous to city's corporate boundary
- Flooding and associated damage in developed floodplain areas
- Lack of trail & greenway system

There are approximately 2,082 acres classified within the current 100 year flood zones in the study area. These can be considered both an asset and an issue. They are assets when left generally undeveloped by providing locations for stormwater during high rain volume events. They become issues when developed because these investments will inevitably become damaged during a flood event. Highland Silver Lake can also be seen as both an asset and an issue as it provides the city's drinking water and excellent recreational opportunities, it also contains pollutants and sedimentation accumulation from both within and north of the study area.

This report provides the foundation for informed decision making as this area develops. Recognizing and protecting the resource assets upfront will help reduce problems associated to stormwater runoff, flooding, erosion and sedimentation, water quality and habitat fragmentation.

If all proposed land uses adopted by the City of Highland Comprehensive Plan are developed, there will be an increase of over 2,100 acre-feet in stormwater runoff. This is a 24% increase in runoff throughout the study area. Unfortunately, when considering the Buckeye Branch watershed which is already dealing with drainage issues and contains the majority of existing urban development, there is a proposed 41% increase in stormwater runoff. Considering future development efforts and the potential impacts of climate change, it becomes even more critical to have a strong natural resource protection strategy.

The overarching recommendation is to incorporate these results into all aspects of the planning and zoning process. Specifically, a natural resource analysis should occur on a site specific basis, identifying primary and secondary protection areas and incorporating them into the preliminary plat design. Considering the impact of future potential development, preserving and protecting open space cannot mitigate all potential negative impacts alone. Local and regional governments must use creative planning, zoning, and ordinance techniques to ensure their communities are prepared for these impacts. Creating new ordinances and updating existing building, subdivision, stormwater, and planning & zoning codes and regulations will allow for the use of resource-sensitive techniques such as low-impact development strategies for stormwater management, conservation subdivision design, green buildings, farmland preservation ordinances and watershed protection ordinances. Incorporating these recommendations will better position the City of Highland to encourage new growth while protecting its resources and improving the quality of life for its residents.

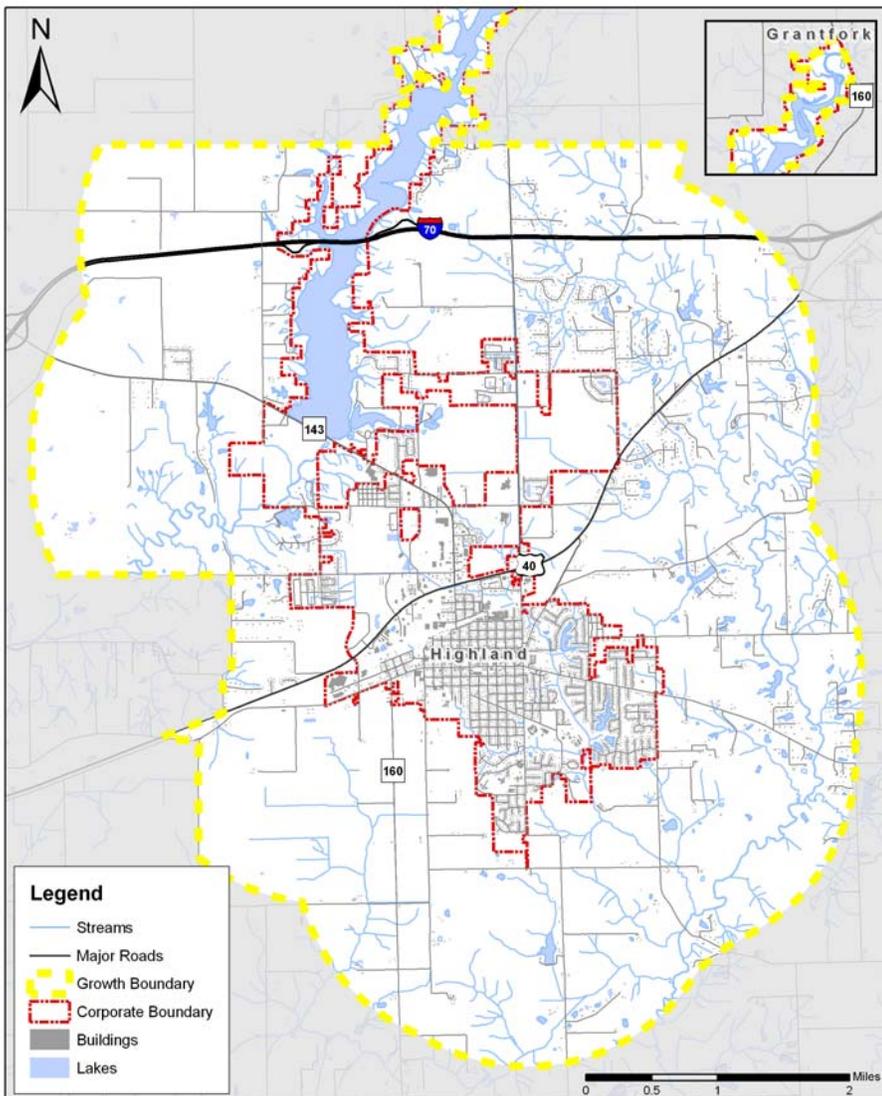
INTRODUCTION

This resource plan was completed for the City of Highland, Illinois in order to provide an analysis of the natural, cultural, historical, and recreational resources within the study area and provide recommendations to best plan for the future of these resources. The City of Highland Study area includes all areas within the corporate boundary and generally encompasses the unincorporated areas in a 1.5 mile buffer area around the corporate boundary. The exceptions to this rule occur on the northern boundary and the southwestern boundary of the study area. The City of Highland has entered into Intergovernmental Agreements with both the Village of Grantfork to the North and the Village of St. Jacob to the West to determine the Facility Planning Area boundaries between each municipality. The Village of Grantfork maintains all planning commission and comprehensive planning control north of the point where Highland Silver Lake Road and State Route 160 intersect. The exception to this is the area surrounding the lake within the Highland Corporate Boundary and if a proposed subdivision of two or more lots is contiguous to the Highland Corporate Boundary it must be considered by the Highland Planning Commission. The area to the southwest follows an Intergovernmental Agreement between the City of Highland and the City of St. Jacob in order to

designate the facility planning area boundaries of each municipality. Specific road centerlines were used to make this distinction.

The corridor has an area of ~21,000 acres or 33 square miles and ~13,000 people. Along with the developed areas within the municipal boundaries there are also several subdivisions within the 1.5 mile planning area jurisdiction of Highland. Interstate 70 runs through the northern section of the study area and US Highway 40 runs diagonally across to the northeast.

This study and analysis was completed using Geographic Information Systems (GIS) technology. GIS uses spatial information that contains database capabilities to store, display and analyze layers of information. All of the data used in this analysis is publicly available or is held by the Madison County GIS Department. For more information contact Southwestern Illinois Resource Conservation and Development.



STUDY AREA
HIGHLAND RESOURCE PLAN

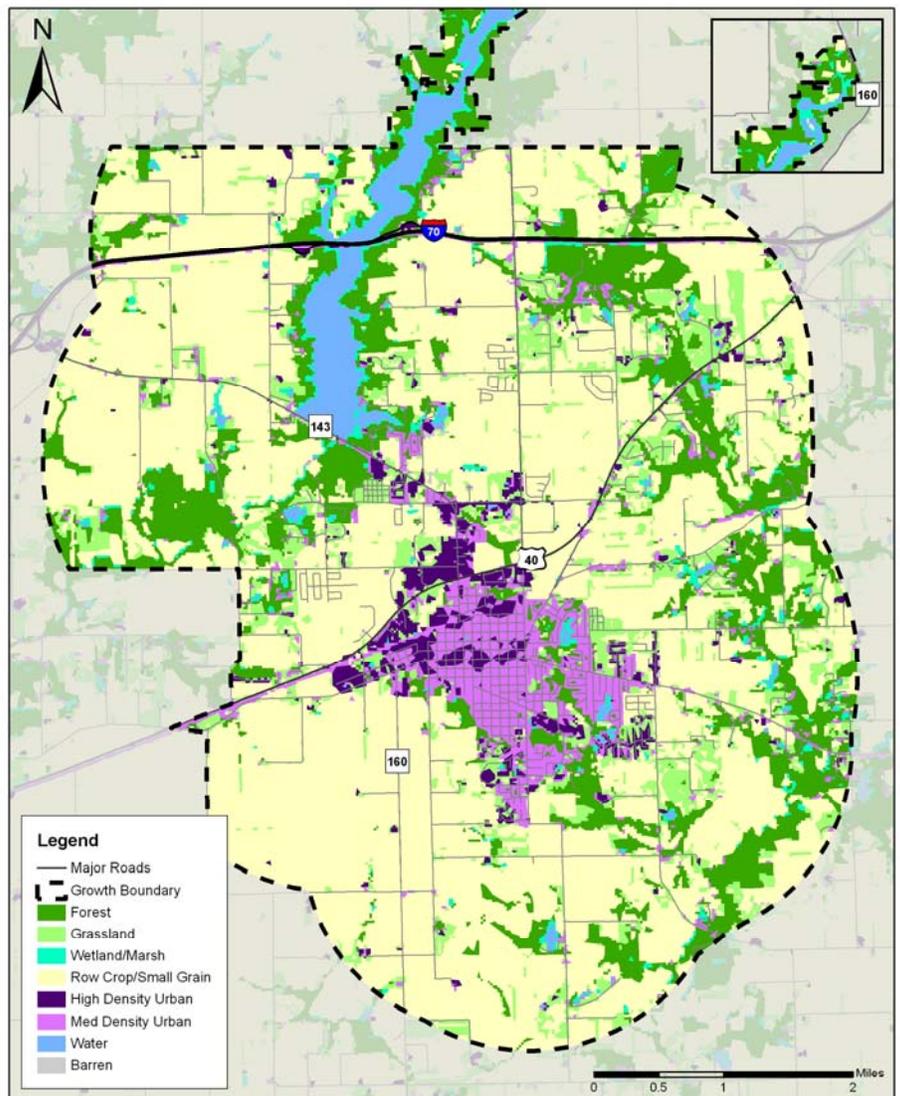




Images above (left to right): Highland welcome sign located at corporate boundary, a field of soybeans and corn with barns in the background, Sugar Creek and riparian zone east of Highland.

The most recent Land Use/Land Cover data was captured in 2000 and was made available to the public in 2002 by the Illinois Interagency Landscape Classification Project (IILCP). This data was developed by satellite at a resolution of 30x30 meters and provides the most accurate resolution for resource planning at a local level.

The study area contains diverse land uses but is predominately still agriculture. The heart of the study area contains the high density urban development of Highland. Lower density developments can be seen spreading on all sides and also disconnected along the Sugar Creek corridor on the western side of the study area. Highland Silver Lake forms a backbone running down the middle of the study area north of the city. It provides the water supply for residents of Highland as well as other nearby residents. The forested areas predominately run along or near the lake, rivers, streams and floodplains, creating a necessary riparian zone for wildlife and to combat stormwater runoff containing pollutants. Due to the age of the existing data, an updated analysis should be conducted when more current information becomes available. Further analysis in this study also provide updates to this data, including updated forest cover, and occurrence of new development confirmed via aerial photography and parcel data.



2000 LAND USE/LAND COVER

HIGHLAND RESOURCE PLAN



CURRENT ZONING & PROPOSED LAND USE

The City of Highland's Comprehensive Plan Update was completed in 2005 and adopted in 2006. It is a twenty-year long range plan with a purpose to "advance the welfare of people by creating an increasingly better, sustainable environment composed of three interrelated parts—social, economic, and physical". The Comprehensive Plan serves as a guiding document that provides legal support to the most recent Zoning Ordinance which was adopted in 2006 and amended in 2007. The zoning code enforces what current land uses may be implemented and the comprehensive plan maps out proposed future land uses and provides a planned vision for the future of Highland.

All solid colors in the map on page seven represent current zoning. The majority of growth in Highland is occurring to the North and East due to easy access to Interstate 70 along US 40, the location of new retail corridors, recreational amenities such as Korte Recreation Center and natural amenities such as Highland Silver Lake and the Sugar Creek corridor. There is also relatively recent residential growth to the south within moderate proximity to downtown and Lindendale Park. The industrial sector started along US 40 and the Conrail train tracks and has remained in this vicinity of Highland. The entire area surrounding Highland Silver Lake is zoned R-1-C and owned by the City. R-1 zoning includes detached single family residential as well as recreational facilities owned by the city. This area is likely to remain undeveloped and provides further opportunity for low impact passive recreation development.

Proposed land use is represented by the hatched lines. Anywhere there is overlap between the two typically represents an area that has not yet been developed even though it is currently zoned. Planned development tends to be contiguous to existing infrastructure. A positive example of upzoning occurs near employment areas and the Korte Recreation Center where an existing single family residential zone is proposed to be multifamily residential. Necessary downzoning is proposed to the far west where current multifamily zoning is proposed to be single family dwellings, creating a necessary lower density transition to adjacent agricultural land.

There are significant proposed acreage increases for many land uses over the next twenty years, the highest being more than 3,000 new acres of single family residential dwellings mainly to the north and south of the city. Industrial, Commercial and Multi-Family Residential lands are proposed to nearly double their current existing acreage. Planned industrial remains focused along the Conrail/US 40 corridor, while commercial land use is proposed in a diffused fashion throughout the northern section of the community to serve newly built residential neighborhood areas.

A system of 50 foot green buffers are also proposed along new industrial sites in order to help mitigate potential adjacent incompatible future land uses. These should serve as links to future city-wide trail routes. A new school is proposed along US 40 to the northeast of Highland. There has been significant rural subdivision growth outside of the corporate boundaries, particularly near the Sugar Creek corridor.



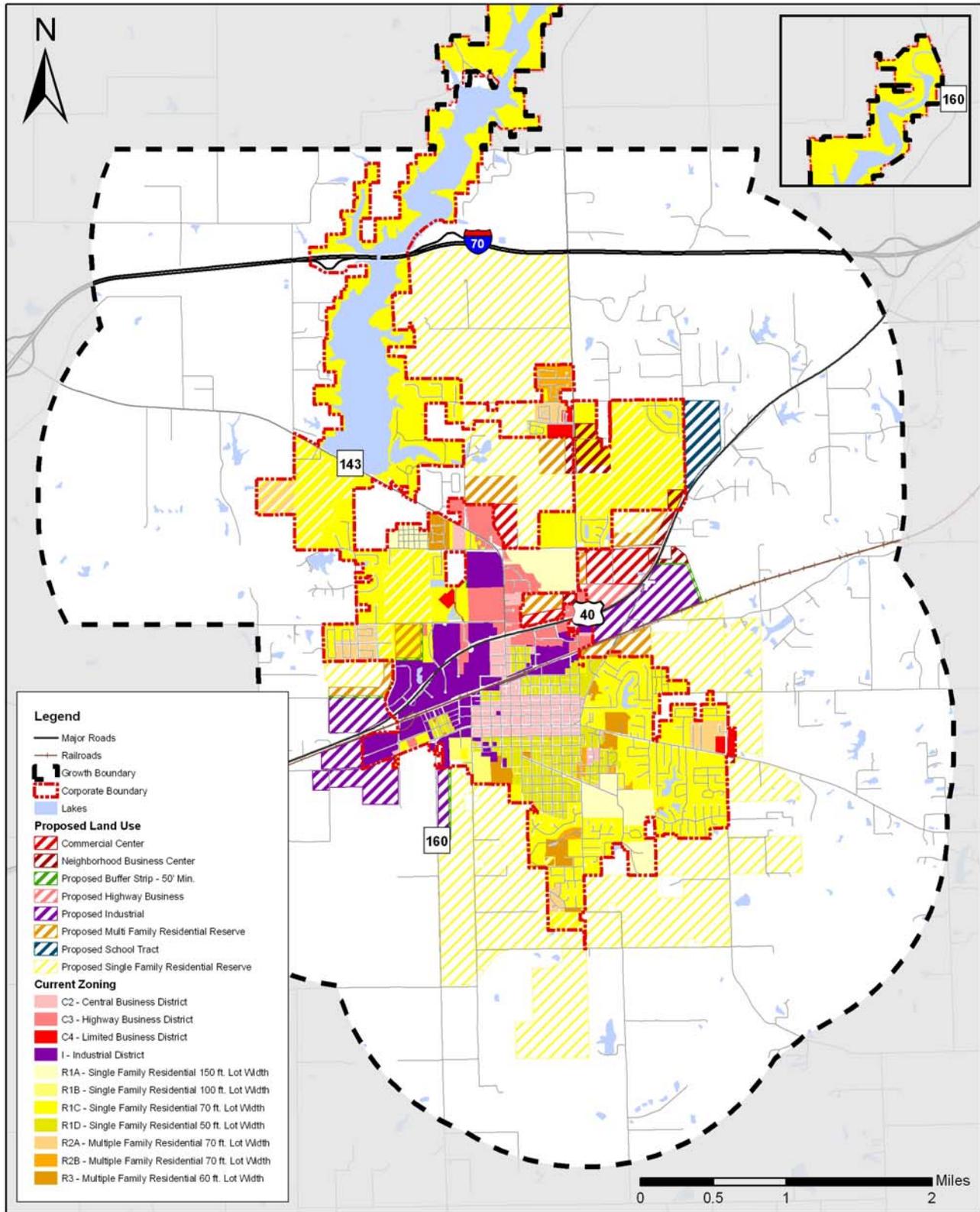
Left: Plaza Square, located in downtown Highland.



Right: Korte Recreation Center, located in Glik Park.



CURRENT ZONING & PROPOSED LAND USE



CURRENT ZONING & PROPOSED LAND USE

HIGHLAND RESOURCE PLAN



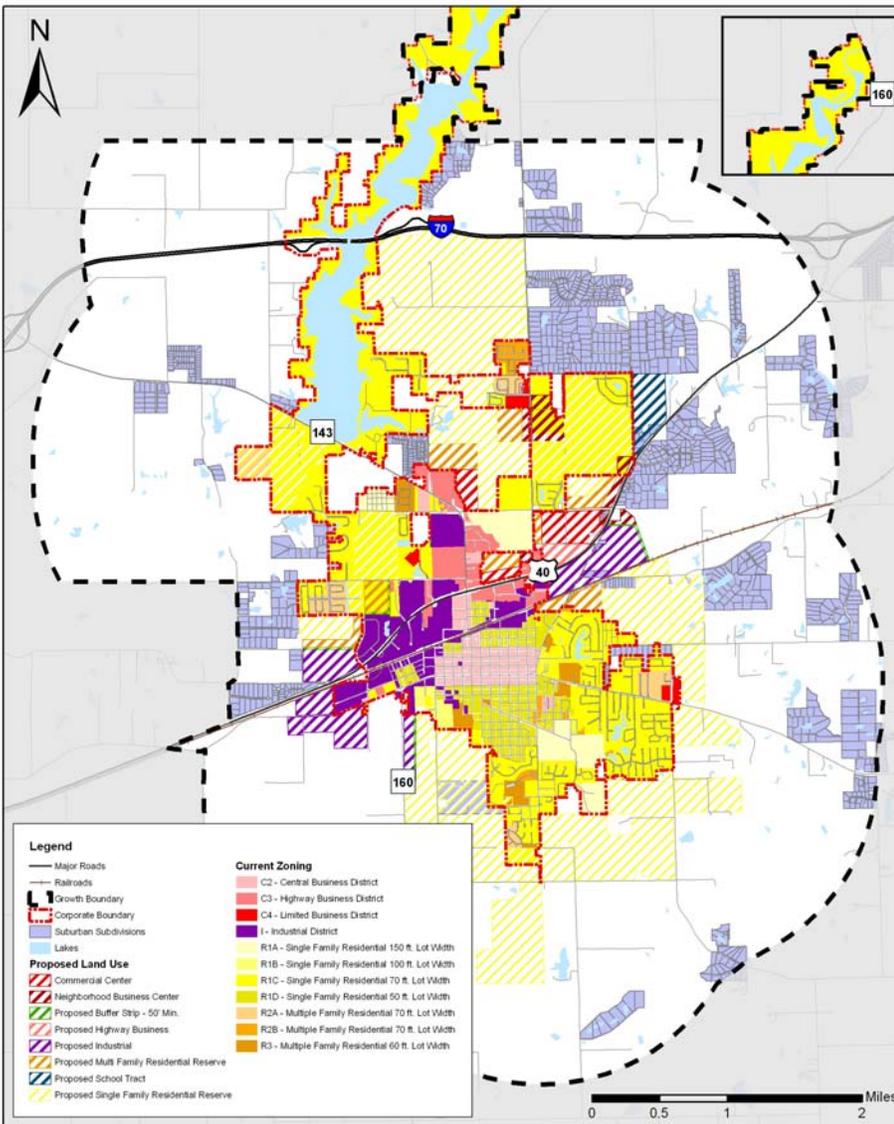
SUBURBAN SUBDIVISIONS

The urban growth shown below occurring outside of the city corporate limits but still within the facility planning area requires a revised review of the existing conditions. Unlike the current zoning and proposed land uses, these significant developments are not directly mapped in the Comprehensive Plan. These residential lots range from a quarter acre to nearly ten acres, however, approximately 97% of these lots are less than five acres and 35% are less than one acre. Analysis and determination of these subdivision parcels was done through existing GIS parcel data provided by the city, giving attribute information for parcels within subdivisions.



Above: New single family housing development adjacent to a soybean field.

This however did not capture all subdivisions and a more in depth analysis using parcel boundaries and aerial photography was used to determine the remaining parcels. Care was given to only include parcels that were adjacent to other subdivided parcels and clearly not associated with adjacent larger agricultural tracts.



While many of the largest subdivisions are adjacent to the existing corporate boundaries, there are several running along both sides of the Sugar Creek corridor to the east of Highland. This represents the real estate attractiveness of forests and open space associated with this corridor. To the west there are a few subdivision near the current city limits that are also in close proximity to forests and wetlands in the East Fork of the Silver Creek Corridor. The others are in strong agricultural areas west of the lake.

The subdivisions furthest away create the largest costs of community services as each additional mile of infrastructure and travel time for emergency services add financial burden to the City of Highland.

SUBURBAN SUBDIVISIONS

HIGHLAND RESOURCE PLAN



RESOURCE ASSESSMENT & ANALYSIS

This section provides analysis and assessments of the resources throughout the study area. The goal is to first define the critical resources in the study area and then proceed to determine the issues that each resource is facing. Only then can recommendations be formulated as to the best methods of mitigating issues and protecting or enhancing resource assets. A comprehensive look at the area's resource assets will include: ecological, agricultural, hydrological, cultural, historical, geological and recreational resources.

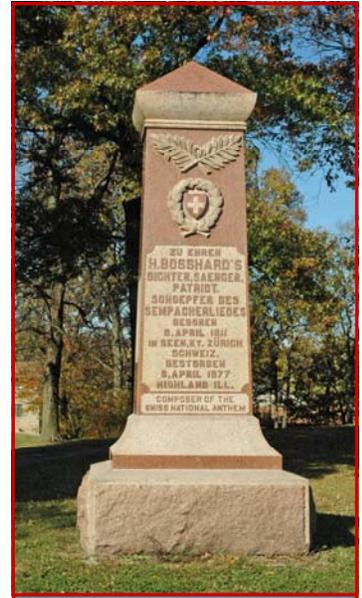
The following pages and maps demonstrate the types of data that were included in this analysis. Details provide the issues, benefits, and areas for improvement for each resource.

The Highland citywide study area has several resource issues such as water quality and sedimentation of Highland Silver Lake and other streams due to stormwater drainage, associated flooding and stream degradation. The most effective solution to these types of resource issues is to begin by utilizing the existing natural systems and then building upon those resources/assets to mitigate future impacts of development in the study area.

This resource plan analyzes the effects both existing and planned land uses have and will have on the resources in the study area. Recommendations will be provided along with mechanisms for current and future resource preservation, thus maximizing and expanding their positive contributions to the study area.

A solid knowledgeable foundation of the region's resources will assist policymakers in avoiding future problems that may be compounded should these resources be lost. Additionally, this assessment highlights types of resources the corridor lacks such as permanently preserved natural lands and greenways providing trail systems linking already existing recreational and cultural assets owned by the city.

The City of Highland will benefit from incorporating the findings of this plan into their future planning efforts. By identifying all vital resources and charting a course to mitigate, protect, enhance and preserve these resources, quality of life for not only citizens but all living creatures will be improved.



Images to the right: Heinrich Bosshard Monument, composer of the Swiss National Anthem in Highland; Northtown retail development; a barn and grain bins; Highland Silver Lake, the Historic National Road was the nation's first federally funded interstate highway.

HYDROLOGICAL: WATERSHEDS & WATER QUALITY

The water resources of the study area provide one of the greatest assets and also one of the largest issues. Water quality is an excellent indicator of the overall health of a watershed. The health of the hydrology system is crucial to a high quality of life, especially when it is the city's main source of drinking water and an excellent source of outdoor recreational opportunities.

The study area intersects seven different watersheds at the twelve digit hydrological unit code (HUC) level. The two watersheds in the map below to the right fall into the larger Sugar Creek Watershed, while the four to the left flow to Silver Creek.

RESOURCE ASSETS There is an abundance of water in the study area. Highland Silver Lake comprises of 641 acres of surface water and provides the city's drinking water. Including all other lakes the total rises to 786 acres. There are also approximately 20 miles of major streams.

RESOURCE ISSUES The tremendous asset of the lake also carries with it several issues in the form of water quality. The Illinois Environmental Protection Agency lists Highland Silver Lake as an Impaired Waterway on its 2008 303d list (partially approved). There are also approximately 9.7 miles of impaired streams. It is important to note that the majority of existing development has occurred in the watersheds flowing into Sugar Creek and this is where both impaired streams are located.

RECOMMENDATIONS In order to improve water quality, 100-foot stream buffer should be placed on all streams. For impaired streams, a 150-foot buffer is the minimum recommendation. Low Impact Development stormwater management ordinances should be drafted and implemented to mitigate pollutants and create more sustainable development.

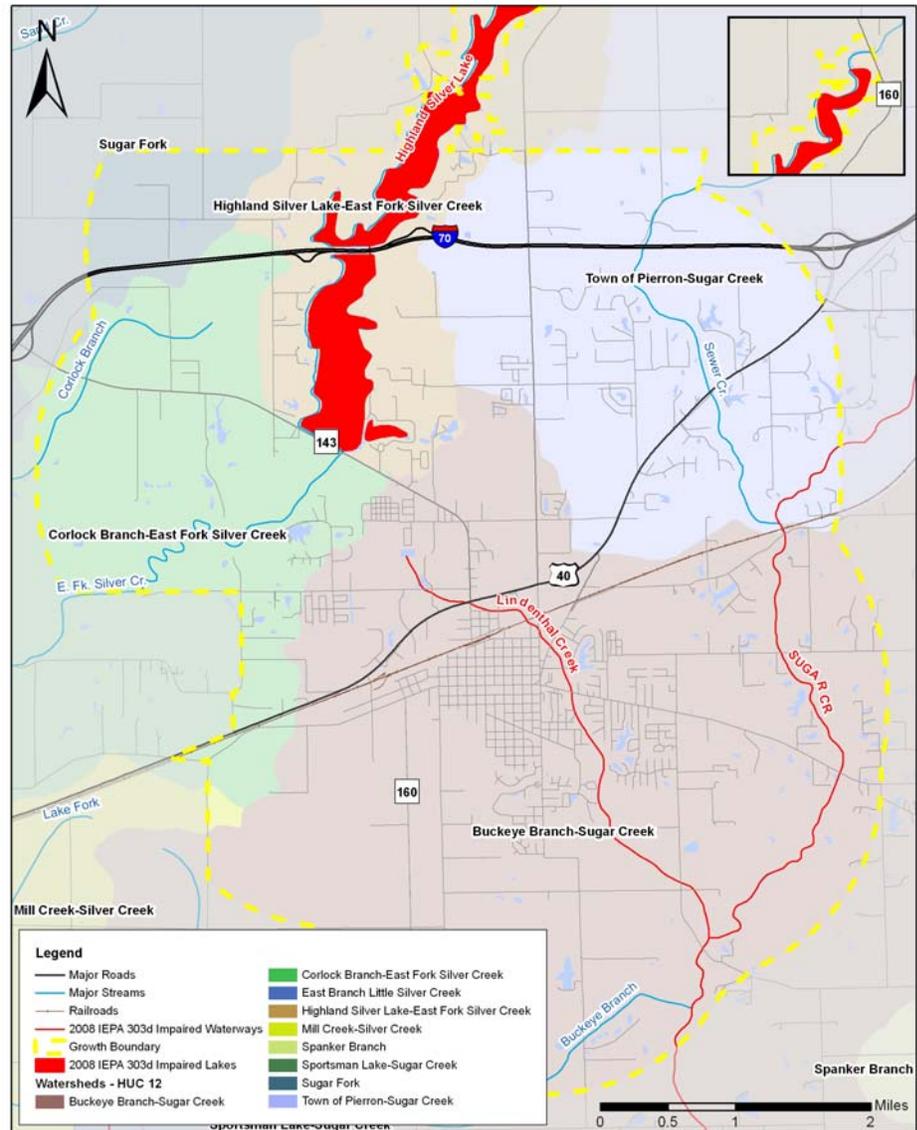
Impaired Waterways

Highland Silver Lake
Problems: Mercury, Chlordane, Manganese, Total Suspended Solids, Total Phosphorus, Aquatic Algae, Sedimentation/Siltation

Lindenthal Creek
Problems: Total Phosphorus, Unknown

Sugar Creek
Problems: Dissolved Oxygen, Total Phosphorus, Sedimentation/Siltation, Endrin

Causes: Urban Runoff/Storm Sewers, Agriculture, Sources Unknown, Municipal Point Sources, Hydrdromodification, Toxic Atmospheric Deposition



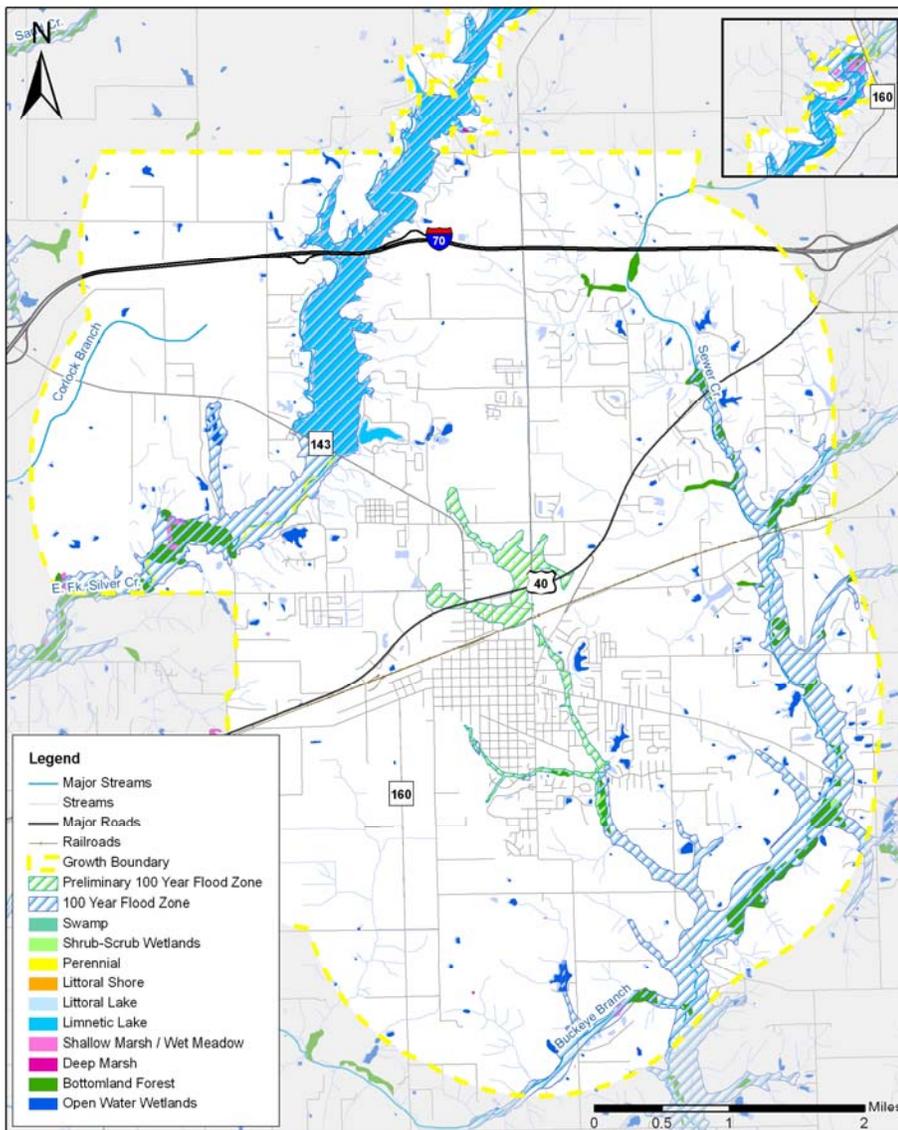
WATERSHEDS & WATER QUALITY
HIGHLAND RESOURCE PLAN



HYDROLOGICAL: WETLANDS & FLOOD ZONES

Wetlands serve as natural filtration systems mitigating pollutants and storing stormwater runoff. The presence of wetlands in the study area and particularly in flood zones create some of the most vital conditions to maintaining a healthy ecosystem and effective stormwater management system.

RESOURCE ASSETS There are approximately 1,109 acres (5%) of land that qualify for classification under the National Wetlands Inventory (NWI). The NWI is a useful regional planning resource, but should only be used for reference and does not replace the need for detailed site-specific field investigation. The inventory divides the types of wetlands into specific categories based upon the specialized habitats they provide for wildlife. There are 2,082 acres (10%) of 100-year flood zones in the study area. The largest flood zones include Highland Silver Lake and downstream areas of the East Fork of Silver Creek, Sugar Creek and Lindenthal Creek going through the city. Together, both wetlands and flood zones help manage rain events, purify drinking water, provide habitat for wildlife and create excellent recreational opportunities.



RESOURCE ISSUES Wetlands are under constant pressure due to changes in land use such as urban development and conversion to agricultural uses. Flood zones left generally undeveloped provide locations for water during flooding events but if developed these investments will inevitably be damaged during flood events. Flooding is of particular concern in the northern portion of Highland.

RECOMMENDATIONS Recreational development such as trails and passive recreational facilities should be the only development allowed in flood zones. Wetlands should be protected and enhanced throughout the study area. Bioretention cells, rain gardens and other low impact development best management practices (BMPs) should be utilized in new developments and retrofitted in flood prone areas throughout the study area. These BMPs are created to mimic natural systems such as wetlands, thus reducing the impacts of stormwater runoff from new and existing developments.

WETLANDS & FLOOD ZONES

HIGHLAND RESOURCE PLAN



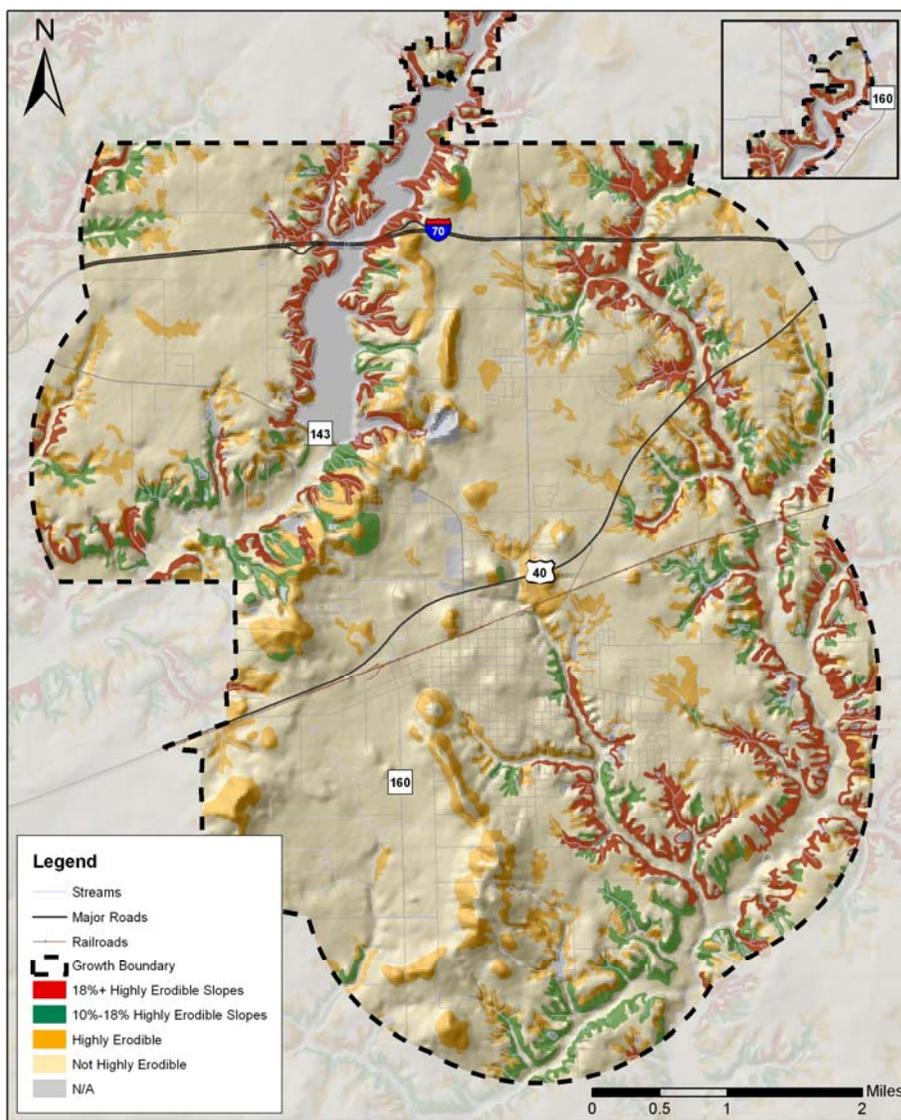
SOILS: STEEP SLOPES & SOIL EROSION

For any development it is critical to know where and what soils are susceptible to erosion based on their properties and contours. Soil content and slopes play a major role in determining the sustainability for development on a site.

RESOURCE ASSETS The Highland study area has a diverse range of soil types and slopes. The majority of highly erodible soils can be found along the riparian zones of the major creeks and Highland Silver Lake. Often times highly erodible soils are associated with steep slopes but not always. Even some soil with less than a 10% slope can be highly erodible based upon unique physical properties. The core and the western edge of the study area are predominately made up of relatively flat land and soils types not likely to erode.

RESOURCE ISSUES Over 28%, or 6,179 acres, in the study area are highly erodible soils. Soil erosion creates sedimentation in streams and lakes. This sedimentation is playing a role in the impairment of water and is particularly a major problem in the northern corridor of Highland Silver Lake. Sedimentation is occurring throughout the East Fork of Silver Creek north of the study area and depositing as it enters the lake. Development in erosion prone areas increases the rate of sedimentation.

RECOMMENDATIONS Highly erodible soil types should be a high priority for protection. By stabilizing existing steep slopes and currently eroding stream banks and shoreline, reductions in sediment loading will maintain water volume capacity, thus preventing stormwater problems and improving the health of watersheds. Highland has received an IEPA 319 Grant to address shoreline and upstream sedimentation. Further expansion of similar projects is necessary to protect these soils. Working to create a multi-jurisdictional watershed protection ordinance in the entire Highland Silver Lake Watershed is the most comprehensive means of addressing negative impacts to the lake originating both within and outside of the study area.



STEEP SLOPES & SOIL EROSION POTENTIAL

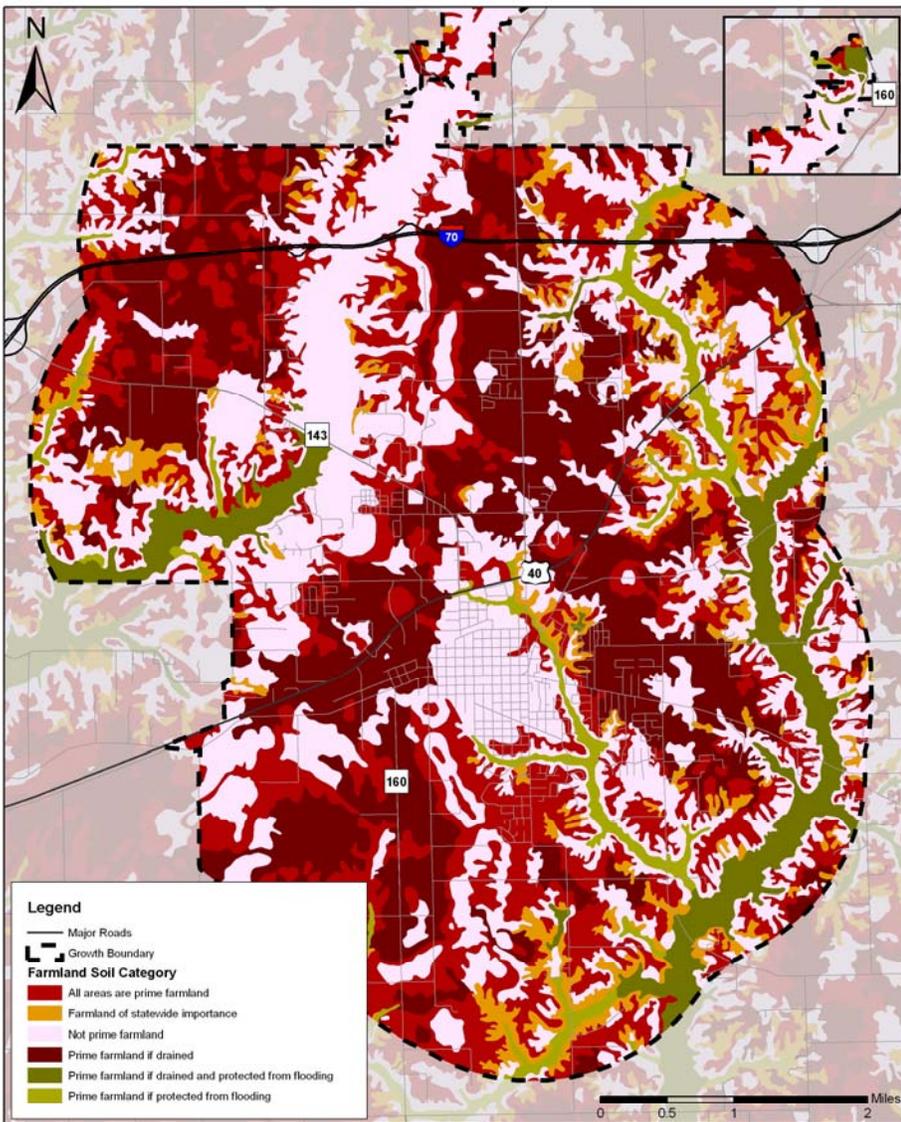
HIGHLAND RESOURCE PLAN



SOILS: PRIME FARMLAND

Prime farmland and statewide important soils types must meet certain physical and chemical criteria including permeability, soil rooting depth, erosion potential, flooding potential, acid-alkali balance, water table, and soil sodium capacity among other criteria. Some prime farmland is conditionally considered prime if certain limitations are overcome such as being drained or protected from flooding. Soils that are prime farmland if drained are likely to have been drained by tile systems many years ago. Soils that are not prime include urbanized areas with high impervious surface percentages and hydric soils or soils with high clay content that easily retain water.

RESOURCE ASSETS This area has 5,325 acres of fertile prime farmland and 1,341 acres of statewide important soils. The best corridors are to the west-southwest and east-northeast of Highland as well as to the west of Highland Silver Lake. Many “prime farmland if drained” soils have been drained and are used to produce high yielding grain or grass and forage legume crops.



RESOURCE ISSUES “Prime soils if drained or protected from flooding” create an excellent source of rich fertile land but also lead to the destruction of wetlands. Prime soils in floodplains that are tilled increase the amount of sedimentation entering waterways as well as agricultural-related pollutants such as fertilizers and other chemicals that bind themselves to the molecules in soil. Urban sprawl causes the greatest destruction to prime farmland and is occurring most rapidly north and east of the city.

RECOMMENDATIONS Several planning tools may be used to protect the proper agricultural use of prime farmland. Purchase of Agricultural Conservation Easement (PACE) programs are voluntary and provide a direct payment to landowners wishing to sell their development rights. The landowner maintains all other property rights but may never convert the farm to urban development. The creation of a community garden in or adjacent to town would also create a vital resource for a more sustainable community.

PRIME & STATEWIDE IMPORTANT SOILS

HIGHLAND RESOURCE PLAN



FOREST COVER

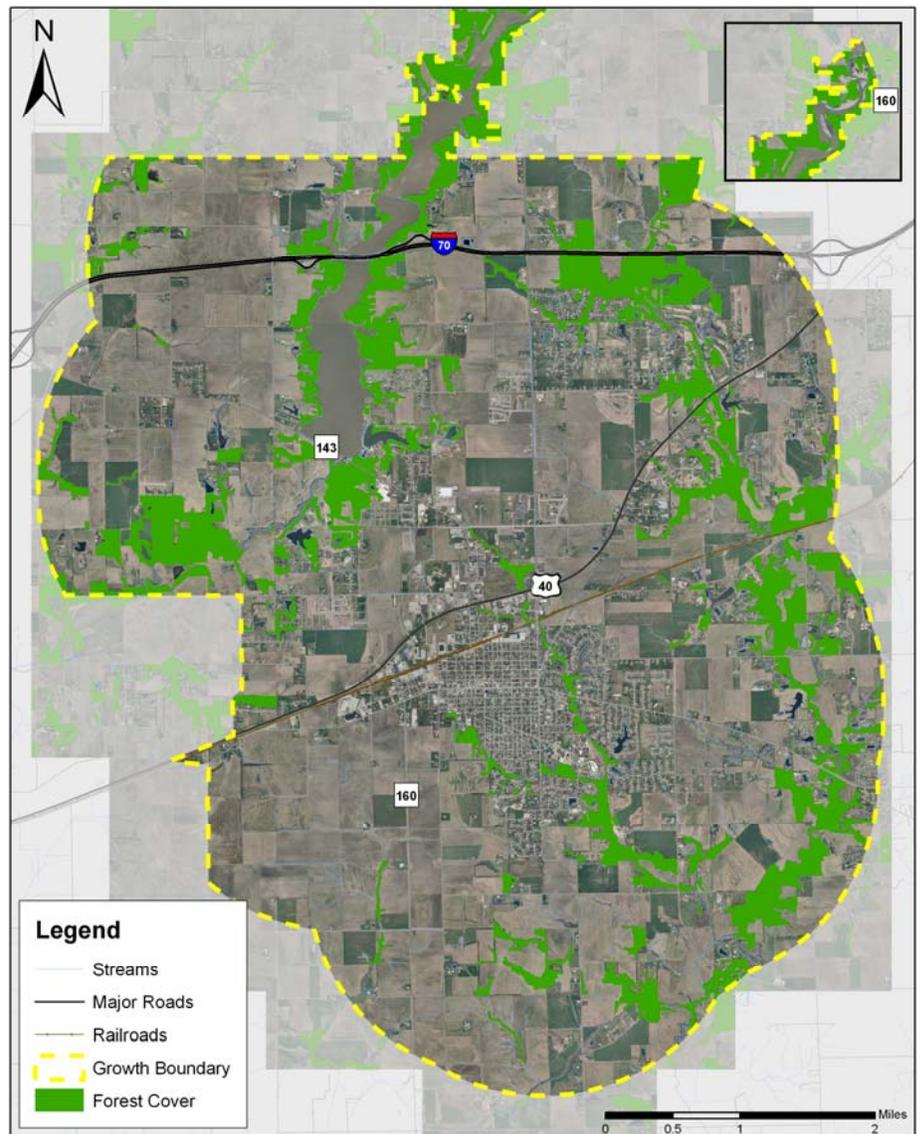
Forested areas provide a wide array of values to any geographic area. Trees produce clean air by filtering air pollutants and provide habitat for wildlife. In regards to stormwater runoff, forests: stabilize soil, cool and slow runoff, and filter pollutants in water.

RESOURCE ASSETS There are 2,780 acres of forested land or just under 13% of the study area. It consists mostly of riparian forests and approximately 274 acres are qualified as bottomland forest wetlands according to the National Wetlands Inventory (see page 11). These areas provide habitat for neotropical migratory songbirds. These birds fly from Central and South America to bottomland hardwood forests in this region each spring and require dense forest interior conditions without gaps.

One of the largest forest blocks is a bottomland forest found along the East Fork of Silver Creek south of the lake. Other large blocks can be found along Highland Silver Lake and Sugar Creek

RESOURCE ISSUES There are currently no documented threatened or endangered species in the study area. However, the presence of bottomland forests indicates that species reliant on this habitat may be present, but not yet documented. "Edge effects" are increasingly seen as forest blocks are fragmented creating lower quality habitats.

RECOMMENDATIONS It is important that value be placed upon all remaining forest blocks in the study area. Forest protection ordinances should be created based upon specific criteria. Contiguous forest blocks over 100 acres should be considered "large forest blocks" and be protected from any land use changes causing fragmentation. Forest blocks in the 100 year flood zones or wetlands should also be a priority for protection. Gaps should be identified and reforested in areas that will connect or create large forest blocks or expand bottomland forest blocks. Smaller blocks should be restricted to recreation based low impact development that create minimum disturbance to existing habitats and forest cover.



FOREST COVER
HIGHLAND RESOURCE PLAN

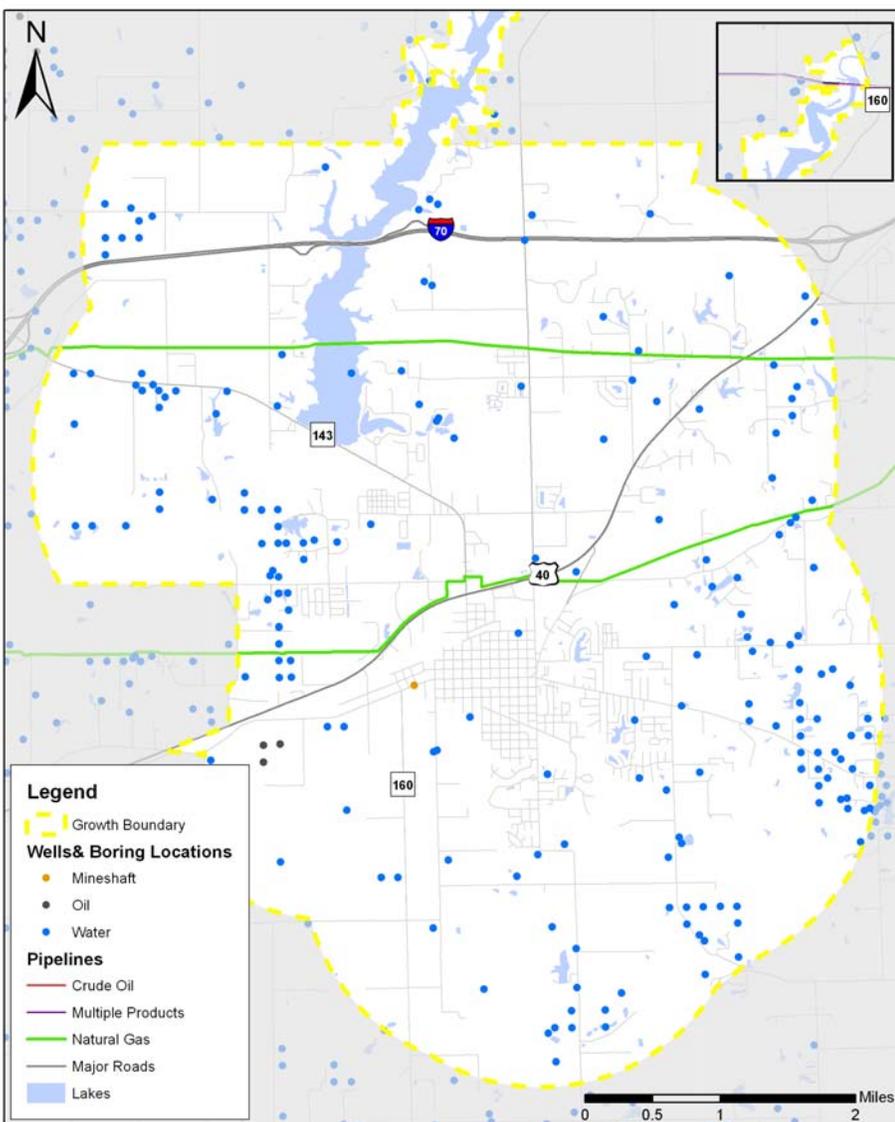


Natural resources formed by processes sometimes taking millions of years often helped create the economic resources for human population centers to grow. The study area is in the Illinois Episode Glacial Event which left anywhere from less than twenty five feet of glacial till in and around the East Fork of the Silver Creek Corridor up to 50-100 feet in the eastern half. Glacial till refers to soils and minerals deposited by glacier activity that created much of the deep topsoil found in the region. Geological deposits include glacial till from this episode as well as river/lake sediments and wind-blown sand.

RESOURCE ASSETS The majority of the study area consists of shallow coarse grained materials and permeable bedrock within 50 feet of the ground surface level. This includes gravel, sand and alluvial matter creating small aquifers able to store enough groundwater to bore wells. There have been approximately 221 water wells drilled in the study area that continue to contain water. Wells in Highland served as some of the original water supply for the city. The western edge of the study area also has a small oil field with three oil wells still active.

RESOURCE ISSUES A salt mine once operated on the west end of Highland. Subsidence issues are possible in the area and have occurred historically. Four pipelines run underground in the study area, three of which run beneath Highland Silver Lake.

RECOMMENDATIONS Further analysis and monitoring of potential mine subsidence should occur. A contingency plan should be in place in the event of a pipeline rupture. Industrial, agricultural and residential properties using water wells should be educated about outtake rates and potential for subsidence. Also, depending on the use of the withdrawn water, the high susceptibility for pollutants to enter these shallow water aquifers should be considered and mitigated.



WELLS & PIPELINES

HIGHLAND RESOURCE PLAN



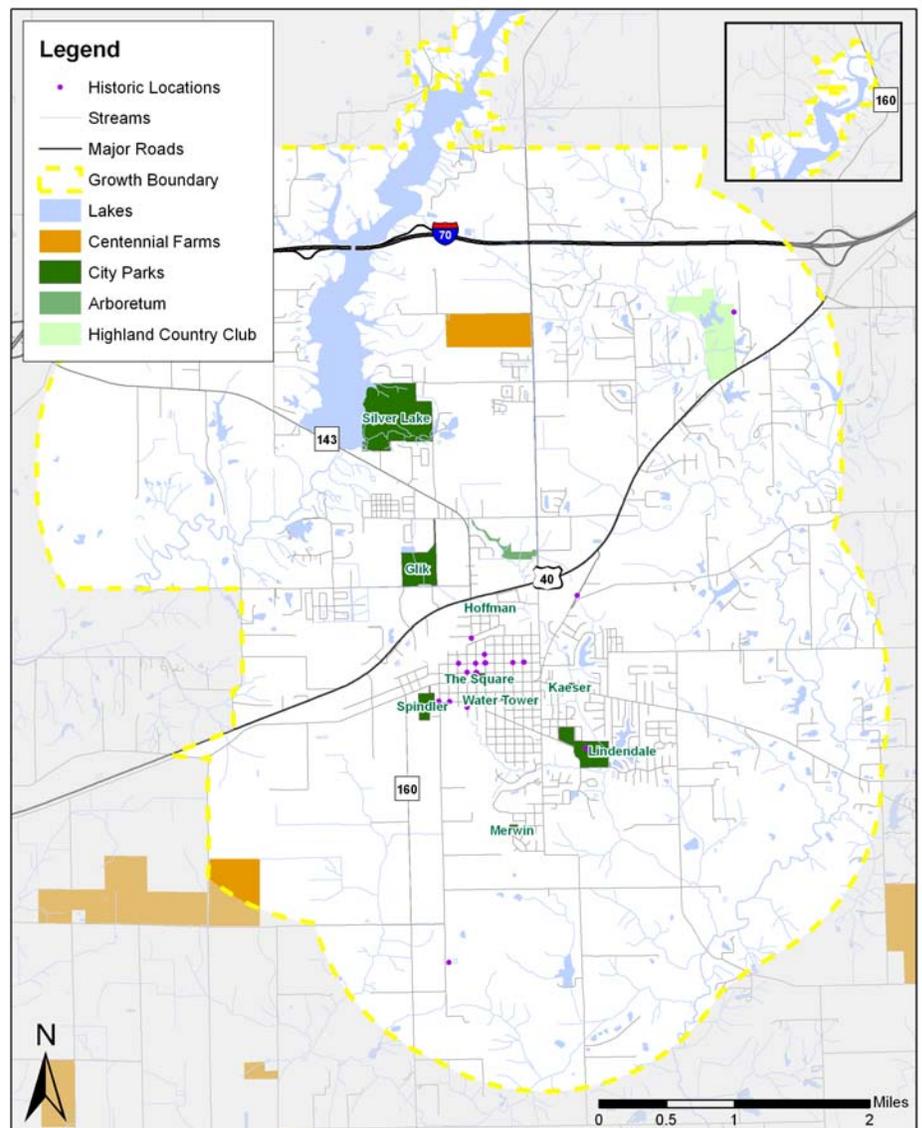
RECREATIONAL & CULTURAL AREAS

Recreational and cultural resources serve as the critical link between natural resources and human interaction with those resources both historically and currently. These resources provide the setting for people to interact and learn the historic and future importance of our natural resources.

RESOURCE ASSETS The City of Highland has a rich history based upon its Swiss heritage. This pride is shown through municipal representations of the city and provides an excellent cultural asset to the study area. There are nine publicly accessible parks, each providing a unique recreational asset to the community. There are twenty significant points of Historic Interest in the study area. These include historically significant structures as well as monuments such as the Bosshard and Cox monuments. The US 40 Historic National Road passes through the study area and is marked with signage. Two Centennial Farms also fall within the study area. This signifies strong family pride over the stewardship of the land and the farming tradition for over one hundred years.

RESOURCE ISSUES The study area lacks trail connectivity for alternative modes of transportation. Many other parts of Madison County already enjoy connections to a regional trail system. There are no planned parks in the comprehensive plan, and Centennial Farms are not protected.

RECOMMENDATIONS Continued preservation and maintenance of existing assets should be a priority. A greenway trail corridor should be developed, connecting existing parks and cultural points of interest. The Lindenthal and Laurel Branch flood plains and riparian zones running through the city have the potential to connect multiple significant locations beginning at Lindendale Park and potentially encompassing Highland Silver Lake. This trail could then be linked to the MCT Heritage Trail and into the regional system. A multimodal trail system would further strengthen the quality of life, civic pride, property values and attractiveness for new residents and businesses throughout the study area. Conservation easements can be used to protect Centennial Farms.



RECREATIONAL & CULTURAL AREAS
HIGHLAND RESOURCE PLAN

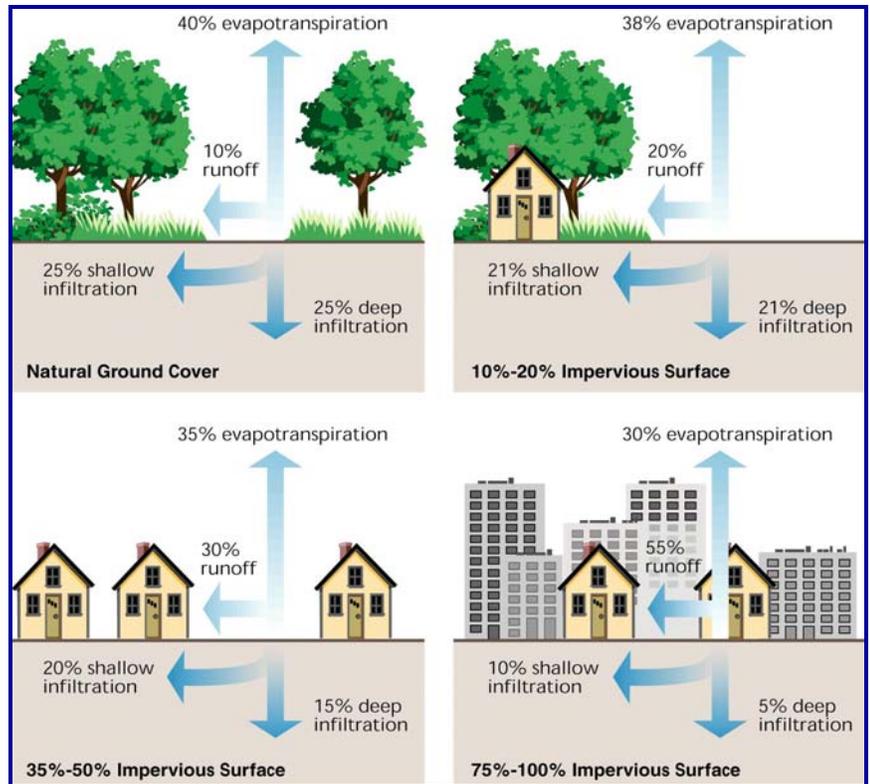


HYDROLOGICAL IMPACTS OF COMPREHENSIVE PLAN

This section analyzes the future impacts on stormwater volumes the planned land uses, as defined by the Comprehensive Plan, will create. Increased impervious surfaces leads to increased water runoff creating a greater demand on local streams systems as well as existing stormwater infrastructure. Knowing the impacts of future stormwater runoff creates a necessary planning tool to use when drafting future development policies.

L-THIA ANALYSIS The Long-Term Hydrological Impact Assessment (L-THIA) model is a tool that compares existing stormwater runoff volume to future conditions based upon planned growth. The L-THIA model was developed by Purdue University and is available as a web-based interface allowing users to calculate runoff estimates based upon:

- Land use/Land cover category
- Location (indicates average annual precipitation)
- Soil hydrologic group (indicates infiltration/runoff potential)



Federal Interagency Stream Restoration Working Group. USDA

Estimated runoff was calculated for existing and proposed conditions in the study area. The existing conditions were based on the 1999-2000 land use/land cover data and was updated with the forest layer and suburban residential land uses outside of the corporate boundaries. Proposed conditions are based upon a composite of Highland's Comprehensive Plan Proposed Land Uses and the 1999-2000 land use/land cover data with the same forest and subdivision updates used in existing conditions. The 1999-2000 land use/land cover, forest and parcel updates were used to fill the gaps where no plan was defined creating no change in stormwater runoff in those areas. Land use categories from the Highland Comprehensive Plan and the 1999-2000 land use/land cover data were modified and grouped to match the L-THIA model. Water and wetlands do not generate any runoff and are not considered by the L-THIA model for this reason, therefore these areas were excluded from the analysis. This is assuming that all wetlands will be protected as development continues which is recommended.

RESULTS This analysis shows that the proposed land uses will significantly impact stormwater volume increases in the study area. Madison County, Illinois receives an average of 40.98 inches of rainfall annually. Some of that water is absorbed into the ground through infiltration. These rates vary by soil type. Larger soil particles like sand have a higher infiltration rate than more microscopic particles like clay which make it difficult for water to penetrate. Water that is not absorbed flows across the surface into the hydrologic network of streams, lakes, ponds and rivers. Impervious surfaces such as rooftops, parking lots and buildings prevent water from infiltrating and increase the runoff volume. Runoff volume is measured in acre-feet, which is the volume of water that covers one acre of a surface to a depth of one foot. The following pie charts represent how land uses are



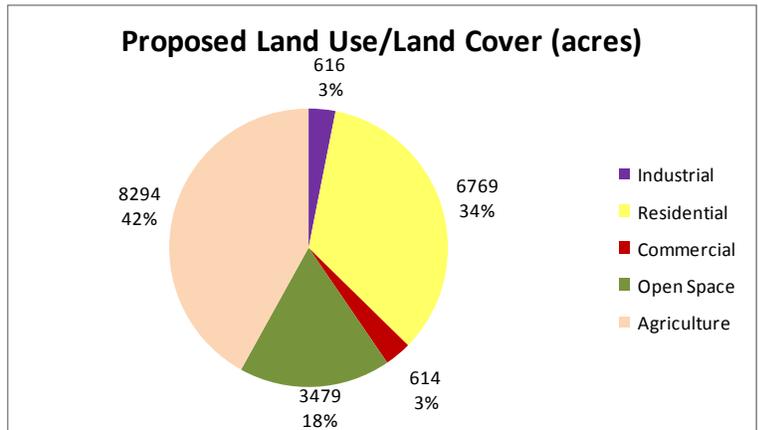
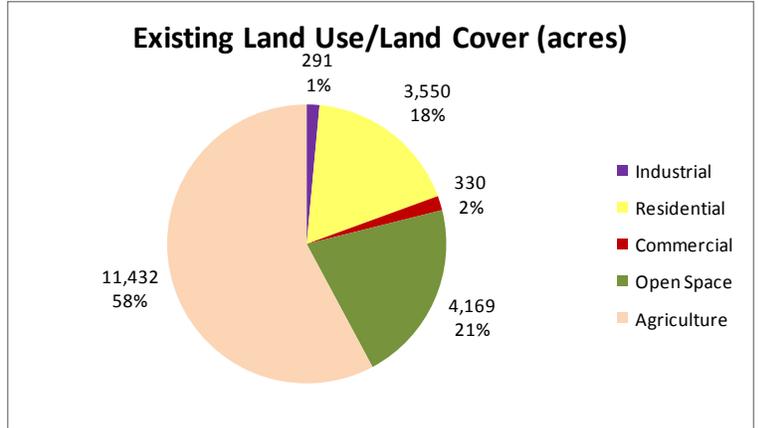
HYDROLOGICAL IMPACTS OF COMPREHENSIVE PLAN

projected to change within the study area. There is a slight difference in acreage due to the variance in source data and complex analysis process but this difference is negligible.

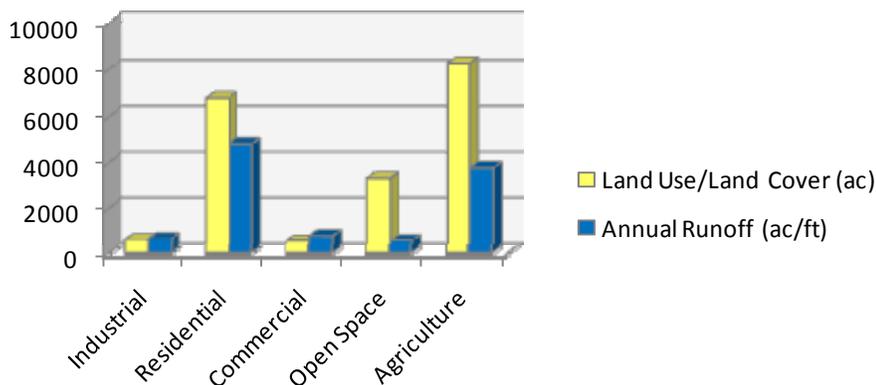
L-THIA recognizes the differences between unique land use types and the percentage of stormwater runoff produced based upon these differences. For example, with similar soils one acre of forested land will produce much less runoff than one acre of commercially developed land. The chart below shows runoff volume based on proposed land use. Both industrial and commercial properties generate much higher runoff per acre than other land uses. The majority of all runoff in the study area will come from residential lots. Even though commercial and industrial properties cover about a third less land than open space, these land uses will produce nearly two thirds as much runoff.

The L-THIA model uses four different soil hydrologic groups (A,B,C&D) to determine infiltration rates. Each soil type is composed of different characteristics and levels of infiltration as listed below:

- **Group A** is sand, loamy sand or sandy loam types of soils. It has low runoff potential and high infiltration rates even when thoroughly wetted. They consist chiefly of deep, well to excessively drained sands or gravels and have a high rate of water transmission.
- **Group B** is silt loam or loam. It has a moderate infiltration rate when thoroughly wetted and consists chiefly of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures.
- **Group C** soils are sandy clay loam. They have low infiltration rates when thoroughly wetted and consist chiefly of soils with a layer that impedes downward movement of water and soils with moderately fine to fine structure.



Runoff Volume Across Land Use Categories (Proposed)



- **Group D** soils are clay loam, silty clay loam, sandy clay, silty clay or clay. This HSG has the highest runoff potential. They have very low infiltration rates when thoroughly wetted and consist chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a claypan or clay layer at or near the surface and shallow soils over nearly impervious material.

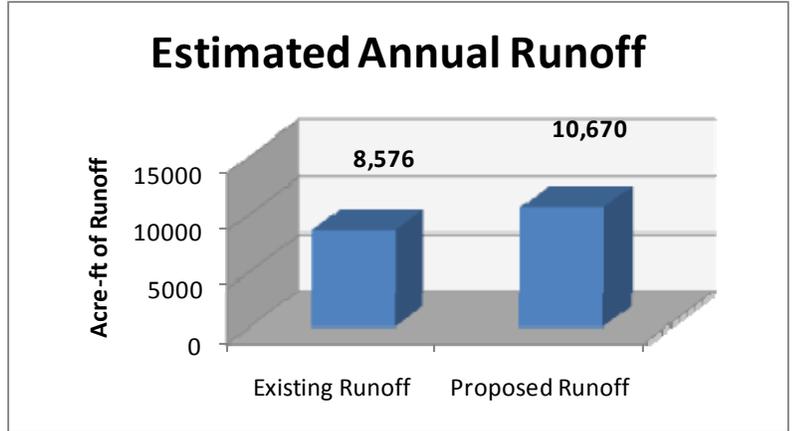
Group B soils are the dominant soil type and can be found in nearly half of the study area. Together Groups C and D make up the other half and



HYDROLOGICAL IMPACTS OF COMPREHENSIVE PLAN

Group A is not present. Most of Highland is included in the Group D category of high runoff potential and very slow infiltration.

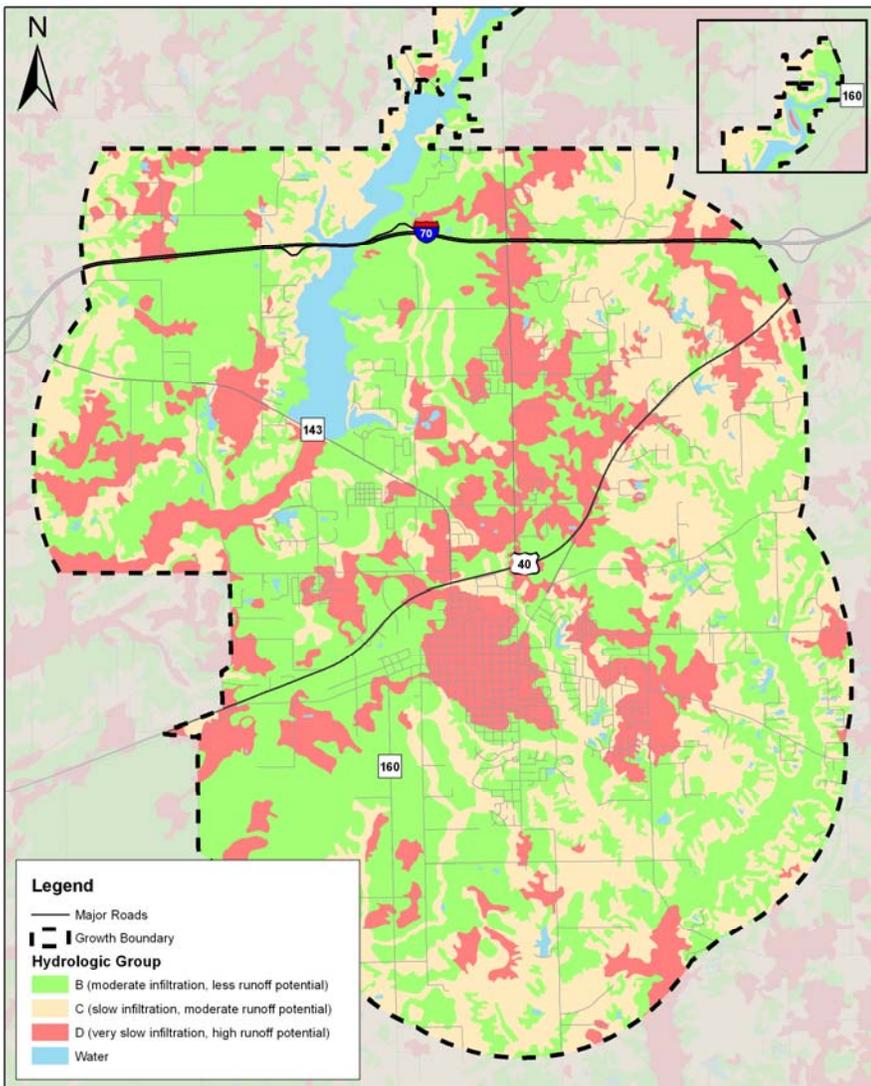
ESTIMATED RUNOFF The estimated runoff for the study area under existing conditions is approximately 8,576 acre-feet of water. The estimated runoff under the proposed land use plan is 10,670 acre-feet. Therefore the proposed development would create a 24% increase in runoff throughout the study area. Unfortunately when broken between watersheds (see page 10) those with the greatest existing issues would see even larger increases. The Buckeye Branch watershed including the majority of the city would see 41% increase in runoff.



The Highland Silver Lake watershed will see a 35% increase in stormwater, exacerbating current shoreline erosion and nutrient pollution.

Based on these results, ordinances should be developed to implement Low Impact Development (LID) Best Management Practices on new developments. These systems operate on their own or assist existing stormwater infrastructure and increase infiltration as well as slow the velocity of water. Examples include:

- Bioretention Cells
- Rain Gardens
- Permeable Pavement
- Grass Swales
- Conservation Subdivision Design
- Recessed Parking Lot Islands



INFILTRATION RATE & RUNOFF POTENTIAL

HIGHLAND RESOURCE PLAN



Recessed Street/Parking Lot Island bioretention cell under construction in Madison County, IL.

LAND USE RECOMMENDATIONS

The resource analysis provides the critical knowledge of the quality of different resources and where they exist within the Highland study area. This knowledge should now be applied through land use recommendations for the local planning process to incorporate when reviewing future development.

Development occurs on a site specific basis, being steered by the Comprehensive Plan and Growth Management Plan. The recommendations of this Resource Plan should be incorporated into the comprehensive plan and applied during the site design phase of the planning process. To illustrate this process a generic area of the study area has been chosen as an example (Page 22) of how to incorporate these recommendations into the planning process. The area selected contains proposed single family residential development. The same process would apply to any category of proposed land uses in the study area. Before a conceptual site design is developed it is necessary to first insert the resource layers in order to determine where development should occur and where it should be discouraged or potentially restricted. Not all types of resources on a site require the same level of protection. This further emphasizes the need for incorporating the site level resource analysis process into the first stage of conceptual planning and design for proposed development.

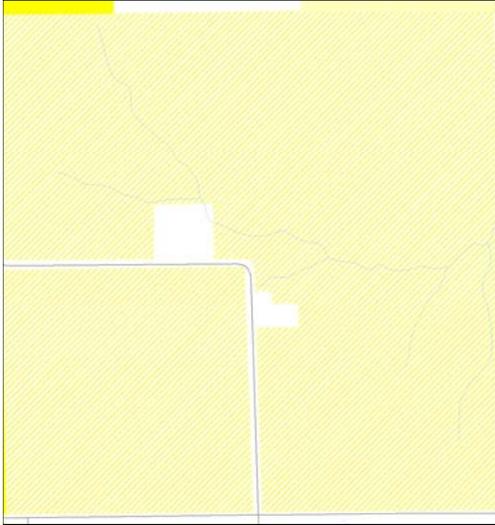
Resources that are the most sensitive in the study area fall into the "Primary Protection Areas" category. These resources are in dark green and should not allow for any development if possible. This category includes: 50 foot (each side) inner stream buffer, impaired streams 150 foot (each side) buffer, wetlands, large forest blocks, 18% or greater steep slopes, and threatened or endangered species habitats if any are recorded. The example on page 22 includes 50 foot inner stream buffers (purple) and 18% or greater steep slopes (light red) from these highly sensitive resources.

"Secondary Protection Areas" still provide many assets to the study area, however are less restricted to certain forms of development. Resources in this category include 50 foot (each side) outer stream buffer, small forest blocks, highly erodible soils, flood zones, and historical/cultural resources. The example on Page 22 includes outer stream buffers (blue), small forest blocks (green) and highly erodible soils (orange). These areas should contain low-impact development that allows the public to interact with their local resources. These are prime locations for parks, trails and other passive recreation or maintained as green space. Developments with these "Secondary Protection Areas" should implement conservation subdivision design, stormwater management techniques such as bioswales, permeable pavement and bioretention areas, and "green" buildings that incorporate a variety of energy conservation measures as well as use of renewable resources for power. Incorporating this resource information into local zoning ordinances and site design planning should reduce construction and maintenance and/or mitigation costs, while at the same time increasing property values and attracting new residents and businesses to the community. This site specific identification of resources and creating development that coexists with these assets provides value to the community through maintaining and enhancing the resources for a healthier and cleaner environment.

These areas can be protected or restored under public or private ownership. This protection assists with wildlife habitat, maintaining or enhancing vegetation, decreasing sedimentation, stormwater management, and recreational opportunities among many other benefits. An initiative to protect these resources should attempt to maximize existing federal, state, and private programs and use local resources to provide leverage in the form of matching funds. Special demonstration programs or targeted resources can also be used to protect resources within the study area.



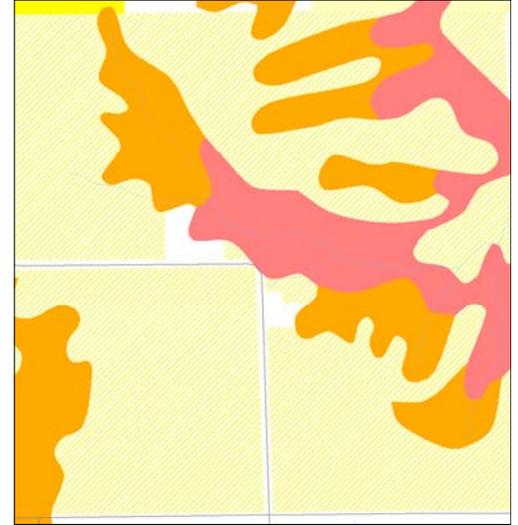
LAND USE RECOMMENDATIONS



Comprehensive Plan

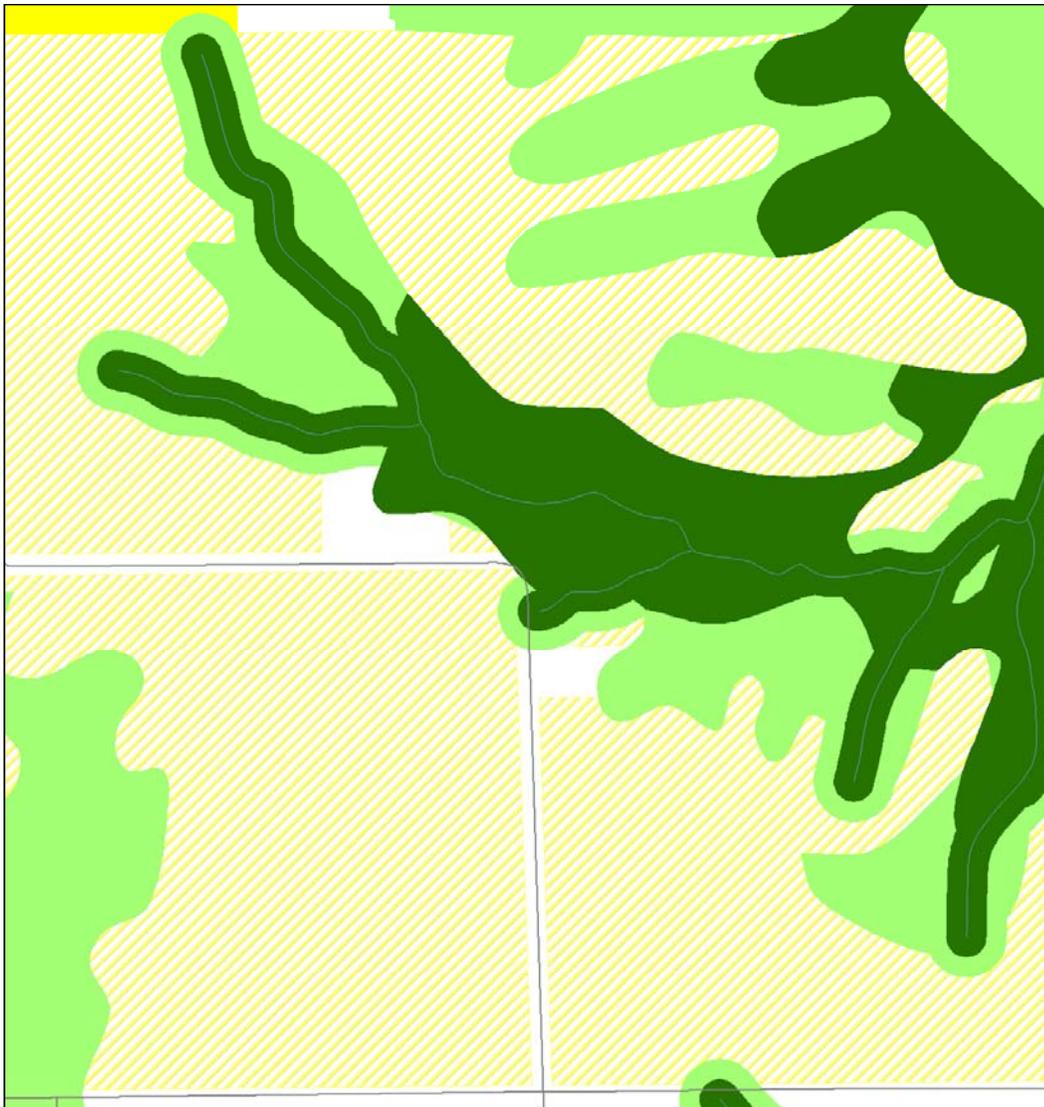


Stream Buffer & Forest Cover



Steep Slopes & Erodible Soils

Example Site Plan



PROGRAMS & ORDINANCES

FEDERAL PROGRAMS

Conservation Easements – Through the federal tax code, charitable gift and estate tax benefits exist for long-term land protection. With a conservation easement, a landowner limits future development opportunities and reduces the value of the property while ensuring long term conservation protection and receiving tax benefits. This program is administered through a local land trust.

Conservation Reserve Program (CRP) – These programs provide a cash incentive payment annually along with cost-share assistance to establish a conservation cover to convert cropland to conservation land uses. The lands are enrolled for a period of time, typically 15 years. This program is administered through USDA-Farm Service Agency with technical assistance from USDA-Natural Resources Conservation Service (NRCS) and the Illinois Department of Natural Resources (IDNR).

Forest Legacy – This program provides a cash payment for a conservation easement on forest land or lands planted to trees. The program requires that a forest management plan be developed to manage the forest for future timber harvests and other conservation purposes. This program is provided through the US Forest Service and IDNR.

Farm and Ranchland Protection Program (FRPP) – This program is designed to protect prime farmland and farmland for future crop production in areas where there are pressures to convert that land to other uses. The program offers a partial cash payment based on the value of the land and requires a local match and a landowner donation. Administered by USDA-NRCS.

North American Wetlands Conservation Act (NAWCA) - Through NAWCA, the US Fish & Wildlife Service provides matching grants to organizations and individuals who have developed partnerships to carry out wetlands conservation projects for the benefit of wetlands-associated migratory birds and other wildlife. Grants are competitive and require a 50-50 match. Areas in this corridor would rank high for grant funds from this program.

Wetland Reserve Program (WRP) – This program provides a cash payment to permanently restrict wetlands for conservation purposes. The program is administered by USDA-NRCS.

319 Program – This program is designed to improve water quality in impaired streams or watersheds. It targets non-point source pollution. To be eligible, a proposal needs to document the need for cost-share assistance and demonstrate a connection between the conservation practices proposed and the impairment. This is a 60-40% cost-share program.

STATE PROGRAMS

Open Space Land Acquisition and Development (OSLAD) and Land and Water Conservation (LAWCON) – These two programs are administered by the IDNR. OSLAD is funded with Real Estate Property Transfer Tax in Illinois. LAWCON is a federal funded program from royalties from off shore oil leases. Illinois uses one application form for both programs. Both land acquisition and park developments are accepted in this program. It is a 50-50 cost share program on a reimbursable basis.

Partners in Conservation (formerly known as C-2000) – This program assists with conservation programs (acquisition, habitat improvement, education, resource economics, etc.). It is available through local ecosystem partnerships and the corridor is in the American Bottom Ecosystem Partnership. It is administered by IDNR with local administrative assistance being provided by the Southwestern Illinois RC&D.

Illinois Nature Preserves Commission – This agency/program is focused on high quality natural areas. There are three levels of protection. The highest level of protection supersedes any use of eminent domain. This program works directly with landowners and is strictly voluntary.

IEPA Environmental Settlements – This program is limited but can be used for a variety of conservation objectives.

REGIONAL/LOCAL PROGRAMS

Ordinances (County/Municipal)

Create and update ordinances to protect green spaces, flood zones, watersheds, wildlife habitat, prime agricultural lands. Examples include: Low Impact Development Best Management Practices, Conservation Subdivision Design, Urban Growth Boundary, Watershed Protection Ordinances, Conservation Zones, Agriculture Zones, Purchase of Agriculture Conservation Easements or Purchase of Development Rights.

Agricultural Areas Act – This protection program is voluntary for agricultural producers/landowners to protect agricultural land. It is administered by the local Soil and Water Conservation District. It provides for some real estate tax benefits and is a registered farming operation that is noted on planning and zoning maps.

Metro-East Park and Recreation District (MEPRD) – This program is approved by voters, to collect a 1/10th sales tax for parks, open space, trails and other conservation programs. Fund divisions are determined by state statute with 50% directed to regional projects and 50% directed to county and local projects.

Private Foundations

The following foundations are all excellent sources of funding for acquisition of land for conservation purposes. Illinois Clean Energy Community Foundation; National Fish and Wildlife Foundation; Grand Victoria Foundation.



PROGRAMS & ORDINANCES

PROGRAM	OWNER	DONATE	PURCHASE	NOTES
FEDERAL PROGRAMS				
Conservation Easements (IRS Tax Code)	Private	X		Donates easement for wildlife/ag land, easement with Land Trust.
Reduced Estate Tax	Private	X		
Charitable Gift	Private	X		Enhanced benefits
Farm and Ranchland Protection Program (USDA-NRCS)	Private	X	X	Purchase a conservation easement, local program needed for match
50% Value Provided by Fed			X	
25% Value From Local Source			X	
25% Value Donated by Landowner		X		
Forest Legacy Program (USDA Forest Service)	Private			Corridor part of SILK Forest Legacy Area
75% for Land Value for Conservation Easement			X	Limited to forest land
25% Donated Value By Owner		X		
Conservation Reserve Program	Private			
Incentive payment for conservation			X	10 or 15 year on permanent contracts
Wetland Reserve Program (USDA)	Private			
Incentive payment for conservation			X	Limited to wetlands. 15/30 year on permanent contracts
STATE PROGRAMS				
OSLAD/LAWCON	Public		X	Purchase of land for parks
Partners in Conservation Program (C2000)	Either	X	X	Acquisition or restoration of land
Illinois Nature Preserves Program (Trumps eminent domain)	Private	X		Various levels of protection
Agricultural Areas Act	Private			Limited protection/benefits
REGIONAL AND COUNTY				
MEPRD	Public		X	Parks, possibly greenways
MEPRD - County level funds	Public		X	Work w/ county for eligibility
General Funds or Special Accounts	Public		X	Tipping Fees
Creation of a County Conservation District	Public		X	Real Estate Taxing District
Creation of a Forest Preserve District	Public		X	Real Estate Taxing District
OTHER SOURCES AND PRIVATE FOUNDATIONS				
Illinois Clean Energy Community Foundation	Public		X	High quality wildlife habitat
Other Local Foundations	Public		X	Varies with funder
National Fish & Wildlife Foundation	Public		X	High quality wildlife habitats
North American Wetlands Conservation Act	Public		X	Acquire/restore high quality wetlands
Environmental Settlement Funds	Either		X	Submit projects to IEPA





SOUTHWESTERN ILLINOIS RESOURCE CONSERVATION & DEVELOPMENT

"Respecting our Environment, Growing our Future"

Southwestern Illinois Resource Conservation & Development is a 501(c)3 non-profit corporation, formed in 1989, and registered in the State of Illinois. The organization has three defined program areas:

Conservation of Open Space

Work regionally to protect agricultural, forest, and other natural lands in order to provide for open space, landscape diversity, sustainable agriculture, wildlife habitat, and conservation benefits for present and future generations.

Foster Liveable and Sustainable Communities

Further the protection of our resources through the utilization of GIS technology, innovative planning processes, the implementation of on-the-ground and educational projects that restore and protect habitat, and promote the use of practices that mitigate the potential impacts of climate change.

Investments in the Environment

Foster the human and financial resources necessary to advance the conservation of our region's environmental resources.

Our work is undertaken within the seven counties making up southwestern Illinois (Bond, Clinton, Madison, Monroe, Randolph, St. Clair and Washington). As environmental and recreational resources often do not align with county lines additional work may be undertaken in adjoining watersheds or counties.

Our Vision:

Healthy and sustainable agricultural, natural, and social communities for current and future generations.

Contact Information

Southwestern Illinois Resource Conservation & Development
406 East Main Street
Mascoutah, Illinois 62258
618-566-4451 ext. 28