

CITY OF EDMOND

Green Infrastructure

Report and Recommendations

2012

A GREAT PLACE TO GROW

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ACKNOWLEDGEMENTS

The creation of this report, Green Infrastructure in Edmond, involved the dedication of several City staff, council members, and interested citizens. Two public stakeholder meetings were held in March 2009 and March 2010, in which many of these people were able to contribute to a citywide conceptual plan. A significant amount of personal time and energy was invested to see this process through to the present.

This is not the end, however, but is intended to be a continuing collaboration between the City of Edmond, the Edmond Land Conservancy, the development community, and other private interests. Special thanks go to presenters and facilitators at the stakeholder meetings: Charles Lamb (City Councilman), Mark Bays (OK Forest Service), Rand Phipps (Edmond Land Conservancy), Ed Macie (USDA Forest Service), John Krupovage (Tinker AFB), Doug Tennant (Jacobs Engineering), and Cindy Friedemann (freelance facilitator). Several staff members also presented at these meetings and contributed to this report. Additional thanks go to Carrie Tomlinson, and Kimberly Miller – the City’s first urban foresters who started down this path toward a green infrastructure conceptual framework.

Abby Hall	Jade Noles
Ashley Stringer	Jan Fees
Ben Pollard	Jeff Cowan
Bob Schiermeyer	Jim Bowlin
Brian Turner	John Bates
Bruce Hoagland	John Krupovage
Charles Lamb	Ken Bryan
Cindy Friedemann	Larry Stevens
Clay Coldiron	Leigh Martin
Cody Gaines	Mark Bays
Dan O’Neil	Melissa Shackford
Dena Bleeker	Phillip Jones
Doug Tennant	Rand Phipps
Earl London	Richard Thomas
Ed Cunliff	Ryan Ochsner
Ed Macie	Shannon Entz
Elizabeth Waner	Steve Commons
Ernie Isch	Steve Lawrence
Fred Rice	Toni Weinmeister
Jacob Moore	Wayne Page

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EXECUTIVE SUMMARY

The City of Edmond has a long tradition of preparing the community for growth, balancing economic growth with quality of life and the environment. Documents such as Tomorrow's Edmond, the Edmond Greenprint, and the Edmond Plan IV give us the foundation for the kind of community we have become, and strive to be. Studies such as the Sensitive Area Studies and 50 Year Water Supply Plan provide us with alternatives and the information we need to preserve our way of life and the cultural heritage that makes people want to live in Edmond. Citizen surveys verify that a vast majority of people in Edmond want our City to be engaged in pursuing enhancements that will make our City a better place to live, improving our health, and increasing our options for mobility. A conceptual green infrastructure network has been created to reflect these values.

INTRODUCTION

The Green Infrastructure Initiative began in the Fall of 2008 with a grant secured through the Oklahoma Department of Agriculture, Forestry Services. It began, and continues today, as an informal partnership between the City of Edmond and the Edmond Land Conservancy – a nonprofit land trust organization committed to preserving, creating, and improving Edmond's natural, scenic and outdoor recreational environment. A committee has been formed among local stakeholders and City staff to analyze and mitigate the impacts of development across Edmond in regard to its ecological systems – recognizing that these systems need our protection for future generations, and that a balanced approach to growth may be accomplished with enhanced results for the developer, the land owner, and local residents.

VISION

To promote environmental stewardship and a healthier community by creating a plan and process that commits Edmond to preserving, protecting, and restoring its interconnected natural resources for the future development of the community.

DEFINITION OF GREEN INFRASTRUCTURE

Green Infrastructure (GI) is defined as a strategically planned and managed network of natural lands, working landscapes, and other open spaces that conserve ecosystem values and functions and provide associated benefits to the people who live there. It is not meant to inhibit development, but to provide a framework for developers in the community and a strategic balance for long term growth. A green infrastructure network consists of hubs, sites, and linkages:

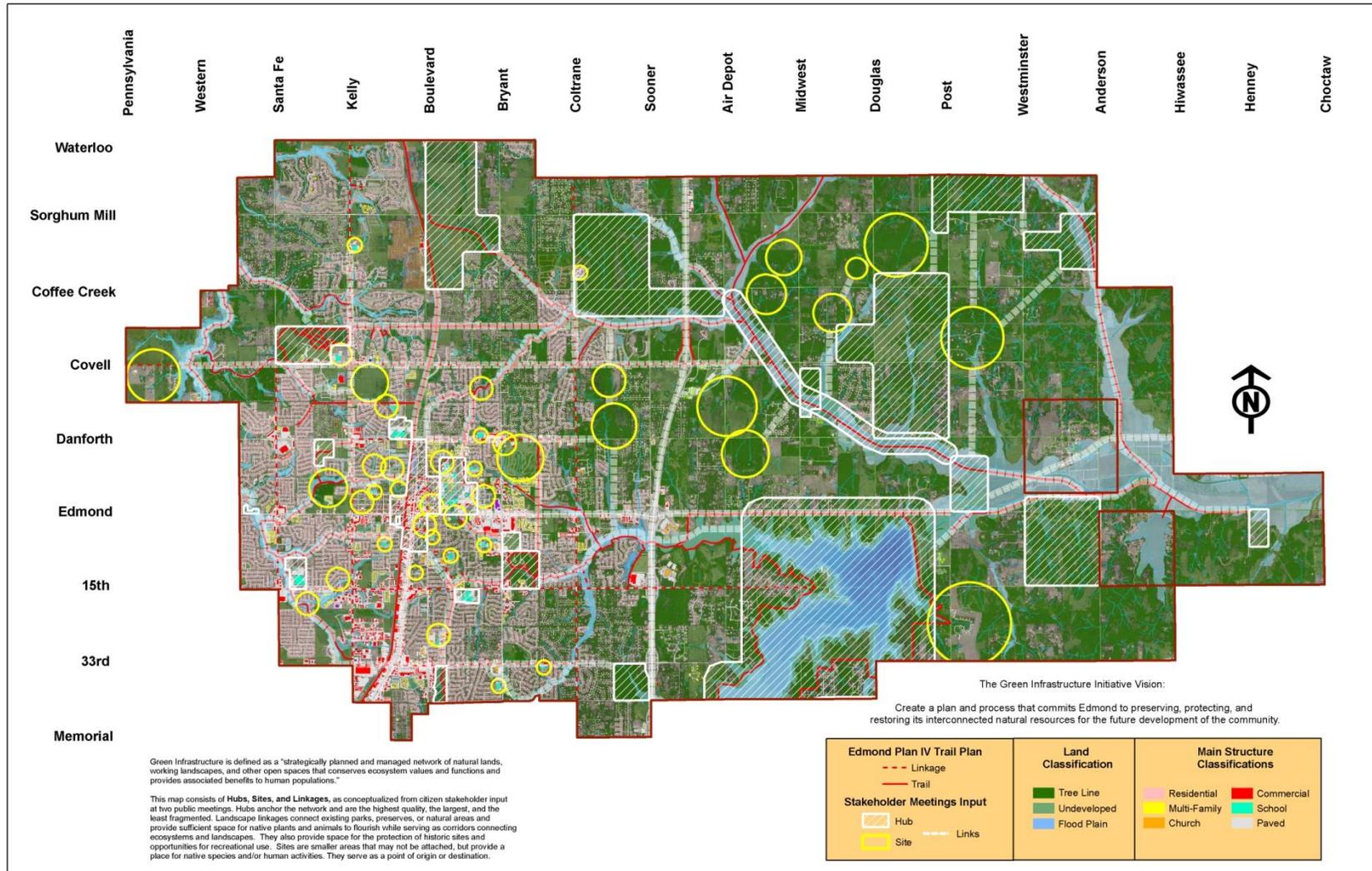
Hubs anchor the network and are the highest quality, the largest, and the least fragmented areas for potential conservation. Examples of the most popular hubs within the City of Edmond include Hafer Park, Mitch Park, and Arcadia Lake.

Sites are smaller areas of land that may not be attached to the network, but provide a place for native species and/or human activities. They serve as a point of origin or destination. Examples for these sites are the many neighborhood parks and conservation areas that have been arranged through negotiations with landowners.

Landscape linkages connect existing parks, preserves, or natural areas and provide sufficient space for native plants and animals to flourish while serving as corridors connecting ecosystems and landscapes. They also provide space for the protection of historic sites, and opportunities for recreational use. The Edmond Plan IV discloses a city-wide network of trails, which contributes to this notion. Also, the many floodplains which traverse the City, where the potential for flooding becomes a hazard, are opportunities for linkages and natural corridors.

EDMOND GREEN INFRASTRUCTURE WORKSHOP EXERCISE

EXISTING AND POTENTIAL AREAS FOR CONSERVATION



EDMOND GREEN INFRASTRUCTURE MAP

Green Infrastructure design objectives, landscape and ecological features, network elements, priorities, and other data layers were used to inform the process of creating a map that identifies hubs, sites, and landscape linkages, as well as existing trails and linkages. Two public stakeholder meetings were held in March 2009 and March 2010. Independently, groups identified potential hubs, sites, and linkages across the City. Draft networks were drawn in consideration of those areas that were deemed strategically important, and/or critical.

Working maps contained a 2009 aerial underlay, potential remnant forests, the master trail plan, City parks, schools, and flood zones. Other reference maps included were Zoning, the Plan IV Ordinance map, prime farmland, watershed basins, population density, and drainage basin flood plain studies.

The resulting map is an illustration, or “birds-eye” view, reflecting potential areas and linkages for preservation.

THE VALUE

Many communities have come to realize the benefits of focusing strategically on land use, where the effects of urbanization are showing to have lasting impacts. Some consider GI just as much a part of development as other utility infrastructure. The value of GI is that it supports the landscape and ecological balance. It supports our culture and quality of life, improving public health and air quality. It promotes bicycle and pedestrian connections, and creates an integrated network of complimentary systems. It can be built into routine architectural practices, and in some cases, significantly reduce construction costs. It protects our watersheds, and makes beautiful places, adding to the value of property.

The population for the City of Edmond has grown from 68,315 to 81,405 from the year 2000 to 2010. This reflects a 19.2% increase from the year 2000. If expansion of the human network is inevitable, how will we manage its impact? The first step is to understand how the natural system functions, and then we must understand the human network. Edmond wants to continue to encourage the kinds of balanced growth that are most beneficial to the community, whether they are transportation options, utility infrastructure, parks and recreational opportunities, or mindful practices to help protect the environment.

The simple importance of trees can be restated briefly – they improve air quality, protect water supply, provide stormwater management, preserve biodiversity and wildlife, provide outdoor recreational opportunities, promote health, provide aesthetics, and create economic opportunity. Trees should not be considered a hindrance to development, but an opportunity for development.

Air Quality is important to maintain, as studies show the alternative can result in respiratory diseases such as asthma, chronic bronchitis, and emphysema. In addition, a status of “non-attainment” in the National Ambient Air Quality Standard would require our region to undertake several federally mandated actions that would result in an increased financial burden for local residents, businesses, and government.

Water Resources will increasingly become more of a challenge for the City with respect to quantity and quality. The 50 Year Water Supply Plan was initiated to provide guidance on water supply, and it was shown that conservation plays an important role in that. The existence of impaired water bodies in Edmond should also stimulate more critical thinking in terms of new development and innovative stormwater management practices, such as Low Impact Development (LID).

Wildlife Resources are a vital component in green infrastructure. Hubs and sites provide areas for natural habitats, giving creatures space to navigate, but these animals also help the native ecosystem by maintaining the balance of biodiversity for a healthy green space. A balanced approach to urban development suggests that we inevitably must find ways to coexist. A deepening appreciation of the ecosystem will not only help these animals, but it will make us a more healthy community as well.

THE OPPORTUNITY

Green infrastructure (GI) involves foresight, political will, and a persistent effort on the part of the City, although it should be said that Green Infrastructure is not a government program. While the City can lead, this concept relies on all sectors of the community, including private landowners. This is an organizational strategy that provides a framework for planning conservation and development. Like any planning effort, green infrastructure calls for cooperation among priorities and interests.

The impacts of urbanization on the environment can be addressed at a variety of scales. They should be managed at the municipal scale, the neighborhood scale, and the site scale. Opportunities for the preservation of open space and forests, and the protection of the aquatic environment are present on all of these scales. Stormwater management in particular is evolving beyond the engineered solutions at the site level, such as detention ponds and curbs and gutter, to an approach that manages stormwater on all scales.

At the largest scale, the preservation or restoration of natural landscape features (such as forests and floodplains) are critical components of green infrastructure. The hubs, sites and linkages, or green infrastructure network, derived from sensitive areas in the main report, will undergo refinement as new opportunities become available, and as others are found to plainly not work. With the exception of some recreational uses, the City of Edmond does not allow development within the 100 year flood plain, and this provides an opportunity to use that space for a natural benefit.

Outside of the 100 year flood plain, however, there are still unprotected watersheds. A total of 134.5 miles of stream corridors have been found in undeveloped parts of the City. With more comprehensive planning there is the opportunity to reduce stream bank erosion issues and further impairment to our water systems. Through the use of conservation easements and riparian buffers there is also an opportunity for landowners and the community at-large to benefit. Conservation easements can provide landowners with tax benefits, and at the same time improve water quality, provide a wildlife habitat, and potential opportunities for outdoor recreation.

The Edmond Plan IV was adopted by Ordinance 3094, April 23, 2007. The Plan conforms with land use policies that were adopted by the Planning Commission and elected officials to the City of Edmond. It is used as the comprehensive land use plan for the City, and from time-to-time portions of the plan are amended or modified according to the Plan Map Implementation and Amendment Procedures. It is based on the Goals and Policies Statements, the Ordinance Plan, the General Plan and Edmond Transportation Plan.

The main purpose of the Edmond Plan is to direct the community's physical development by providing specific land use strategies, and articulating goals and objectives. The Plan Map, created with GIS, is a current graphical representation of those goals and objectives. Common threads that were in *Tomorrow's Edmond* and the *Edmond Greenprint* are also present in the *Edmond Plan IV*. Guidelines have been documented to provide for a Sensitive Area Conservation Assessment. There is an opportunity here for Green Infrastructure to present new guidelines for the Plan IV assessment.

At the neighborhood scale, green infrastructure planning can include topography and native vegetation, street and road designs, thinking strategically about parking supply, all stormwater options, and consideration of urban tree goals. At the site scale, green infrastructure practices include rain gardens and bioretention cells, porous pavements, green roofs, and rainwater harvesting for non-potable uses such as toilet flushing and landscape irrigation.

In 2011 the EPA launched a new strategy to promote the use of green infrastructure by cities and towns to reduce stormwater runoff that pollutes streams, creeks, rivers, lakes and coastal waters.

“In addition to protecting American’s health by decreasing water pollution, green infrastructure provides many community benefits including increased economic activity and neighborhood revitalization, job creation, energy savings and increased recreational and green space.” – EPA spokesperson

For better stewardship of our natural resources, a review of local ordinances is necessary to remove barriers and ensure coordination across all development codes. Edmond’s development codes (Titles 21, 22, and 23) already provide a framework, and with some focus can be improved to better balance the grey infrastructure we need, and the green infrastructure we want.

EXISTING GREEN INFRASTRUCTURE

On the following pages are two maps. The first map illustrates the **current green areas** of Edmond in contrast with the more urbanized areas of town, while the second map, highlighted in bright green and blue, represents the current areas of Edmond that are **currently committed** to conservation and/or recreation. Some areas committed to conservation are community and neighborhood parks, while the area around Arcadia Lake belongs to the Corps of Engineers. Other components of the network are within the 100 year flood plain where development is not allowed to occur, and others may be platted easements for trails, trees, or walking and biking paths. Considering the amount of undeveloped green space that the City has available, and the value that it holds for Edmond residents, the recommendations in this report strive to find ways of encouraging environmentally friendly practices, and ways to use natural topography and native vegetation, while searching for other opportunities where both the public and private sectors can make further contributions.

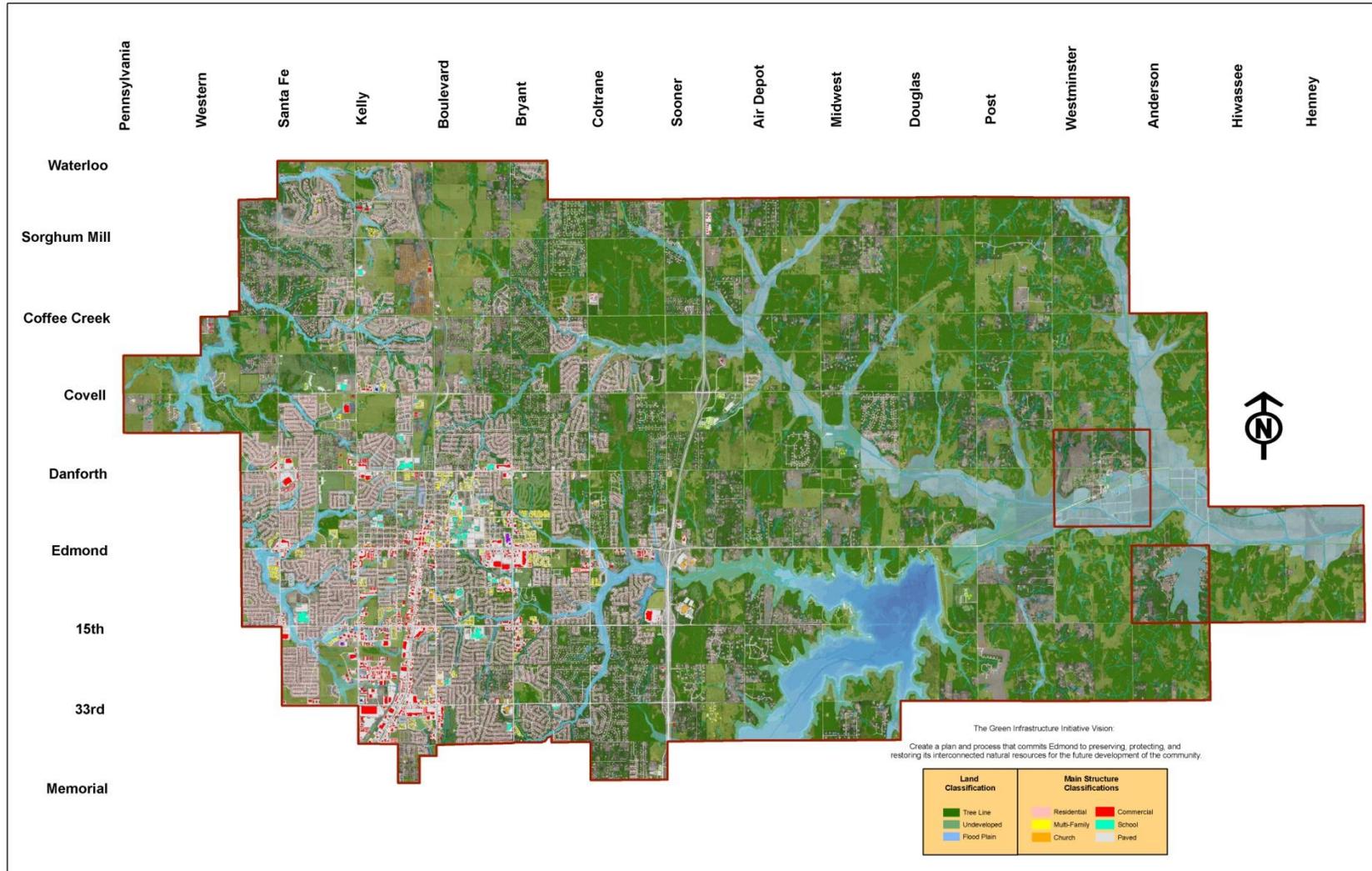
RECOMMENDATIONS

A number of recommendations are made in order to find ways to ‘protect, preserve, and restore.’ The primary recommendation is that the Green Infrastructure Plan be incorporated into the Edmond Plan IV Assessment criteria. Other recommendations involve the use of low impact development, and finding ways of encouraging those practices. Finally, software tools that the City is currently using, such as GIS and I-Tree can be utilized to assist in Plan Amendment reviews and to provide a basis for determining how we are doing in the 5 year plan update process.

Following the maps on the next two pages is the full list of recommendations (A-Z). Following that is a table for the recommendations, listed by recommended departments responsible for implementation. These challenges will involve a multi-disciplined coordination effort for maximum benefit.

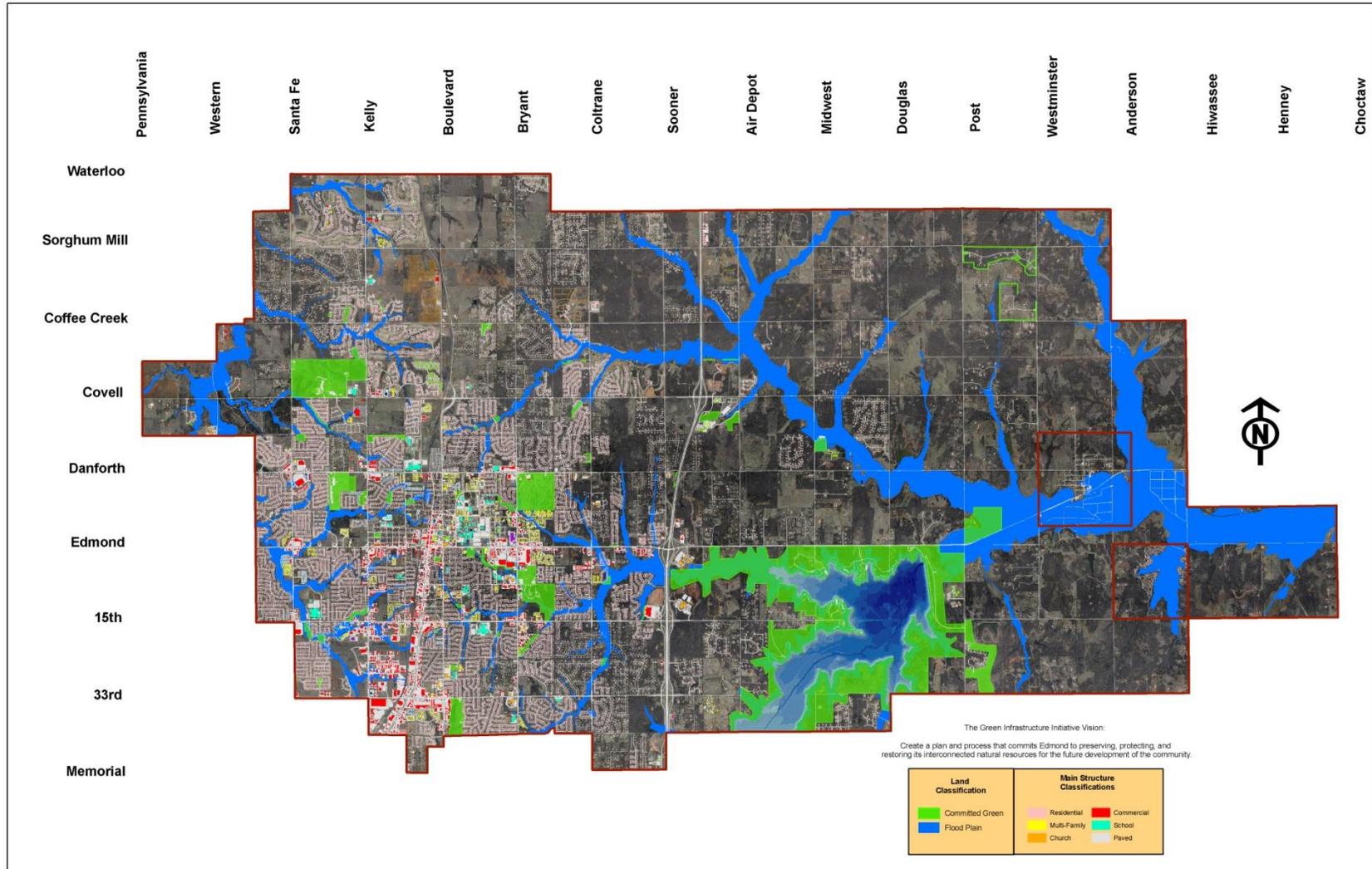
CITY OF EDMOND

GREEN AREAS CONTRASTED WITH MORE URBANIZED AREAS



CITY OF EDMOND

COMMITTED CONSERVATION OR RECREATION AREAS



RECOMMENDATIONS (following page: listed by Departments Responsible for Implementation)

The following is a list of recommendations, resulting from the findings in this report.

- A. Trail Study: Update and prioritize Trails Plan based on the findings in the GI Study, and the locations of schools, parks, population/square mile, and recommendations from other stakeholder groups.
- B. Convey the GI Report results to the Parks department, and consultants for the Parks Master Plan and Downtown Master Plan, with specific Site recommendations for greenways and park locations.
- C. Modify the Plan Assessment Form to include considerations that are a part of the Sensitive Area Conservation Assessment (Plan IV) form, to be signed and dated by the City's Planning and Urban Forestry staff for each proposed development, awarding points for those considerations.
- D. Evaluate a Riparian Buffer Ordinance for streams identified in this Study.
- E. Use the Composite Value (CV) Grid map, Stakeholder Exercises, the Trail Plan Map, and Stream Buffers to make suggestions for updates to the Plan IV Ordinance.
- F. Add a staff member from the Engineering Stormwater division to the Site Plan team.
- G. Create a procedure for contacting property owners to discuss potential trail extensions.
- H. Create a procedure for pre-plat meetings with developers prior to their paying for the plat.
- I. Set up an email communiqué with the Edmond Land Conservancy for relevant Site Plans or Plats.
- J. To encourage conservation and restoration, create a pamphlet and/or video for all applicants for development to describe the benefits of Conservation Easements, Low Impact Development (LID) techniques, Riparian Buffers, and the Trail Plan.
- K. Create an online informational site for developers and citizens, describing LID techniques and benefits.
- L. For the purposes of LID, review the City municipal codes and remove all barriers to LID to ensure coordination across all development codes, and explore ways to incentivize.
- M. Explore other options for reforestation, or open space, and coordinate with the Urban Forestry Commission, Parks, and the Edmond Land Conservancy.
- N. Use the Composite Values grid for alternatives and further assessment as development continues.
- O. Implement a Street Tree Program and pursue funding sources, including private investment.
- P. Market green initiatives to attract green investment, and sponsor educational workshops.
- Q. Host an LID Design Competition for a Planned Unit Development (PUD), and explore other ways in which the City can lead by example.
- R. Create a voluntary Backyard Wildlife Program, and explore opportunities for a Nature Park.
- S. Establish Private/Public partnerships to help fund green initiatives, with name recognition at the Site.
- T. Encourage Conservation Subdivisions, such as cluster housing, as defined in Edmond Plan IV, where physically feasible and financially appropriate.
- U. Embrace the GI recommendations as part of Energy Efficiency and Resource Conservation Measures.
- V. Inventory: Water quality data for selected water bodies.
- W. Inventory: City-owned forest mitigation sites
- X. Inventory: City actions taken to apply low-impact development techniques
- Y. Inventory: Tree canopy and associated greenhouse gas mitigation
- Z. Inventory: Miles of existing trails, park area, and other conservation areas

RECOMMENDATIONS - Listed by Departments Responsible for Implementation

	Recommendations	Planning	Urban Forestry	Engineering	Parks	Marketing
A	Trails Plan Updates	x				
B	Relay GI Findings to Plan Consultants	x			x	
C	Plan and Sensitive Area Assessment	x	x			
D	Riparian Buffer Evaluation	x		x		
E	Plan IV Ordinance Updates	x				
F	Add Stormwater Quality Specialist to SPRT ¹			x		
G	Communicating Potential Trail Extensions	x			x	
H	Add Pre-Plat Meetings	x				
I	Communiqué with the ELC	x				
J	Applicant Informational Packet	x	x	x		x
K	Online Informational Site	x	x	x		x
L	Review of Municipal Codes	x		x		
M	Restoration Opportunities	x	x		x	
N	Composite Values Grid	x				
O	Street Tree Program		x			
P	Marketing and Workshops	x	x	x	x	x
Q	LID Design Competition	x		x		
R	Backyard Wildlife Program		x			
S	Private/Public Partnerships		x		x	
T	Conservation Subdivisions	x				
U	Include Green Infrastructure in EERCM ²	x				
V	Inventory - Water Quality Data			x		
W	Inventory - City-Owned Forest Sites	x	x			
X	Inventory - City Actions Applying LID	x	x	x	x	
Y	Inventory - Tree Canopy and GHG Mitigation	x	x			
Z	Inventory - Miles of Trails and Park Areas	x				

¹ SPRT – Site Plan Review Team

² EERCM – Energy Efficiency and Resource Conservation Measures

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INTRODUCTION

The City of Edmond Green Infrastructure Initiative began in the Fall of 2008 with a grant secured through the Oklahoma Department of Agriculture, Forestry Services. It began, and continues today, as an informal partnership between the City of Edmond and the Edmond Land Conservancy – a nonprofit land trust organization committed to preserving, creating, and improving Edmond’s natural, scenic and outdoor recreational environment. A committee has been formed among local stakeholders and City staff to analyze and mitigate the impacts of development across Edmond in regard to its ecological systems – recognizing that these systems need our protection for future generations. The general goal is to seek a balanced approach to growth that supports these values, but meets the needs of a growing City.

STATEMENT OF PURPOSE

This report is a culmination of previous reports and studies created toward making Edmond a more livable city. There is also additional analysis and study regarding specific areas for potential conservation. Our purpose is to provide justification, guidance and recommendations for further community action.

VISION

To promote environmental stewardship and a healthier community by creating a plan and process that commits Edmond to preserving, protecting, and restoring its interconnected natural resources for the future development of the community.

DEFINITION OF GREEN INFRASTRUCTURE

Green Infrastructure is defined as a strategically planned and managed network of natural lands, working landscapes, and other open spaces that conserve ecosystem values and functions and provide associated benefits to the people who live there.³ It is not meant to inhibit development, but to work alongside development and the community, to provide a strategic balance for long term growth. A green infrastructure network consists of hubs, sites, and linkages.

Hubs anchor the network and are the highest quality, the largest, and the least fragmented areas for potential conservation. Examples of the most popular hubs within the City of Edmond include Hafer Park, Mitch Park, and Arcadia Lake.

Sites are smaller areas of land that may not be attached to the network, but provide a place for native species and/or human activities. They serve as a point of origin or destination. Examples for these sites are the many neighborhood parks, and conservation areas that have been arranged through negotiations with landowners.

Landscape linkages connect existing parks, preserves, or natural areas and provide sufficient space for native plants and animals to flourish while serving as corridors connecting ecosystems and landscapes. They also provide space for the protection of historic sites, and opportunities for recreational use. The Edmond Plan IV discloses a city-wide network of trails, which contributes to this notion. Also, the many floodplains which traverse the City, where the potential for flooding becomes a hazard, are opportunities for linkages and natural corridors.

³ Green Infrastructure Linking Landscapes and Communities, Mark Benedict and Edward McMahon, Island Press, 2006

BACKGROUND

The City of Edmond's commitment to good stewardship of the environment is underscored by a history of continued development in plan documentation and guidance for the growth of the community. Some results of this are the 14 neighborhood parks, 4 community parks, 4 recreational areas around Arcadia Lake, 1 dog park, 1 skate park, 2 disc golf courses, an estimated 20 miles of hiking and biking trails, and more.⁴

Three documents, three community surveys, and three additional studies that will be mentioned here are Tomorrow's Edmond: A Community Dialog, The Edmond Greenprint, the 2006, 2008, and 2011 Community Satisfaction Surveys, The Edmond Plan IV, the 2003 and 2004 Sensitive Area studies, and the 50 Year Water Supply Plan. Briefly mentioned, also, will be the Stakeholder Meetings which led to the formation of this report.

TOMORROW'S EDMOND

The first document is Tomorrow's Edmond: A Community Dialog. In Planning sessions in 1995 and 1996, Council members expressed their desire to solicit citizen input into the direction of Edmond. The project featured the creation of eleven Focus Groups. Study areas were Economic Development, Parks and Recreation, Community Livability, Education, Social Services and Health, Infrastructure, Community Design, Housing and Land Use, Culture and History, Governance, Youth, and Community Image. Tomorrow's Edmond was adopted in 1998, and it represents a series of visions for the future of Edmond. The Abstract/Action Plan summarizes these visions and identifies key issues along with an action plan to implement those visions. It represents hours of thought and discussion from more than 200 Edmond residents.

The Vision for this dialog is that "Edmond will be a diverse and innovative hometown committed to excellence through leadership, balanced growth, and cooperation. These high standards will only be accomplished by citizen participation."

Among the goals within Tomorrow's Edmond, common threads can be found for Green Infrastructure. On the topic of "Connected Citizenry", by far the most preferred way to connect was through a network of pedestrian and bicycling paths throughout the community. In addition, some key issues were to identify opportunities for development, and to provide for neighborhood parks. On the topic of "Development in the Community", there was a desire to have higher standards through zoning, code enforcement, good design, and comprehensive planning. Nearly every topic group dealt with the preservation of Edmond's natural beauty. Commonly mentioned target areas are I-35 and Arcadia Lake. Topics dealt with the protection and enhancement of residential areas, encouragement of appropriate business development, and the incorporation of more environmental protection into development standards. Civic participation was also encouraged, along with a desire for efficient government and efficient use of resources.

⁴ Community Stewardship list: http://edmondok.com/assets/files/edmond_living/green_initiatives_guide.pdf

EDMOND GREENPRINT

In 2003 a plan was developed, called the Edmond Greenprint. It came about when the City of Edmond appointed a task force to develop a long-term plan for enhancing outdoor recreational amenities and preserving natural resources. The goal of this document was to ensure that the best natural areas, which still exist, are not lost.

“Though we seek economic opportunities for our residents, both current and future, this process must not threaten the character of Edmond by impairing water or air quality or permanently destroying our forests, farmland, floodplains, or streams.”

From recommendations by the task force the Edmond Land Conservancy was established – to oversee and advise on implementation of the Greenprint, conduct ongoing public awareness efforts, and help to monitor compliance with relevant city codes.

SENSITIVE AREA STUDIES

In addition to the Edmond Greenprint two studies were completed in 2003 and 2004 to document the valuable resources and other biologically sensitive areas found within the City of Edmond - beginning from the City’s recorded history in 1871. Edmond’s Urban Forestry Commission, in cooperation with the City of Edmond, commissioned the studies with the land management consulting firm, Cross Timbers Forestry. Several areas in the City were found to contain potentially sensitive ecosystems or characteristics, including areas that may contain pre-settlement remnant forests. Other sensitive land types were sensitive soils, areas of archeological interest, and sensitive wildlife habitats. Geographic Information Systems (GIS) were used to document these areas for potential conservation.

Analyzing the data, it was determined that 20% of the 1871 forest may still be in existence as pre-settlement remnants, and that one in five trees existing before settlement still existed in 2004. In total for these studies, there were approximately 32,000 acres identified as potentially sensitive areas, including land that may have been previously developed. As a result of these studies, sensitive areas are considered in the Site Plan review process for many new developments. Tree preservation is included in the process, where preservation landscaping credits can be awarded in place of new plant units. A Tree Preservation Plan is requested for “all trees proposed to be saved”, as codified in 22.3.5[C] of the Edmond City Code. This includes a letter of approval from an ISA certified arborist or degreed forester.

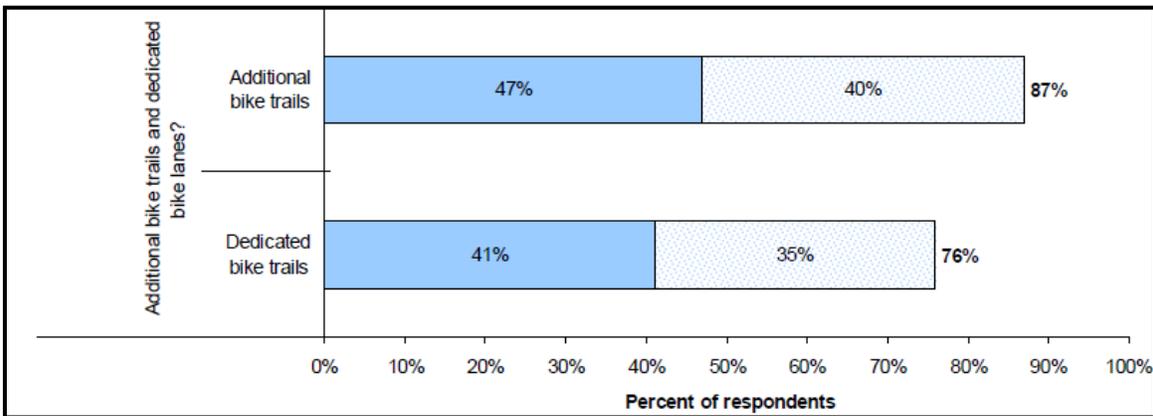
Other recommendations from the studies included learning more about these areas and their function, in addition to codifying Edmond’s commitment to their conservation. The potential remnants are the most readily identifiable locations for research, and more research and continued efforts to conserve these areas is warranted. Inventories should determine the relative age of the trees, the age distribution, the species distribution and if a corollary can be made between species and age. In addition, it was suggested that long term research could provide valuable information on the dynamics of the ecosystem and help identify viable conservation techniques.

“Techniques for accurately assessing the value of these areas in light of possible conflicting interests will be an important step in the conservation process...”

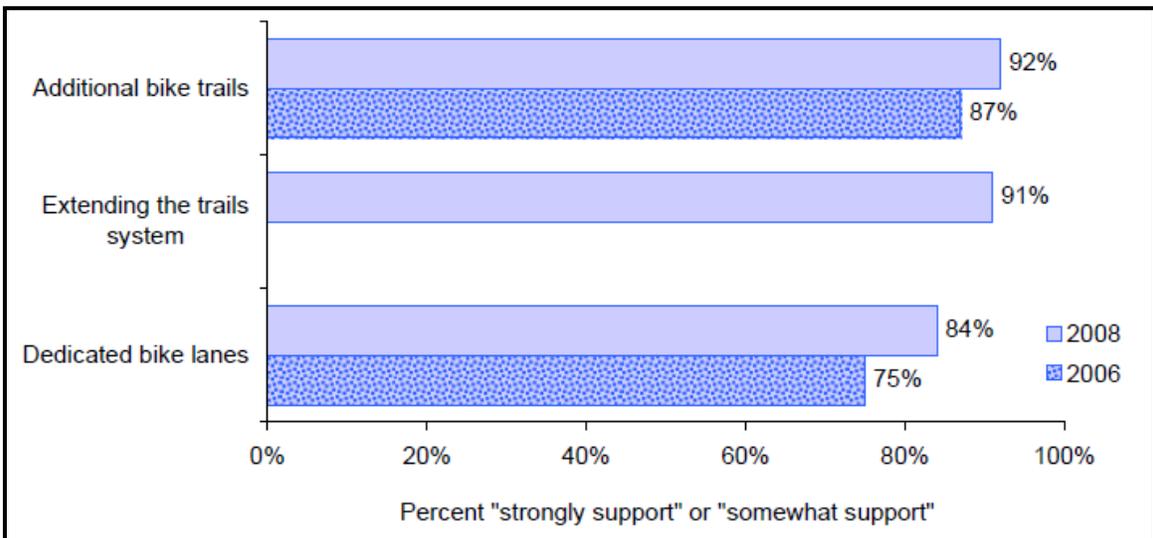
CITIZEN SATISFACTION SURVEYS

In 2006 and 2008 the City of Edmond contracted with the National Research Center, Inc to conduct a community wide citizen survey. In 2011 a similar survey was conducted by Wilson Perkins Allen Opinion Research, showing comparable results. The Surveys serve as a consumer report card for Edmond by providing residents the opportunity to rate the quality of life in the city, as well as the community's amenities, service delivery, and their satisfaction with local government. The survey also permits residents to provide feedback to government on what is working well and what is not, and to communicate their priorities for community planning and resource allocation.

In 2006 when asked about support for bike trails, eight-seven (87%) of respondents said they would "strongly" or "somewhat" support additional bike trails. Three-quarters (76%) said they would at least "somewhat" support dedicated bike lanes.



In 2008 residents were asked to indicate their level of support for extending the trails system. At least half of the respondents "strongly" supported each idea, and an overwhelming majority either "strongly" supported or "somewhat" supported these ideas. Support for additional bike trails and dedicated bike lanes increased from 2006 to 2008.



EDMOND PLAN IV

The Edmond Plan IV was adopted by Ordinance 3094, April 23, 2007. The Plan conformed with land use policies that were adopted by the Planning Commission and Edmond's elected City Council members. It is used as the comprehensive land use plan for the City, and from time-to-time portions of the plan are amended or modified according to the Plan Map Implementation and Amendment Procedures. It is based on the Goals and Policies Statements, the Ordinance Plan, the General Plan and Edmond Transportation Plan.

The major purpose of the Edmond Plan is to direct the community's physical development by providing specific land use strategies and articulating goals and objectives. The Plan Map, created with GIS, is a current graphical representation of those goals and objectives.

Common threads that were in the Tomorrow's Edmond and the Edmond Greenprint are also present in the Edmond Plan IV. Guidelines have been documented to provide for a Sensitive Area Conservation Assessment. The description and use of this assessment is shown below:

Description and Use

Conservation of valuable environmental areas such as remnant forests, farmland and floodplains is an important goal of Edmond Plan IV (as documented in the General Plan, vision, goals and policies). In an effort to conserve environmental resources, the City has established a Sensitive Area Conservation Assessment... The Conservation Assessment establishes a guideline for the desired conservation area of a development site.

The recommended conservation area is based on a point system that values the size and the type of resource (forest, floodplain, farm land) that is conserved, compared to the overall size of the development site. The recommended conservation area is intended to be a flexible guideline...

The point system is intended to achieve these corollary purposes below, related to the health, safety and welfare of the community.

1. Maximize space for aquifer recharge areas on hard to develop lands including those with remnant cross timber forests, rocky shallow soils, and steep slopes.
2. Preserve forested areas to reduce the destruction of sensitive natural resource areas that provide habitat to sensitive species.
3. Reduce the quantity and improve the quality of stormwater runoff from expected development.
4. Minimize impervious surface area maximizing recharge and reducing soil erosion by using appropriate stormwater Best Management Practices (BMPs).
5. Reduce the capital cost of development.

WATER SUPPLY PLAN

The 50 Year Water Supply Plan was completed in May, 2009. Significant growth has occurred within Edmond in the last three decades. The resulting population growth, and the expected growth for future Edmond will result in water demands doubling by the year 2030. In 1999 the City of Edmond hired Camp Dresser & McKee (CDM) to develop a Water System Master Plan to help guide the City's water system investments, and many of those plan recommendations have been implemented. A key finding in the 1999 Master Plan was that Edmond had sufficient resources up until the year 2020. In recognition that the City would continue to grow beyond the year 2020, the 50 Year Water Supply Plan was developed. The purpose of the Plan was to evaluate a wide range of water supply and demand options, and to develop an implementation strategy that the City can reference into the foreseeable future.

As part of this implementation strategy, it's important to note that conservation plays a role in the Plan, and in the City's efforts to mitigate demand. The peak day demand projection for the City, assuming no additional water supplies through the year 2060, shows a supply gap as early as 2020 (figure 3-8, 50 Year Water Supply Plan).

The Plan calls for "Level 1" and "Level 2" conservation options. Other similar options in the plan call for "stormwater beneficial reuse" and "non-potable" reuse. There are several suggestions in the plan for these options, which will not be restated here. The average annual yield for Level 1 and Level 2 conservation options comes to 2,240 acre feet per year, and 4,480 acre feet per year. That translates to 2,190,000,000 gallons per year that are called on to be conserved as a part of the overall strategy. To put that number into perspective, the current average annual production for Water Resources is 4,428,337 gallons. The City of Edmond Water Resources department is leading the way in efforts to promote conservation of water resources. Methods for water conservation, which also may improve water quality, will be discussed in this report.

STAKEHOLDER MEETINGS

Two public input stakeholder meetings were held regarding Green Infrastructure in March, 2009 and March, 2010. The purpose of these meetings was to gain additional input from knowledgeable staff and other outside sources, and to further refine our conservation goals for the community.

The first meeting (Appendix A) was facilitated by Edward Macie, a nationally recognized Urban Forestry specialist with the USDA Forestry Service. He has nearly 25 years of experience in urban forestry, and for the past 17 years has directed the Southern Regional Urban Forestry Program for the Forest Service. A major focus for Ed's work has been on the effects of urbanization and public policy on forest ecosystems.

The second meeting (Appendix B) was opened up to discussion with the public, developers, and new stakeholders alike. The goal for the meeting was to communicate the information that we had gathered, and the goals and direction of the initiative, as well as gain additional input for next steps. An overview of Green Infrastructure concepts was reintroduced, and the Composite Map and Table Results from the first Stakeholder Meeting were shared.

“WHY” GREEN INFRASTRUCTURE

Infrastructure (n): the substructure or underlying foundation on which the continuance and growth of a community or state depends.

Many communities have come to realize the benefits of focusing strategically on land use, where green infrastructure is considered just as much a part of development as other utility infrastructure. The value of GI is that it supports the landscape and ecological balance. It supports our culture and quality of life, improving public health and air quality. It promotes bicycle and pedestrian connections, and creates an integrated network of complimentary systems. It can be built into routine architectural practices, and in cases, significantly reduce construction costs. It protects our watersheds, and makes beautiful places, adding to the value of property.

This base map of an Edmond neighborhood below shows the grey infrastructure, including buildings, paved roads and parking lots (left). High-resolution aerial photographs add a green infrastructure data layer (trees and other vegetation) (right). Through the City’s planning efforts, a trail has been built connecting the public with this corridor of green space, which in turn connects Fink and Hafer parks. This has been constructed behind one of the largest commercial sectors within the City, providing recreational, natural, and scenic relief to the urban core’s busy streets.



Studies have shown that a lack of planning, coupled with the effects of urbanization on populations can be harmful to the environment and human health. The following is a list of potential effects.

- Poor Water quality
- Poor Air quality
- Loss of wildlife habitats
- Loss of working lands
- Forest fragmentation, invasive species
- Increased soil erosion
- Sedimentation impacts in streams
- Depletion of groundwater
- Higher incidence of flooding
- Increased wildfire risks
- Impaired aquatic life
- Trees viewed as hindrance

Green infrastructure (GI) involves foresight, political will, and a persistent effort on the part of the City, although it should be said that Green Infrastructure is not a government program. While the City can lead, this concept relies on all sectors of the community, including voluntary contributions from private landowners. This is an organizational strategy that provides a framework for planning conservation. Like any planning effort, green infrastructure calls for tradeoffs among priorities and interests.

PROTECT, PRESERVE, RESTORE

The population for the City of Edmond has grown from 68,315 to 81,405 from the year 2000 to 2010. This reflects a 19.2% increase from the year 2000. If expansion of the human network is inevitable, how will we manage its impact? The first step is to understand how the natural system functions, and then we must understand the human network. The refined, overarching Goals of the Green Infrastructure (GI) initiative are to:

1. Encourage the use of Conservation Easements.
2. Conserve or restore forest lands or open space in Edmond.
3. Preserve and protect floodplain and watershed lands.
4. Continue implementation of the City's trail plan, with specific suggestions.
5. Make provisions for trail access on conservation easements, whenever possible.

As stated over and over in plan documentation, Edmond has a long standing and deep rooted tradition in environmental and health awareness. Edmond's GI will serve the community by promoting human interactions with the environment, while managing our natural resources. Understanding the following four focus areas should provide further evidence toward the importance of these goals.

- Environmental Services
- Water Resources
- Air Quality
- Wildlife Resources

This section will discuss the four areas and address why they are important to our community, indicating supporting data. The following section will describe additional analyses that this committee has undertaken, exploring alternatives for reaching our goals – to protect, preserve, or restore.

ENVIRONMENTAL SERVICES

While the scope of human interaction within the natural environment is extremely broad, this section discusses two distinct areas. These areas are, maximizing positive interactions with nature, and the preservation of cultural landscapes.

Maximizing Positive Interactions with Nature

Green Infrastructure will help provide essential environmental services to Edmond. Extensive studies link the environment to your mental and physical health. Research conducted on physical health issues such as obesity, ADHD, and respiratory health repeatedly indicate that access to and utilization of green spaces helps to reduce the occurrence, severity, or likelihood of these health issues.

The following facts are taken from the Oklahoma Health Equity Campaign and the Oklahoma Physical Activity and Nutrition Program. These reports contain additional supporting data for the goals set forth in Green Infrastructure.

Oklahoma Health Equity Campaign

The *Oklahoma Health Equity campaign* is a public engagement partnership of twenty-three Oklahoma county health departments, the Oklahoma State Department of Health, and the National Association of City and County Health Officials (NACCHO).

OKLAHOMA ranks at the bottom of the national health rankings, according to the United Health Foundation (49th) and the Commonwealth Fund State Scorecard (50th).

OKLAHOMANS suffer more unhealthy days (mentally and physically) than adults nationally with suicide being the most common type of violent death according to the 2008 State of the State's Health Report.

OKLAHOMA consistently ranks among the lowest states in the consumption of fruits and vegetables and is ranked as the 8th most obese state.

Oklahoma Physical Activity & Nutrition Program

The Oklahoma State Department of Health Chronic Disease Service, in cooperation with the Centers for Disease Control and Prevention, created the *Oklahoma Physical Activity & Nutrition Program* (OKPAN). OKPAN was formed to help Oklahoma build state capacity to address the issues surrounding obesity and obesity-related chronic diseases across the lifespan and develop a physical activity and nutrition state plan to coordinate and inform further efforts on the topic. The OKPAN Taskforce developed strategies in five Focus Areas; one area being physical activity.

Physical activity improves health and well being for Oklahoman's of all ages. When performed on a regular basis, physical activity substantially reduces the risk of dying from heart disease, the leading cause of death in Oklahoma. When performed on a daily basis it also reduces the risk of colon cancer, diabetes, high blood cholesterol, high blood pressure and obesity.

OKPAN lists several physical activity objectives under Community and the Environment. These strategies should be considered as Edmond strives to maximize positive interactions with nature. The strategies include:

1. Create development that is pedestrian and transit friendly by allowing a mix of land uses and increased density where appropriate.
2. Suggest that zoning regulations support the creation and maintenance of green space and public parks.
3. Maintain and improve parks and playgrounds to address safety issues and aesthetics.
4. Maintain and develop programming and facilities for active play and recreation.

Preservation of Cultural Landscapes

Edmond spans two distinct **eco-regions**, as defined by the Environmental Protection Agency (Figure 1, p 12). The east side of Edmond is within the “Northern Cross Timbers” while the western portion of town is in the “Cross Timbers Transition”. Understanding, preserving, and enhancing these eco-regions is important to maintaining the natural beauty of our city and the health of our environment.

Eco-regions are defined as general purpose regions that are critical for understanding and implementing ecosystem management strategies. By recognizing the spatial differences in the capacities and potentials of ecosystems, eco-regions stratify the environment by its probable response to disturbance.⁵ According to the EPA, some differences in water quality between lakes can be explained by ecoregions. Here is one early description of the Cross Timbers ecoregion:

“We spent the morning in one of the most beautiful stretches of forest that I have ever seen. There were magnificent, sparsely scattered trees and twenty varieties of climbing plants, some bright green and others delicately shaped and turned red by the frost. The entire wood seems to burst with many colors of autumn. The ground was covered with thick waves of horse-bean plants, forming an impenetrable, tangled carpet lifted up but not pierced by the underbrush..”⁶

Parts of Edmond retain good examples of this ancient ecosystem. The value of this cultural and environmental resource within the City cannot be understated, for study and for the other intrinsic benefits that have been well-documented. The “Cross Timbers are a complex mosaic of upland forest, savanna, and glade...Cross Timbers is one of the least disturbed forest types left in the United States..” and contains some of the last virgin North American hardwood forest.⁷

This ecosystem, however, has been greatly impacted by influences such as overgrazing, changes in fire pattern, woody species invasion of prairie areas, urban development, agriculture, and oil and gas production.

The benefits of preserving, or restoring these forests will improve air quality, help to protect and preserve water quality and supply, provide stormwater management and hazard mitigation, preserve biodiversity and wildlife habitats, and provide additional opportunities for outdoor recreation and conversing with nature. They should not be considered a hindrance to development, but an opportunity for development. The City emphasizes that importance by employing two urban forestry staff.

A snapshot of Edmond (**Figure 2**) on pg 13 shows the areas that were potentially old growth forests during the Sensitive Area Studies. While we understand that not all can be saved, this valuable ecosystem that exists within Edmond’s city limits currently has no formal plan or practice to ensure its survival.

⁵ Ecoregions – a geographic framework to guide risk characterization and ecosystem management: Environmental Practice Bryce, S.A., Omernik, J.M., and Larsen, D.P., 1999

⁶ On The Western Tour With Washington Irving: The Journal and Letters of Count de Pourtales. G.F. Spaulding, University of Oklahoma, 1832

⁷ The Ancient Cross Timbers Consortium for Research, Education, and Conservation: from the Tree-Ring Laboratory, University of Arkansas, 2003

CITY OF EDMOND

CROSSTIMBERS TRANSITION and NORTHERN CROSSTIMBERS

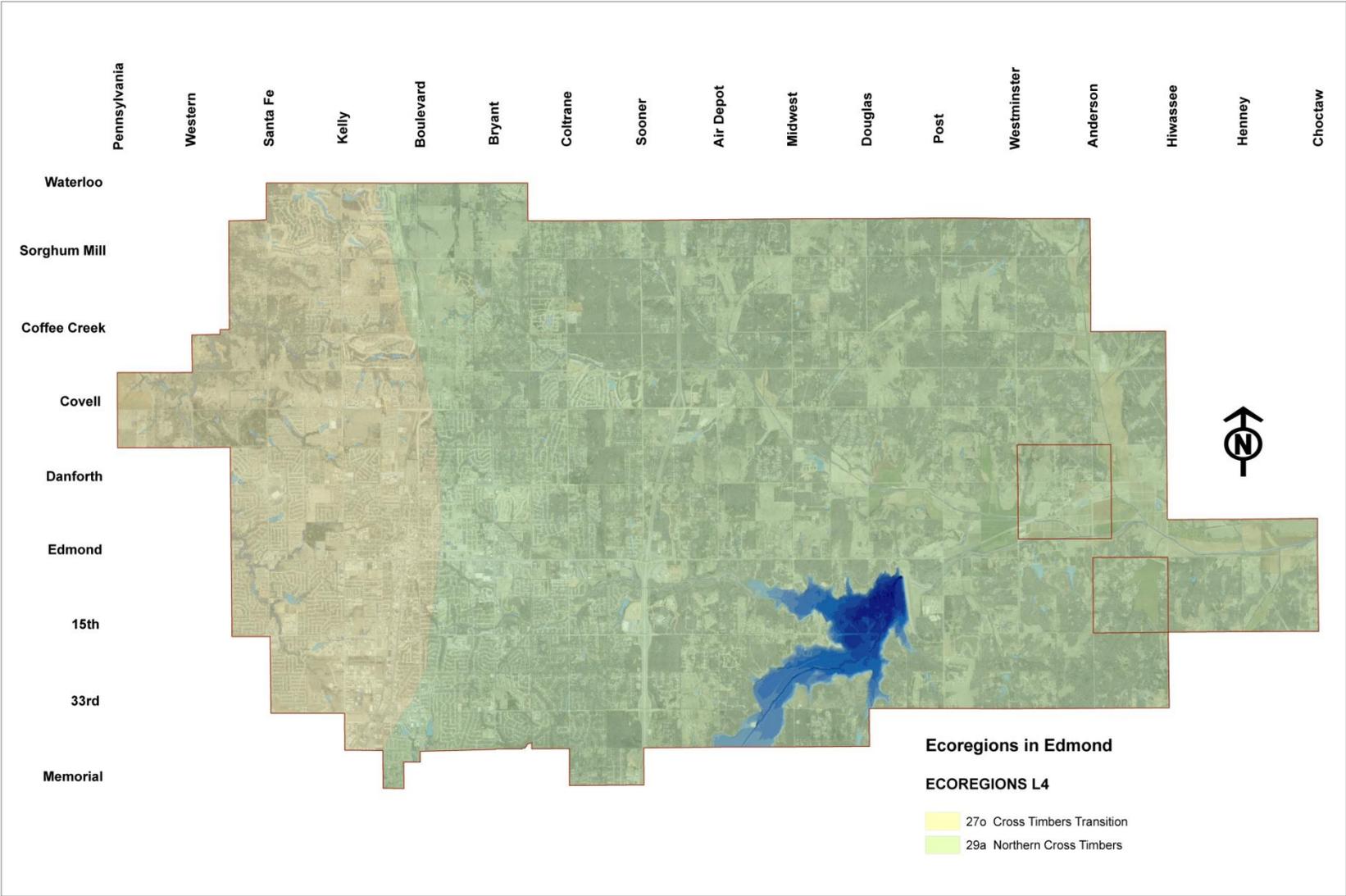


Figure 1

CITY OF EDMOND POTENTIAL REMNANT FOREST & ECOREGIONS

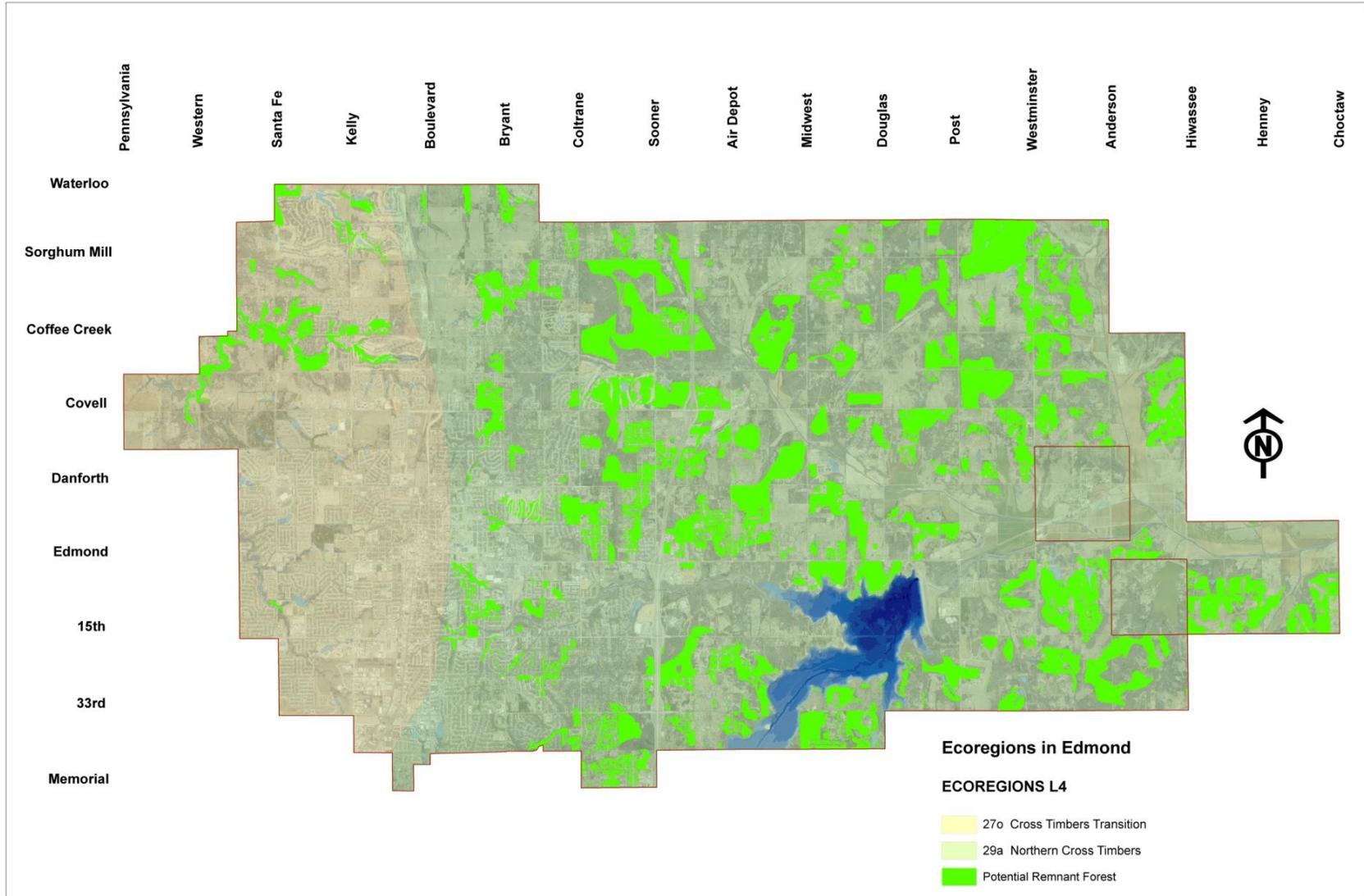


Figure 2

WATER RESOURCES

Water Quality

Water resources include both the quality of water, and practices for conservation and water reuse. Water quality can be broken down into two separate goals, restorative goals and preventative goals. Restorative goals focus on restoring water resources that are currently degraded, while Preventative goals focus on preventing healthy or fairly healthy water resources from becoming degraded.

Restorative Measureable Goals:

- Removal from **DEQ 303(d) list**⁸
- Monitor water quality testing results to see any improvement
- Achieve healthy macroinvertebrate and fish populations where currently poor

Preventative Measureable Goals:

- Maintaining healthy fish and macroinvertebrate populations
- Lack of inclusion on DEQ 303(d) list
- Monitor water quality testing results to notice any troubling data

Both of these measurable goals can be achieved through the same implementation methods. One important method is to prevent stormwater from coming into contact with pollutants. This is achieved by infiltrating stormwater on a site instead of piping it across hard surfaces where it picks up pollutants. This practice is known as Low Impact Development (LID).



Two examples of visible pollutants in the City of Edmond

A strong public education and outreach program is also needed to convey the message and encourage participation among developers, engineers, contractors, homebuilders and homeowners. The establishment of riparian buffers along creeks that are not within the FEMA 100 year floodplain can provide beneficial filtering to reduce many pollutants. These types of buffers are in place in several Oklahoma communities.

⁸ The 303(d) list is considered the state's official list of impaired waters. The US Clean Water Act requires states to develop lists of water bodies that do not meet water quality standards and to submit updates to the U.S. Environmental Protection Agency every two years.

The waterbodies denoted with red in the map below have been designated impaired water bodies within the City of Edmond. At the time of this report the State’s official 303(d) list for 2010 is pending approval by the USEPA Region 6.

IMPAIRED WATER BODIES Oklahoma Dept of Environmental Quality

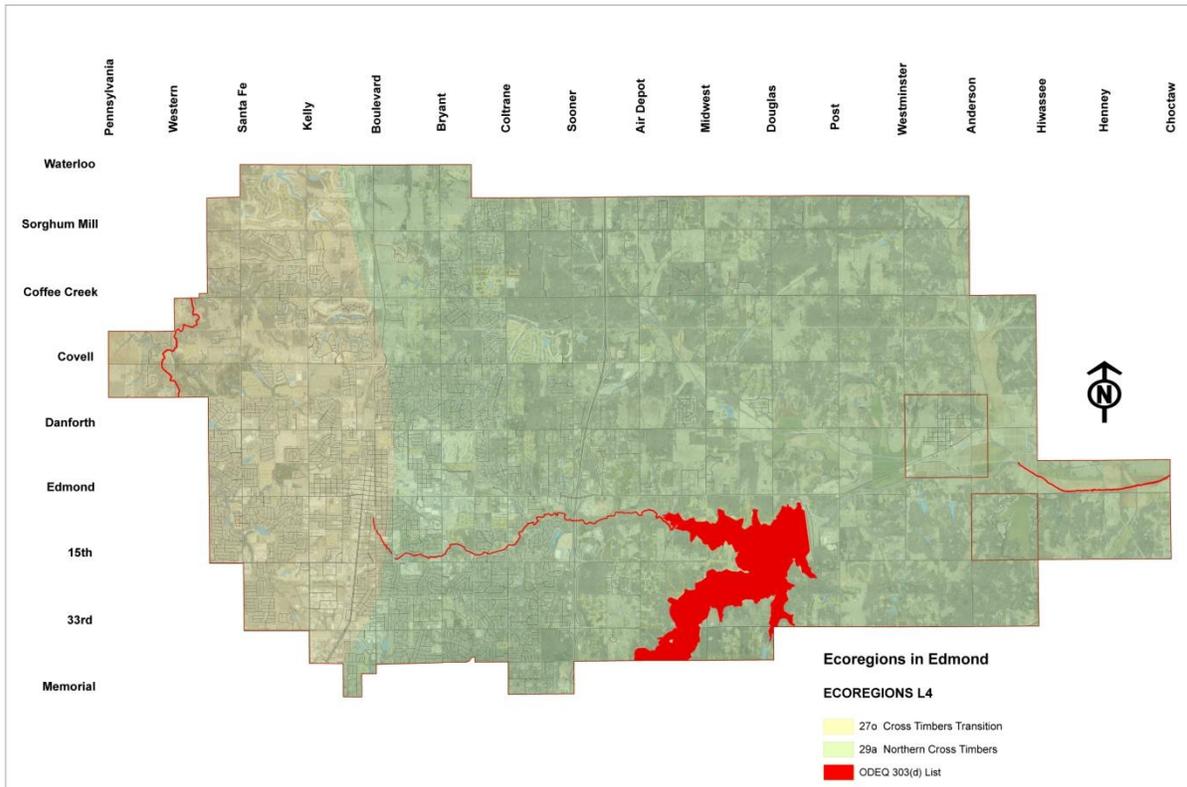


Figure 3

Specific Data on Edmond’s Watershed Health

Spring Creek

This highly urbanized watershed is currently listed on the 303 (d) list for an E. Coli impairment. A recent Blue Thumb Report⁹ on Spring Creek also indicates that the stream lacks a diversity of macroinvertebrates and fish typically found in streams in this ecoregion.

The report sites poor erosion control practices and higher flows as the contributing factors to the decline in species diversity. This waterbody is an ideal target for restorative action. E. Coli impairments can be caused by several sources including; sanitary sewer overflows and leaking septic systems.

⁹ Online resource: http://www.ok.gov/conservation/Blue_Thumb/index.html

Chisholm Creek

This watershed only flows through a small portion of western Edmond, but is also listed on the 303 (d) list for Nitrates and Enterococcus. Nitrates are primarily caused by overuse of fertilizers and human waste.

Coffee Creek

This watershed is characterized by some residential development but is largely rural in nature. However, a Blue Thumb report from 2007 states that the overall score for the fish community was a “D”. More specifically, this score means that top carnivores and many expected species were absent or rare while omnivores and tolerant species were dominant. The biological assessment of fish and macroinvertebrates indicate that the stream is beginning to have trouble. Life is there but could be better if it was more diverse and had pollution sensitive organisms. This waterbody would be an ideal target for preventative action.

Arcadia Lake

This waterbody is one source of Edmond’s drinking water and is also a popular recreation spot. It is also listed on the DEQ 303 (d) list for Turbidity and Chlorophyll (algae related). Suspended sediment is a major cause of turbidity. Sediment can come from a variety of sources such as construction sites, accelerated stream bank erosion, cropland erosion, and natural erosion. This waterbody would be an ideal target for restorative action.

Deep Fork River

Arcadia Lake drains into the Deep Fork River. The Deep Fork River has recently been listed on the 303 (d) list for Enterococcus. Enterococcus is a type of bacteria and can enter waterways by sanitary sewer overflows and leaking septic systems.



Two examples of severe stream bank erosion in the City of Edmond

Water Quantity

Water quantity and utilizing methods for conservation and reuse, addressed in the 50 year Water Supply Plan, are also considerably important. Conservation efforts can be addressed by the City, but it will be up to individual consumers to make the most difference. Those practices associated with LID are not only used in protecting water quality, but may also be used as part of the solution to assure a more plentiful supply of water for future generations. Notably, in Edmond the winter time average use of water is roughly 8.0 million gallons per day, while the summer time use is closer to 20.0 million per day.

The graphic below was taken from the 50 year Water Supply Plan to demonstrate the importance of water conservation efforts. The Plan outlines several options for filling the projected gap in supply. The “Level 1” and “Level2” conservation options and alternatives for “Stormwater Beneficial Reuse” and “Non-Potable Reuse” are parts of that solution.

Figure 3-8 shows the peak day demand projection and projected supply mix for the City assuming no additional water supplies through the year 2060. Because peak day demands are 2.2 times higher than average annual, a supply gap is projected to be seen as early as 2020.

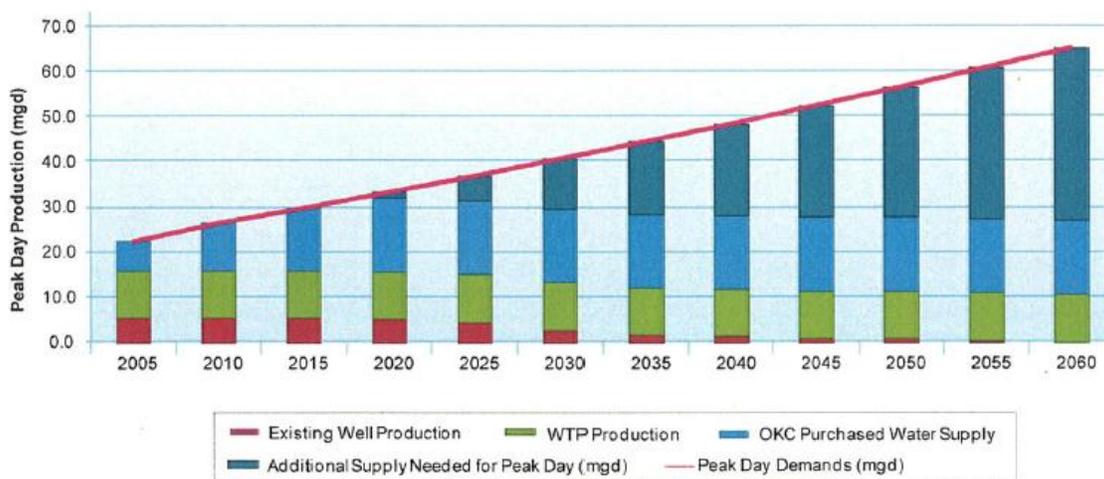


Figure 3-8
Projected Peak Day Water Supply for Edmond

LOW IMPACT DEVELOPMENT (LID)

A discussion about Water Resources would not be complete without a description of some low impact development practices. Low Impact Development is an innovative, ecosystem-based approach to land development and stormwater management. LID practices can help protect the natural hydrology of watersheds. Under natural conditions, about 75 percent of the water from each rainfall event is either intercepted by the forest and returned to the atmosphere, or infiltrated into the ground. The water that infiltrates is critical to maintaining the base flows of streams for fish and other aquatic life.

When land is developed with frequency, however, the volume and rate of water runoff is increased dramatically. This is because of increased impervious areas, such as roads, driveways and buildings. The loss of vegetation from development also decreases the amount of rainfall returning to the atmosphere

and the amount that infiltrates the ground. This increased volume of runoff and reduction in groundwater recharge erodes stream channels and degrades in-stream habitat. The amount of sediments and pollutants also increases, which further degrades the habitat.

The goal of LID design is to maintain the integrity of each watershed by maintaining the natural, pre-developed hydrology on each development site. An LID design creates a functional hydrologic landscape by maintaining natural drainages, like streams, and by using small-scale stormwater controls distributed evenly throughout the site. By doing this on individual sites, the overall watershed can be better protected. Common LID practices include the following.

Rainwater Harvesting

Water conservation techniques come in all shapes and sizes. Rainwater harvesting is a process that collects and stores rainwater from downspouts and rooftops for future use, watering lawns and gardens. There are two ways to collect rainwater, through a rain barrel and through a cistern. Generally a rain barrel is made using a 55-gallon drum, a vinyl garden hose, PVC couplings, a screen grate to remove debris and keep insects out, and other materials found at neighborhood hardware stores. Rain barrels can be constructed in a number of ways, but they all serve the same purpose — to collect rainwater and decrease the amount of stormwater runoff that leaves your property.

During the summer months it is estimated that nearly 40 percent of household water is used for lawn and garden maintenance. A rain barrel collects water and stores it for those times that you need it most — during the dry summer months. Using rain barrels can help homeowners lower water bills, while also improving the vigor of plants, flowers, trees, and lawns. Cisterns also collect rainwater but on a much larger scale and have the ability to hold thousands of gallons of water for reuse. Cisterns can be placed above or below ground.



Rain Barrel for Residential Use



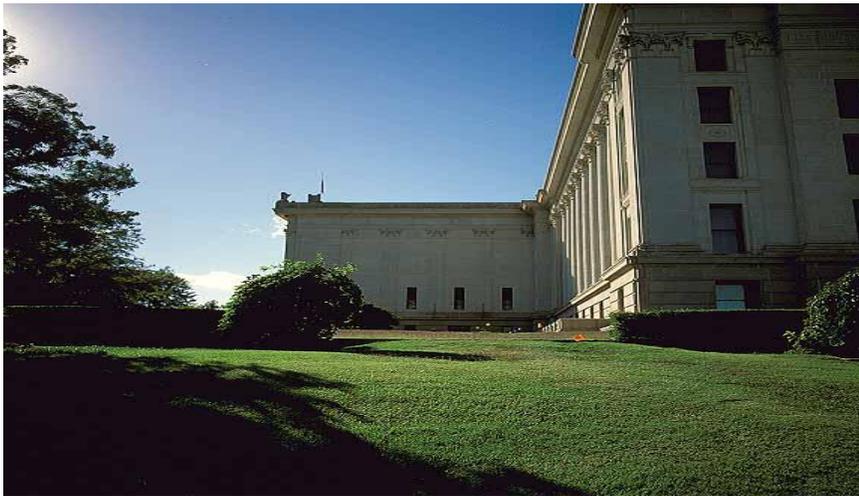
Cistern for Larger Facility (Bickham-Rudkin Park)

Permeable Pavements

Permeable pavements provide alternatives to standard asphalt and concrete, which are completely impervious surfaces. Permeable pavements allow water to infiltrate or pass through them and ultimately reduce runoff, recharge the water table, and remove pollutants. Several types of permeable pavements are available, including pervious concrete, pervious asphalt, permeable pavers, concrete grid pavers, and plastic reinforced grass pavement. These permeable pavements are appropriate for a variety of uses, such as driveways, pedestrian walkways, overflow parking areas, parking lots, and residential roads. Permeable pavements have also proved the test of time as applications in the New England states have been in place up to 30 years without problems.



Pervious Pavement Parking Lot at Oklahoma Federal Building



Grasspave on the SE corner of the Oklahoma State Capitol Building

Rain Gardens & Bioretention Cells

Rain gardens are beautiful natural landscape features that require less maintenance and fewer chemicals than lawns. Rain gardens capture runoff from impervious areas such as roofs and driveways and allow it to seep slowly into the ground. Most importantly, rain gardens help protect nearby streams and lakes by reducing the amount of runoff and filtering pollutants.

Rain gardens provide for the natural infiltration of rainwater into the soil. This helps to filter out pollutants including fertilizer, pesticides, oil, heavy metals and other chemicals that are carried with the rainwater that washes off your lawn, rooftop and driveway.

Rain gardens also reduce peak storm flows, helping to prevent stream bank erosion and lowering the risk for local flooding. **One award-winning neighborhood design for Ventana Lakes in Houston reduces the 100-yr peak discharge by 52%, while providing 71% amenity lots, saving \$5 million in development costs, and meeting all of their lot count targets¹⁰.**

By collecting and using rainwater that would otherwise run off your yard, rain gardens allow you to have an attractive landscape with less watering in addition to providing habitat for wildlife. Bioretention cells are very similar to rain gardens; just on a larger scale and they can sometimes have underdrains in them to handle larger quantities of water. While rain gardens are generally used in a residential setting, bioretention cells are used in both parking lots, commercial and residential developments.



Bioretention Cell in Parking Lot



Rain Garden on Residential Lot

¹⁰ Edminster Hinshaw Russ and Associates, Low Impact Development Design Competition 2009-2010, Houston, Tx
<http://houstonlwsforum.org/LowImpactDevelopmentDesignCompetition2009-2010.html>

Green Roofs

Green roofs are systems that are comprised of various types and forms of vegetation that are placed on traditional rooftops. The terms living roof and vegetative roof are terms also used to describe the same system. Green roofs typically consist of a number of layers: a waterproofing membrane, a drainage system, root protection, growing media (soil) and vegetation. Green roofs provide numerous environmental benefits and offer a valuable tool for integrating storm water management. Green roofs retain rainfall from small, frequently-occurring storms by storing rainfall in the soil. In turn, this water is lost to evaporation or transpiration by plants. For larger storms, the runoff volume and peak flow rate is reduced because of percolation and temporary storage in the soil. Recent studies show green roofs reduce annual stormwater runoff by 50-75 percent while preventing atmospheric pollutants from entering the stormwater system. Simultaneously, these vegetative roof systems intercept solar radiation and act to cool the building during summer, reducing the air conditioning costs by between 25-75 percent.



Green Roof on St. Louis Community College
Source: (www.greenroofs.com)



Green Roof on St. Louis Community College
Source: (www.greenroofs.com)



Green Roof on the National Weather Center
University of Oklahoma
Photo by Reid Coffman



Tulsa Lofts Green Roofs
Tulsa, Oklahoma
Photographer Unknown

Riparian Buffers

A riparian or forested buffer is a vegetated area along a shoreline, wetland, or stream where development is restricted or prohibited. The primary function of aquatic buffers is to physically protect and separate a stream, lake, or wetland from future disturbance or encroachment. If properly designed, a buffer can provide stormwater management, and can act as a right-of-way during floods, sustaining the integrity of stream ecosystems and habitats. As conservation areas, aquatic buffers are part aquatic ecosystem and part urban forest. EPA scientists studying buffer effectiveness have found that to maintain maximum effectiveness, buffer integrity should be protected against soil compaction, loss of vegetation, and stream incision. “Maintaining buffers around stream headwaters will likely be most effective at maintaining overall watershed water quality”. Finally, EPA also states that “creating ordinances and zoning to protect existing buffers will likely be cheaper than creating new buffers or restoring degraded ones.”



The Strum Buffer, Story County, IA

Source: (www.buffer.forestry.iastate.edu)

Photo by Tom Schultz



The Strum Buffer, Story County, IA

Source: (www.buffer.forestry.iastate.edu)

Photo by Tom Schultz

LID Cost Comparisons

An additional consideration when discussing LID approaches to stormwater management is the large potential for reducing overall project costs. In the vast majority of cases in the U.S., the EPA has found that implementing well-chosen LID practices has resulted in cost savings for developers, property owners, and communities while protecting and restoring water quality. In one study, examples provided were selected on the “basis of the quantity and quality of economic data, quantifiable impacts, and types of LID practices used.”¹¹ Note that not all projects use the same techniques in Table 1.

Table 2 illustrates a summary of cost comparisons between conventional and LID approaches.

¹¹ Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices, United States Environmental Protection Agency, EPA 841-F-07-006, Prepared under Contract No. 68-C-02-108, December 2007

Table 1
LID Techniques

Name	Biore-tention	Cluster Building	Reduced Impervious Area	Swales	Permeable Pavement	Vegetated Landscaping	Wetlands	Green Roofs
2 nd Avenue SEA Street	✓		✓	✓				
Auburn Hills	✓		✓	✓		✓	✓	
Bellingham Parking Lot Retrofits	✓							
Central Park Commercial Redesigns	✓			✓				
Crown Street	✓		✓	✓				
Gap Creek			✓			✓		
Garden Valley	✓	✓		✓	✓		✓	
Kensington Estates		✓	✓		✓	✓	✓	
Laurel Springs	✓	✓	✓	✓				
Mill Creek		✓	✓	✓				
Poplar Street Apartments	✓			✓			✓	
Portland Downspout Disconnection*			✓					
Prairie Crossing	✓		✓	✓		✓		
Prairie Glen	✓	✓	✓	✓		✓	✓	
Somerset	✓			✓				
Tellabs Corporate Campus	✓			✓		✓	✓	
Toronto Green Roofs								✓

Table 2
Summary of Cost Comparisons Between Conventional and LID Approaches¹²

Project	Conventional Development Cost	LID Cost	Cost Difference ^b	Percent Difference ^b
2 nd Avenue SEA Street	\$868,803	\$651,548	\$217,255	25%
Auburn Hills	\$2,360,385	\$1,598,989	\$761,396	32%
Bellingham City Hall	\$27,600	\$5,600	\$22,000	80%
Bellingham Bloedel Donovan Park	\$52,800	\$12,800	\$40,000	76%
Gap Creek	\$4,620,600	\$3,942,100	\$678,500	15%
Garden Valley	\$324,400	\$260,700	\$63,700	20%
Kensington Estates	\$765,700	\$1,502,900	-\$737,200	-96%
Laurel Springs	\$1,654,021	\$1,149,552	\$504,469	30%
Mill Creek ^c	\$12,510	\$9,099	\$3,411	27%
Prairie Glen	\$1,004,848	\$599,536	\$405,312	40%
Somerset	\$2,456,843	\$1,671,461	\$785,382	32%
Tellabs Corporate Campus	\$3,162,160	\$2,700,650	\$461,510	15%

¹² Not all projects listed in Table 1 could be displayed in the format of this table for Table 2. Negative values denote increased cost for the LID design over conventional development costs. Mill Creek costs are reported on a per-lot basis.

AIR QUALITY

It cannot be understated that the fundamental nature of good stewardship is the wise use of scarce resources, and the assurance that the health and well-being of future residents is taken into account. The best way to determine the wisest use of our resources is through an open market economy, but adhering to plans that take into account affordability, mobility, community cohesion, and environmental impact.

Transportation directly impacts the well-being of our residents through the associated impacts of increased traffic. At the time of this report Central Oklahoma is an air quality *attainment* region. This means that we are in good standing with the Environmental Protection Agency (EPA) under the National Ambient Air Quality Standard (NAAQS). A designation of *non-attainment* would result in many negative economic, health and quality of life impacts for our region. Aside from the associated negative effects of such respiratory diseases as asthma, chronic bronchitis, and emphysema, a status of non-attainment would obligate our region to undertake several federally mandated actions that would result in an increased financial burden for local residents, businesses, and government.

Due to the expense of most major transportation projects, localities have need of federal matching funds to make improvements for their transportation systems. A status of non-attainment would require the region's transportation improvement programs to undergo a conformity evaluation before any projects could receive federal funds in order to ensure that planned improvements will not negatively impact the future air quality of the region.¹³

Consequently, modes of alternative transportation are encouraged when using federal funds. Encompass 2035 states, *"To encourage walking and biking, additional safe and secure sidewalks and bike trails are needed."*¹⁴

Also, as stated by the US Department of Transportation Secretary Ray LaHood, we need to *"..transform the way transportation serves American people by creating more choices and encouraging less carbon-intensive transportation, and we are working hard on that challenge.."*

By providing planning support for a diverse range of mobility options such as transit, automobiles, bicycling, and walking, the City hopes to present a range of transportation opportunities for its citizens.

Green Infrastructure offers a partial solution to some of these challenges. Encouraging voluntary conservation easements allows for the preservation of natural resources and sensitive areas. Among those considerations are forested areas as well as open space. Conservation easements also allow space for potential recreational activities such as trails, walking/biking paths and parks. Trees have many benefits, which won't be restated here, but perhaps the most relevant service they perform in the case of air quality is to help mitigate some of the impacts of increased traffic through the natural absorption of excessive CO₂.

In Oklahoma air quality impacts are measured by the Oklahoma Department of Environmental Quality, and Edmond will use those measurements to follow the regional impact of development. Locally, we can measure the impact of our own actions using two methods. I-Tree software is a suite of tools developed by the USDA Forest Service. It will help quantify the benefit of community trees and their associated environmental services. The other method will be to measure our own energy efficiency in fleet and all public facilities, quantifying the associated greenhouse gases (GHG). The following website may also be used for the general public to follow air quality trends in the United States: <http://www.airnow.gov/>.

¹³ 2030 OCARTS PLAN REPORT, Association of Central Oklahoma Governments, 2005

¹⁴ Encompass 2035 Long Range Plan, Association of Central Oklahoma Governments, 2011

WILDLIFE RESOURCES

Located on the edge of the Cross Timbers forest ecosystem, Edmond has historically shared its landscape with many different species of trees, herbaceous plants, forest, prairie and aquatic wildlife. With the expansion of development and disappearance of green spaces, the habitat for creatures large and small has become fragmented, potentially isolating them with no place to live and making it difficult to navigate across the landscape. Just like the trees along Edmond's streets and in parks, wildlife helps hold together the native ecosystem, maintaining the delicate balance of biodiversity that encourages healthy green spaces.

With the expansion of human impact on green spaces, several conservation issues have arisen. Because wildlife species are very specialized and have unique needs for population survival, it is important to consider potential ways to address these issues when possible. Conservation issues (provided by Oklahoma Department of Wildlife Conservation) include:

- Fragmentation and isolation of native habitat into smaller tracts
- Increase in eastern red cedar above historic conditions due largely to fire suppression
- Spread of exotic plant species that displace native vegetation
- Conversion of native grasslands into pastures dominated by exotic grasses
- Clearing of native oak and riparian woodlands and forests - replaced with exotic trees

Through green infrastructure, not only is the balance of surrounding rural green space enhanced, but the health of the urban environment for both people and Oklahoma's native wildlife can be improved.

Benefits of wildlife habitat for the Edmond community include:

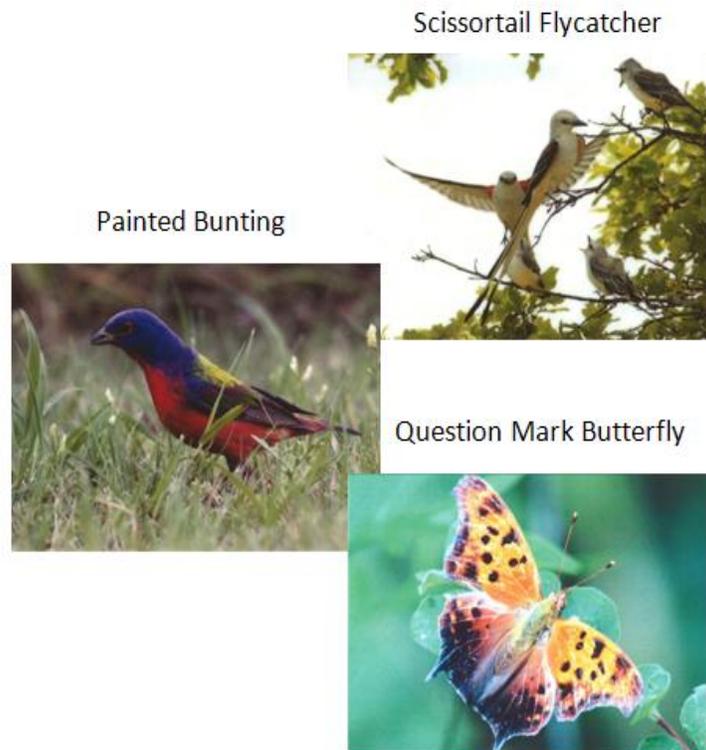
- Preservation of Edmond's natural beauty
- Improved environmental health of the native landscape, including biodiversity
- Improved air quality with the use of native plants and natural landscapes
- Reduction of costly yard maintenance practices for the City, such as mowing
- Improved quality of life for Edmond residents and wildlife
- Deepened understanding of nature and increased connection to the natural world
- Allows space for natural groundwater infiltration
- Improved water quality through reduced use of chemical fertilizers and pesticides

Goals related to the value of wildlife habitat in the Edmond community include:

1. Promote the preservation of forested lands and prairies through the Site Plan and Plat process.
 - a. **Justification:** Natural areas within developed Sites provide corridors for travel by wildlife, which prevents forcing them onto streets and areas of vehicular travel. Not only is plant life crucial, but native species of plants provide substantial value in maintaining wildlife populations. Natural areas provide food, water, cover and places to raise young which contribute to a thriving, biodiverse, and thereby healthy urban ecosystem. Large areas of undisturbed green space also provide optimal conditions for many species that cannot thrive on small tracts of land.
 - b. **Measurement:** This goal may be measured by the acreage of areas planned for preservation in the Site Plan and Plat Review process.

2. Creation of a voluntary wildlife habitat program

- a. **Justification:** Creation of wildlife habitat in previously developed areas will provide new sources for food, water, cover and places to raise young for displaced, native wildlife. Use of native plants meets the needs of local wildlife more effectively than many of the exotic, ornamental plants used today. Some species rely on plants such as native warm season grasses in their habitats. A voluntary program with large emphasis on education can increase public knowledge of urban environmental health, a greater sense of connection to the natural environment, and a sense of community within neighborhoods and public spaces.
- b. **Measurement:** This goal may be measured by the number of individuals who obtain wildlife habitat certifications through the National Wildlife Federation.



Photos taken in Edmond

Species that are listed endangered for Oklahoma County, according to the Oklahoma Natural Heritage Inventory, are the least tern and the black-capped vireo. Species of special concern that may be threatened with extirpation are the Texas horned lizard and the barn owl.

Some species of special interest that reside here in Edmond include the summer tanager, painted bunting, Texas horned lizard, Delaware skipper, eastern box turtle, question mark butterfly, western kingbird, gray fox, black and white warbler, great horned owl, red shouldered hawk, least tern, and barn owl.

For more information on threatened species in Oklahoma, contact the Oklahoma Biological Survey.

ADDITIONAL ANALYSES

In 2010 three additional analyses were done regarding sensitive areas, using Geographic Information Systems (GIS). The purpose of these studies was to gain additional insight on areas for potential conservation and/or restoration.

Analysis I – Defining a Green Infrastructure Network

The first study is in three parts. The first part uses similar criteria to the Sensitive Area Studies created for the City in '03 and '04. The second part superimposes the sensitive areas criteria with undeveloped land, and the third part compares that with work done in the first Stakeholder Meeting.

Sensitive land types considered were potential pre-settlement remnant forests, prime farmland, and areas of archeological interest. To add additional weight, also considered were parcels of land owned by the City, parcels where there is a tree stand greater than or equal to one acre, and land where there is a flood zone, surface water, and/or impaired water. The locations of schools, the Edmond Trails Plan, and the urbanized area as defined by the 2000 US Census were also used to determine whether there would be an immediate educational or recreational value to the population.

The Urbanized Area shown in Figure 4 serves many purposes in both the public and private sectors. It constitutes the largest and most dense area of settlement, and therefore is effective in determining where a potential project would most benefit the urban population. For example, the Federal Government has used UAs to calculate allocations for transportation funding.¹⁵

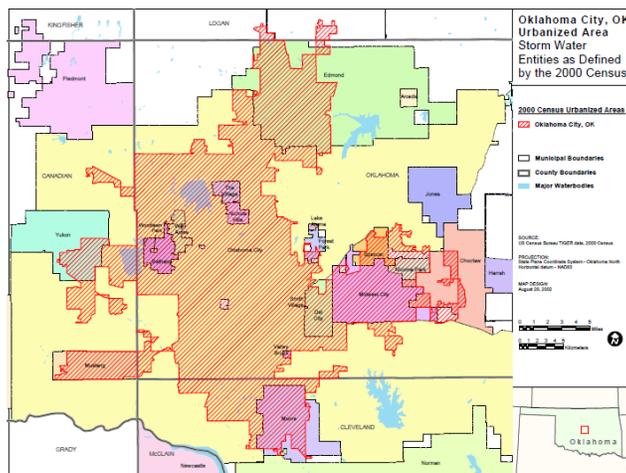


Figure 4

¹⁵ Storm Water Phase II Final Rule, US Environmental Protection Agency, Office of Water, EPA 833-F-00-004 Fact Sheet 2.2, revised December 2005

Part 1

To start, the City was split into a grid of 4 ½ acre tracts of land. These relatively small acreages provide enough area to capture multiple criteria, and they provide more manageable areas for potential site development considerations. Tracts were selected that intersect with the criteria listed below in Table 3. This GIS layer is called the Composite Value Grid (CV Grid).

A basic point system was set up so that a composite score could be obtained for each 4 ½ acre tract. Each tract was given 1 point for every time that land area intersected with a criteria. The composite score for each tract can help determine preferred areas for preservation or restoration. For example, one 4 ½ acre tract might be potential remnant forest, in a flood plain, and have proximity to the trail plan. This tract would have a total score of 3 points. These criteria can be changed, or the point scale changed, if at such time it is determined that one criteria should hold more weight than another.

Table 3

Composite Values Criteria	Points City-Wide
City Property	347
Prime Farmland	11315
Tree Stands Greater than 1 acre	5240
Potential Remnant Forest	4603
Potential Archeological Artifacts	1024
ODEQ Impaired Water 303(d)	680
100 yr Flood Plain	4860
Surface Water	6713
Proximity to School	106
Proximity to Trails Plan	1765
Urbanized Area	4323

This data shows that there is a large amount of prime farmland and surface water within the City of Edmond. Soil types were garnered from the US Department of Agriculture, Natural Resources Conservation Service. Notably, many land tracts may be in the 100 year flood plain where development is prohibitive, and many may be working farms.

Part 2

The second part of this analysis was an assessment of the **undeveloped land** within the City of Edmond. For this analysis, undeveloped land is defined as that which is currently not subdivided, or it has a current use that would favor conservation efforts. The land status is always changing, but it can be used to narrow the search for areas that would most readily be protected or restored.

The amount of undeveloped land at the time of this report (2011) is approximately 28,721 acres, subtracting the surface area of Arcadia Lake. Table 4 separates the undeveloped land into Zoning categories, and other pertinent land holding descriptions.

Table 4

Landuse	Description or Zoning Classification ¹⁶	Acres of Undeveloped Land
Agriculture	G-A	11,650 acres
City-Owned*	Owned by City of Edmond (includes golf course and parks)	1,527 acres
Commercial	CBD, D-1, D-2, D-3, D1NRC, E-1, E-2, E-LU, L-3, L-4, L-5, PUD	1,213 acres
Corp of Engineers	Land owned by Corps	2,156 acres w/o surface area of Arcadia Lake
Flood Zone	100 Year Flood Plain (FEMA)	4,426 acres
Detention Areas	Homeowners Associations	399 acres
Industrial	E-3, F-0, F-1, F-1-A, F-1-B, F-2	501 acres
Office	D-0, PUD	155 acres
Residential	A, B, C-1, C-2, C-3, DRD, L-1, L-2, PUD, R-1, R-2, R-2-A, R-3	6,694 acres

The first map on the following pages shows areas of Edmond that are considered undeveloped (Figure 5). The second map shows the 4 ½ acre grid tracts from the CV Grid where the cumulative score of 3 or more, **and** where they are still in an **undeveloped area** (Figure 6).

Using the Undeveloped Land and CV Grid layers in GIS, we can superimpose the two and determine where conservation or restoration opportunities lay in sections of Edmond that are undeveloped.

The composite score of 3 or more was used because it provided more areas to consider, while scores of less than 3 covered too much area to provide a discernable result.

¹⁶ Title 22 Zoning Ordinance - City of Edmond, Oklahoma

* When calculating acreage, City property took precedence over flood plains when the two intersected. There are no overlapping polygons. 100 Year Flood Plains were given precedence over every other type of landuse when calculating the acreage.

CITY OF EDMOND UNDEVELOPED LAND

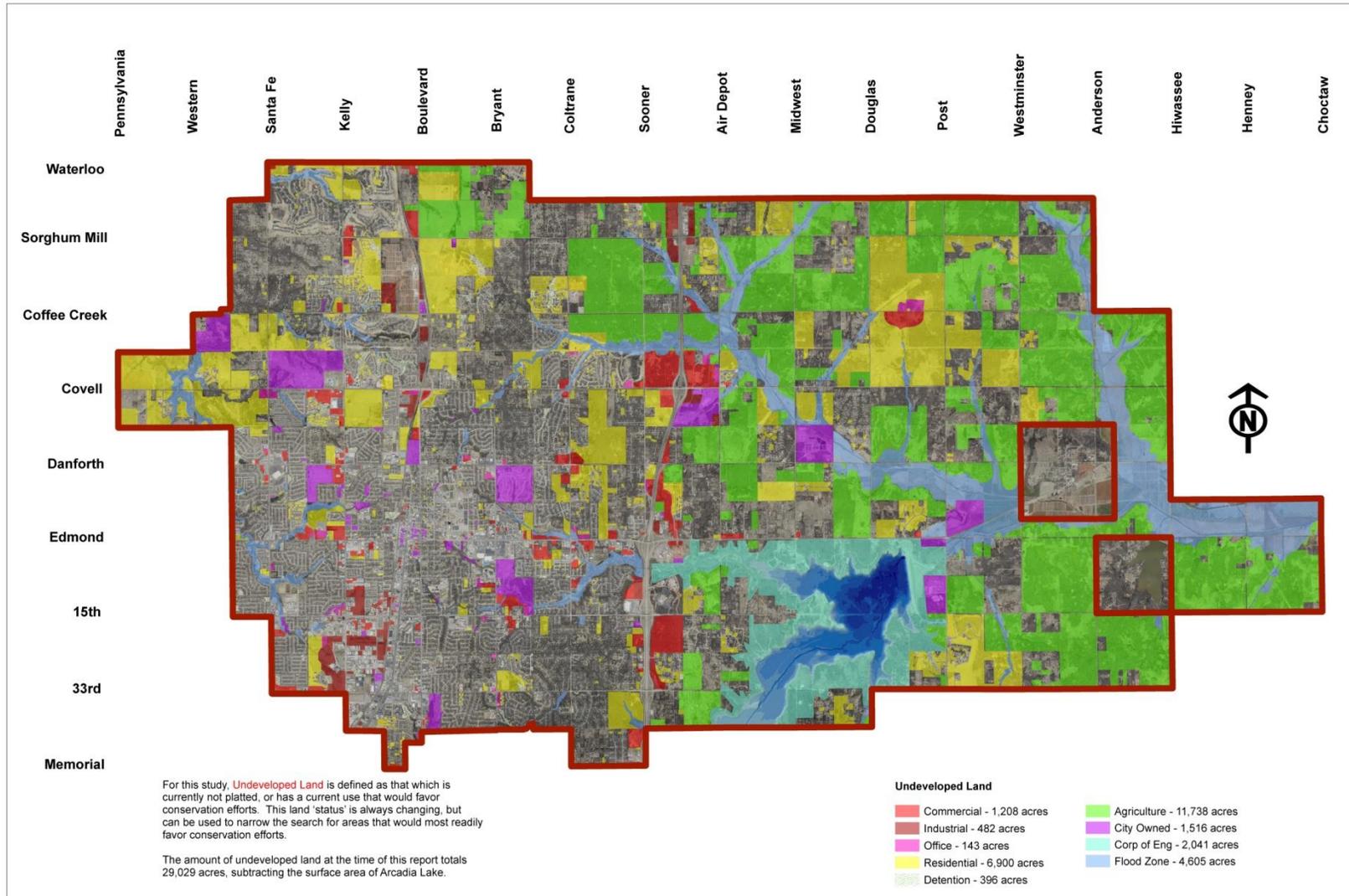


Figure 5

CITY OF EDMOND COMPOSITE VALUES (3 or more)

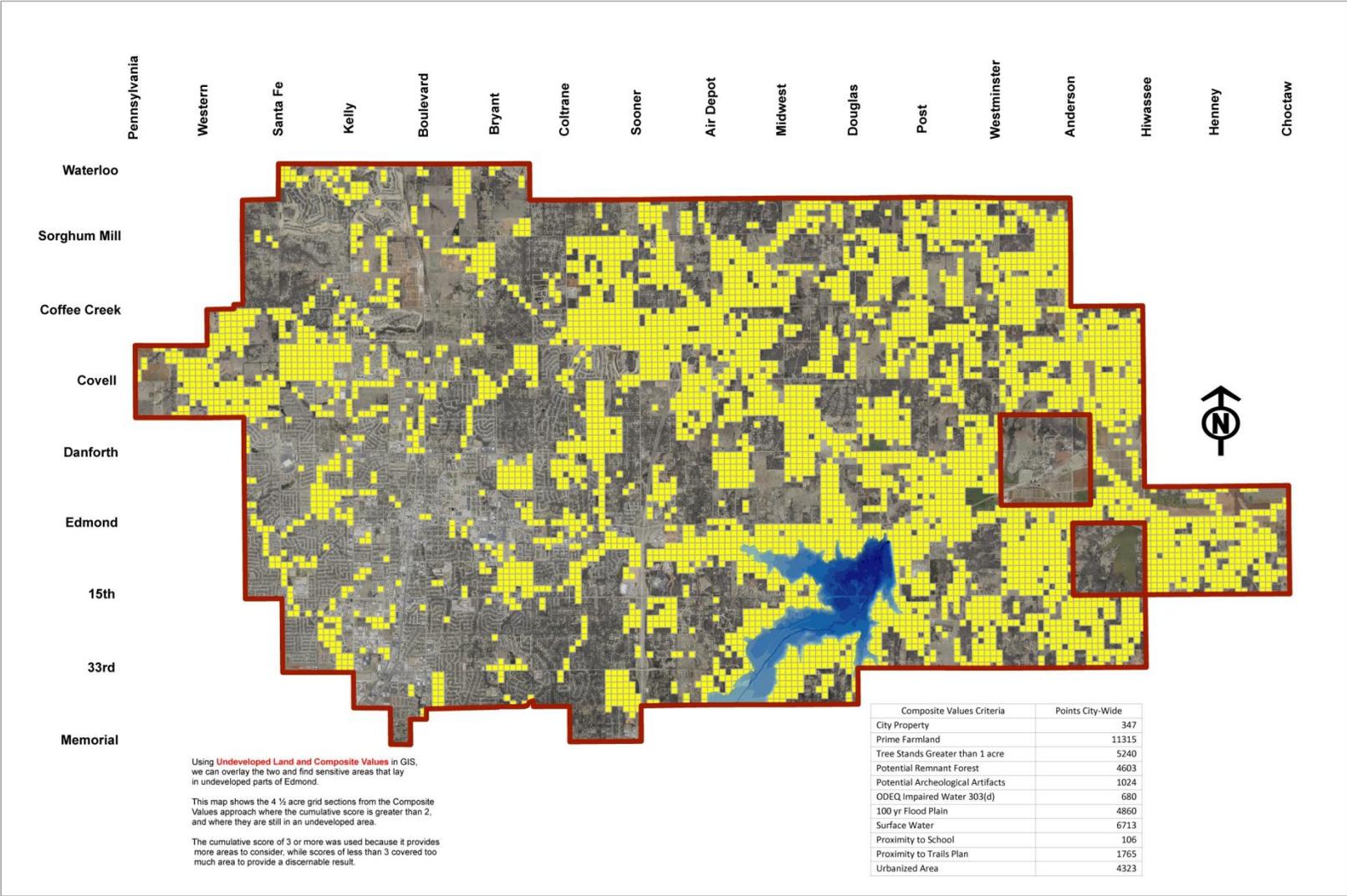


Figure 6

Part 3

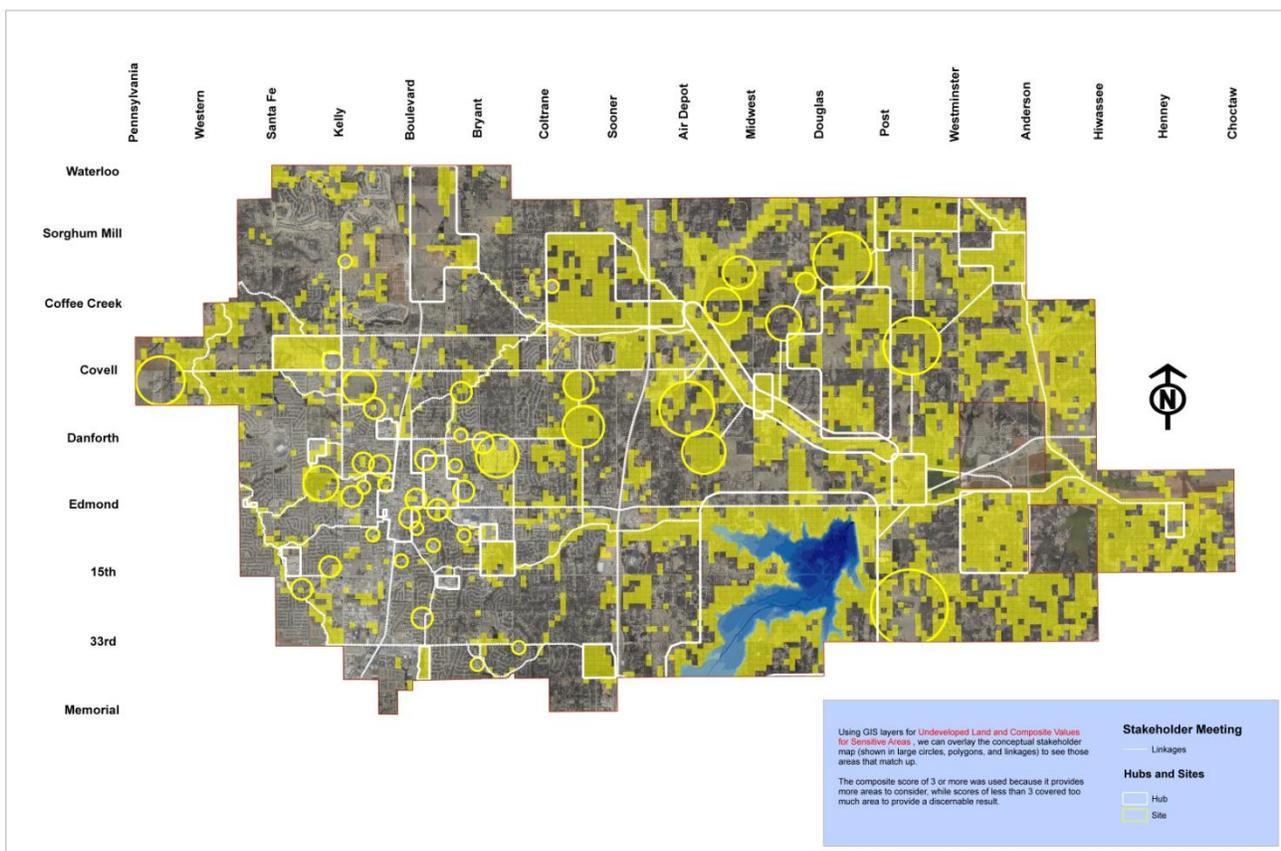
During the first Stakeholder meeting there was an exercise where participants were asked to produce their own concept for potential areas to consider in a Green Infrastructure network. They were asked to consider the design objectives, landscape and ecological features, the network elements, priorities, and other data layers to inform the process. The group split up into five groups and was each given a working map on which to draw.

The working maps contained a 2009 aerial underlay, potential remnant forests, the master trail plan, our parks, schools, and flood zones. Other reference maps were available on the walls, including: Zoning, Plan IV Ordinance map, Prime farmland and Remnant forest, Watershed basins, Population density, and Hydrology.

Independently, the groups identified potential hubs, links, and sites across the city. Draft networks were drawn in consideration of those areas that were deemed strategically important, and/or critical. The exercise was intended to produce a “large picture” view from the participants.

The map below shows the combined results of the stakeholder exercise (large polygons, circles, and linkages), superimposed on the CV Grid. Many of the areas identified in the stakeholder exercise line up with the larger values of the CV Grid (shaded yellow). The resulting map is an illustration of how a GI network is formulated.

Composite Values for Sensitive Areas with Conceptual Stakeholder Map



Figure

Analysis II - Stream Buffer Analysis of USGS Blue Lines

The second study is a Stream Buffer analysis to see where those watersheds are located that are not currently protected by the 100 year FEMA flood plain. With the exception of some recreational uses, the City of Edmond does not allow development within the 100 year flood plain. This is for public health, safety, and general welfare, and to minimize public and private losses due to flood conditions in specific areas. These corridors provide a good example of where land might be restored or maintained to the natural benefit of the landowner and the City.

As previously stated, many communities have come to adopt ordinances that create riparian buffers along unprotected streams in order to further protect water quality and prevent stream bank erosion. Using USGS blue-line¹⁷ streams that lay outside the 100 year flood plain, and also that lay outside of parcels that are already developed, this analysis provides a detailed view of the many miles of watersheds that are still vulnerable.

This map shows the FEMA flood plains superimposed on a USGS topographic map (Figure 8).

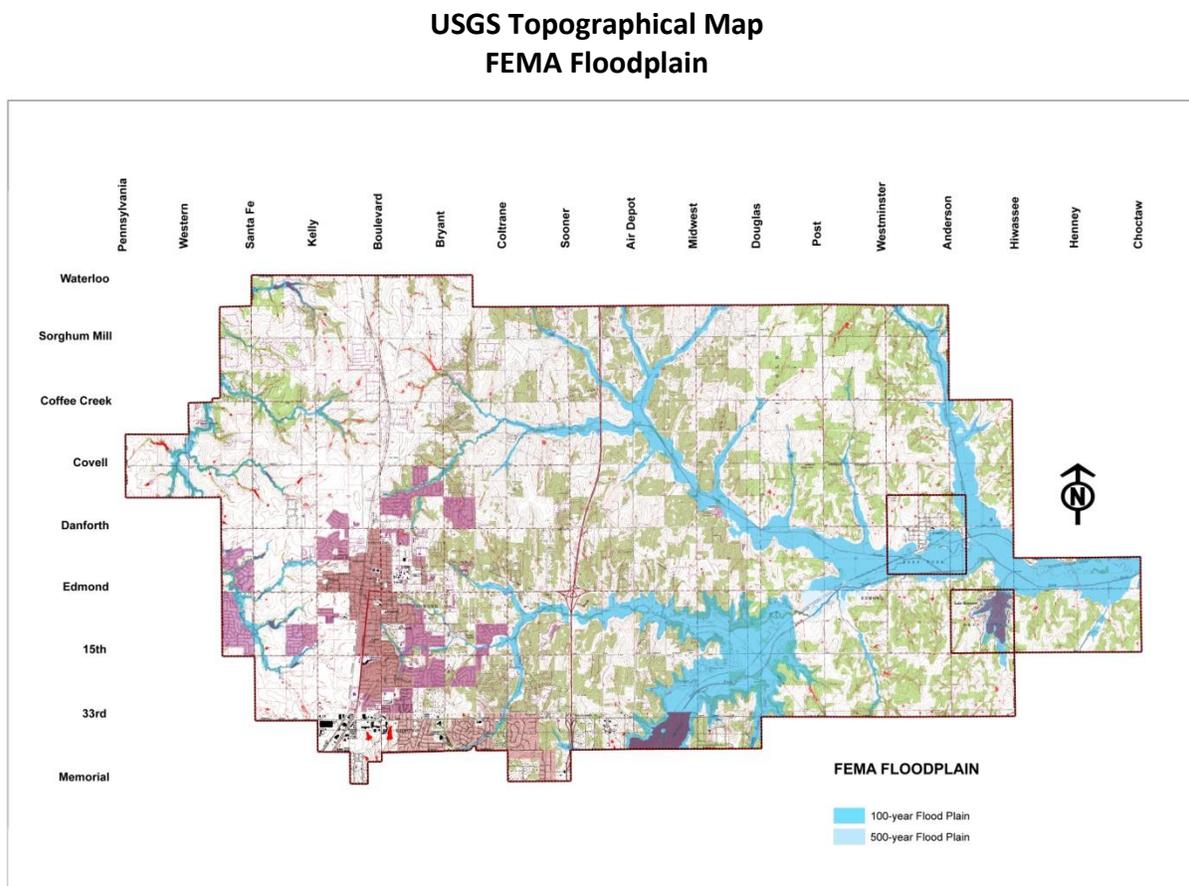


Figure 8

From this map (Figure 8) the blue-lines were matched with streams in the GIS hydrology layer. These were then used to determine which blue-lines were falling outside the protected flood plain.

¹⁷ The term “blue-line” refers to both perennial and intermittent stream classifications.

A separate layer was created for these blue-lines and, again, superimposed onto a map showing undeveloped land within the City of Edmond (Figure 9). So that those streams would be more visible, they are red in this representation. The analysis revealed that **134.5** miles of stream corridors remain outside of the 100 year flood plain, and run across undeveloped land.

Stream Buffer Analysis USGS Perennial and Intermittent Streams on Undeveloped Land

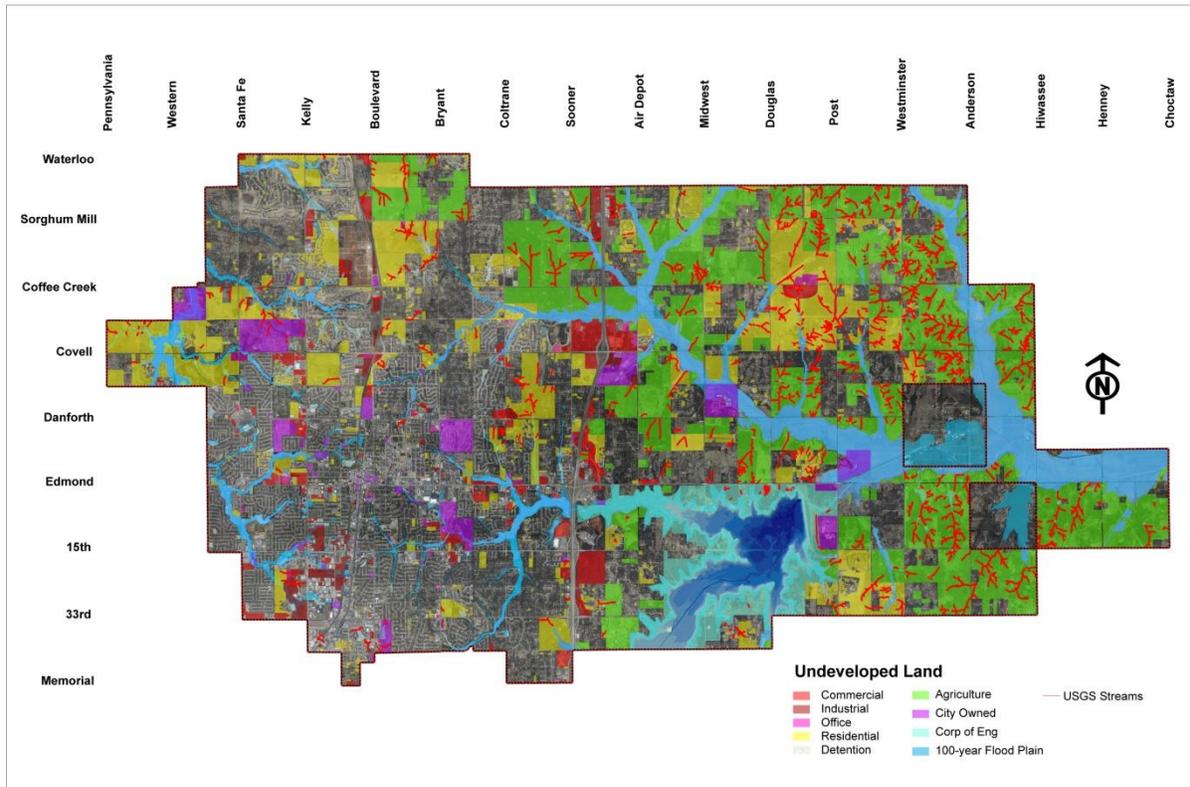


Figure 9

The results of this study, combined with those details of impaired waters (pg 15) and the CV Grid (pg 31), emphasize that the quality of water might be protected further upstream while accomplishing other GI Goals in the process. By encouraging more low impact development techniques for on site development and neighborhood development, and establishment of riparian buffers along these watersheds we can encourage the corridors and linkages that would create the most benefit.

Furthermore, the Oklahoma Department of Environmental Quality is currently considering requiring regulated communities, such as Edmond, to remove all barriers to LID within their city ordinances. This condition would be part of the next Small MS4 General Permit (OKR04)¹⁸. Currently, this permit is in draft phase.

¹⁸ Oklahoma Department of Environmental Quality Small MS4 Permit Fact Sheet:
<http://www.deq.state.ok.us/WQDNew/stormwater/ms4/index.html>

Analysis III – Biological Inventory by Oklahoma Biological Survey

One of the conclusions for the Sensitive Area reports in 2003 and 2004 was that sensitive areas in Edmond offered a “wealth of unique information and ecological benefits to the area.” It was recommended that next steps should focus on “continuing to learn more about these areas and their function, as well as codifying Edmond’s commitment to their conservation.” One of the ways in which Edmond has approached this recommendation is to work with the Oklahoma Biological Survey (OBS), so that we might better understand the sensitive ecosystems that exist within Edmond. As stated in the Sensitive Area reports: “..conservation of potential remnant (forests) can serve as a focal point for tree conservation.”

In 2010 two properties were identified in Edmond for further study. These two areas are planned for future growth, so it was determined that a study of these sites might provide an immediate benefit for those developments. With the owner’s consent, OBS surveyed the areas shown on the map below (Figure 10).

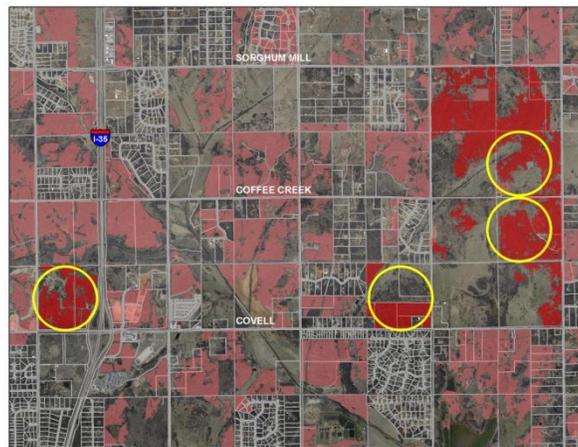


Figure 10

The map shows existing tree stands greater than or equal to one acre in size. The dark red tree stands represent the study area, and the circles represent those areas where sample data was taken. An evaluation was performed on the impact of fragmentation and the edge effect. Also, a comparison was taken of field data to ranked timber observations provided by the initial General Land Office (GLO) Public Land Surveys completed in 1873. Finally, a qualitative assessment of the ecological character for the various survey sites was used as an example for how sensitive areas might be characterized in future site analysis.

In conclusion, the basis for comparison between field data and the GLO surveys proved to be difficult because of the relative scale of the two surveys. Trees were identified in the older study that were not found in this exercise. Among the observations was that blackjack oak and post oak were dominant among the species at the forest edge, and had approximately the same ratio as elsewhere in the study. This observation and the fact that larger diameters of trees were found along the forest edge, suggested that the edges were well established. The “larger value for average diameter contributes to a larger basal area for edge trees, which is consistent with previous research on edge effects in fragmented forests.”

This study and the qualitative measures described within may be used for future assessments, though the extent to which those measures will be used has not yet been determined. The full report may be obtained through the City of Edmond, Urban Forestry division.¹⁹

¹⁹ Richard Thomas, *An ecological assessment of Cross Timbers Remnants in Edmond, OK* (Oklahoma Biological Survey, 2010)

RECOMMENDATIONS (following page: listed by Departments Responsible for Implementation)

The following is a list of recommendations, resulting from the findings in this report.

- A. Trail Study: Update and prioritize Trails Plan based on the findings in the GI Study, and the locations of schools, parks, population/square mile, and recommendations from other stakeholder groups.
- B. Convey the GI Report results to the Parks department, and consultants for the Parks Master Plan and Downtown Master Plan, with specific Site recommendations for greenways and park locations.
- C. Modify the Plan Assessment Form to include considerations that are a part of the Sensitive Area Conservation Assessment (Plan IV) form, to be signed and dated by the City's Planning and Urban Forestry staff for each proposed development, awarding points for those considerations.
- D. Evaluate a Riparian Buffer Ordinance for streams identified in this Study.
- E. Use the Composite Value (CV) Grid map, Stakeholder Exercises, the Trail Plan Map, and Stream Buffers to make suggestions for updates to the Plan IV Ordinance.
- F. Add a staff member from the Engineering Stormwater division to the Site Plan team.
- G. Create a procedure for contacting property owners to discuss potential trail extensions.
- H. Create a procedure for pre-plat meetings with developers prior to their paying for the plat.
- I. Set up an email communiqué with the Edmond Land Conservancy for relevant Site Plans or Plats.
- J. To encourage conservation and restoration, create a pamphlet and/or video for all applicants for development to describe the benefits of Conservation Easements, Low Impact Development (LID) techniques, Riparian Buffers, and the Trail Plan.
- K. Create an online informational site for developers and citizens, describing LID techniques and benefits.
- L. For the purposes of LID, review the City municipal codes and remove all barriers to LID to ensure coordination across all development codes, and explore ways to incentivize.
- M. Explore other options for reforestation, or open space, and coordinate with the Urban Forestry Commission, Parks, and the Edmond Land Conservancy.
- N. Use the Composite Values grid for alternatives and further assessment as development continues.
- O. Implement a Street Tree Program and pursue funding sources, including private investment.
- P. Market green initiatives to attract green investment, and sponsor educational workshops.
- Q. Host an LID Design Competition for a Planned Unit Development (PUD), and explore other ways in which the City can lead by example.
- R. Create a voluntary Backyard Wildlife Program, and explore opportunities for a Nature Park.
- S. Establish Private/Public partnerships to help fund green initiatives, with name recognition at the Site.
- T. Encourage Conservation Subdivisions, such as cluster housing, as defined in Edmond Plan IV, where physically feasible and financially appropriate.
- U. Embrace the GI recommendations as part of Energy Efficiency and Resource Conservation Measures.
- V. Inventory: Water quality data for selected water bodies.
- W. Inventory: City-owned forest mitigation sites
- X. Inventory: City actions taken to apply low-impact development techniques
- Y. Inventory: Tree canopy and associated greenhouse gas mitigation
- Z. Inventory: Miles of existing trails, park area, and other conservation areas

RECOMMENDATIONS - Listed by Departments Responsible for Implementation

	Recommendations	Planning	Urban Forestry	Engineering	Parks	Marketing
A	Trails Plan Updates	x				
B	Relay GI Findings to Plan Consultants	x			x	
C	Plan and Sensitive Area Assessment	x	x			
D	Riparian Buffer Evaluation	x		x		
E	Plan IV Ordinance Updates	x				
F	Add Stormwater Quality Specialist to SPRT ²⁰			x		
G	Communicating Potential Trail Extensions	x			x	
H	Add Pre-Plat Meetings	x				
I	Communiqué with the ELC	x				
J	Applicant Informational Packet	x	x	x		x
K	Online Informational Site	x	x	x		x
L	Review of Municipal Codes	x		x		
M	Restoration Opportunities	x	x		x	
N	Composite Values Grid	x				
O	Street Tree Program		x			
P	Marketing and Workshops	x	x	x	x	x
Q	LID Design Competition	x		x		
R	Backyard Wildlife Program		x			
S	Private/Public Partnerships		x		x	
T	Conservation Subdivisions	x				
U	Include Green Infrastructure in EERCM ²¹	x				
V	Inventory - Water Quality Data			x		
W	Inventory - City-Owned Forest Sites	x	x			
X	Inventory - City Actions Applying LID	x	x	x	x	
Y	Inventory - Tree Canopy and GHG Mitigation	x	x			
Z	Inventory - Miles of Trails and Park Areas	x				

²⁰ SPRT – Site Plan Review Team

²¹ EERCM – Energy Efficiency and Resource Conservation Measures

APPENDIX A

Stakeholder Meeting 1

March 27th – 28th, 2009

Stakeholder Input – Exercise 1

The stakeholders were asked to identify Edmond's five most important ecological, environmental, social, or cultural considerations (issues) that would benefit or be enhanced with the implementation of green infrastructure. The following are the individual group comments, and then, a condensed list. The exercise was relatively quick, and was intended to produce the basic, or elemental, responses from the participants.

Group 1

Arcadia Lake – Water Resources – Recreation/Open Space Asset
Route 66 & I-35 Corridors – Image for the City and Density Planning
Comprehensive Strategy for Trees – Remnant Forest – Preservation and Reforestation
Connectivity through Parks and Trails
Mngmt/Protection of Floodways/Floodplains

Group 2

Small Town "Feel"
Preserve and Expand Tree Canopy / Preserve working Farmlands
Water Quality and Quantity – Managing Downstream Impacts
Enhancement of Building Codes and Regulations
Open Space – Passive and Active Recreation – Health
Green Development – Sustainable Growth - Energy Conservation – Economic Growth

Group 3

Storm Water Quantity/Quality
Green Space / Trails
Remnant Trees / Conservation
Quality of Life: Balanced Growth – Keeping Sense of Community
Educational Opportunities
Regional Co-op – Context Matters
Creek Banks – "Space" for Elbow Room

Group 4

Availability of Quality Water – Use / Need vs Conservation
Landscape Preservation – Scrape/Replace vs Retention – Site Specific Topography
Connectivity of Community – Trail System, Connected Green Spaces
Break Auto Habit – Mass Transit / Other Alternatives – Reduction of Carbon Footprint
Encourage Downtown as a Hub
Encourage Sustainable Development

Group 5

Sense of Community

Preservation of Open Space – Expand Tree Canopy and Preserve working Farmlands

Recreation / Sports / Health

Consideration of Utility Infrastructure Placement

Need for Stream Buffers – Floodplains

De-centralization of Water WasteWater Infrastructure

Condensed Response

This is what stakeholders identified as Edmond's most important ecological, environmental, social, or cultural considerations (issues) that would benefit or be enhanced with the implementation of a green infrastructure plan.

Educational Opportunities

Downtown as a HUB

Connectivity of Greenspace and Trails

Small Town Feel – Balanced Growth - Cultural/Historical Identity – Route 66 & I-35

Recreation/Sports/Health

Preservation of Open Space and Working Farmlands

Comprehensive Strategy for Tree Cover, Remnant Forest – Preservation / Reforestation

Stream Buffers – Management and Protection of Floodways - Functional and Aesthetic

Decentralization of Water/Wastewater Infrastructure

Storm water Quality/Quantity

Regional Co-op – Regionalized Storm Water – “Context Matters”

Building Codes and Regulations

Green Development – Sustainable Growth - Energy Conservation – Economic Growth

Break Auto Dependency – Mass Transit/Other Alternatives – Reduce Carbon footprint

Site Specific Topography – Scrape and Replace vs Retention

Additional Comments on Water Quality

- An opportunity is present with the city's DEQ stormwater permit requirements to encourage improvements in site planning and stormwater techniques, such as low-impact development and green infrastructure practices that best replicate pre-development hydrologic conditions. Some of the many benefits of reducing stormwater runoff include: fewer pollutants in receiving streams, recharge of aquifers, and the prevention of flooding.
- Under the Post Construction condition of the city's permit, the development of ordinances that require the use of additional Best Management Practices (BMPs) to prevent erosion and stormwater runoff is needed. Through the revision of zoning and subdivision codes to remove barriers to LID, conservation design, and other site design improvements, the protection of water quality can be achieved.

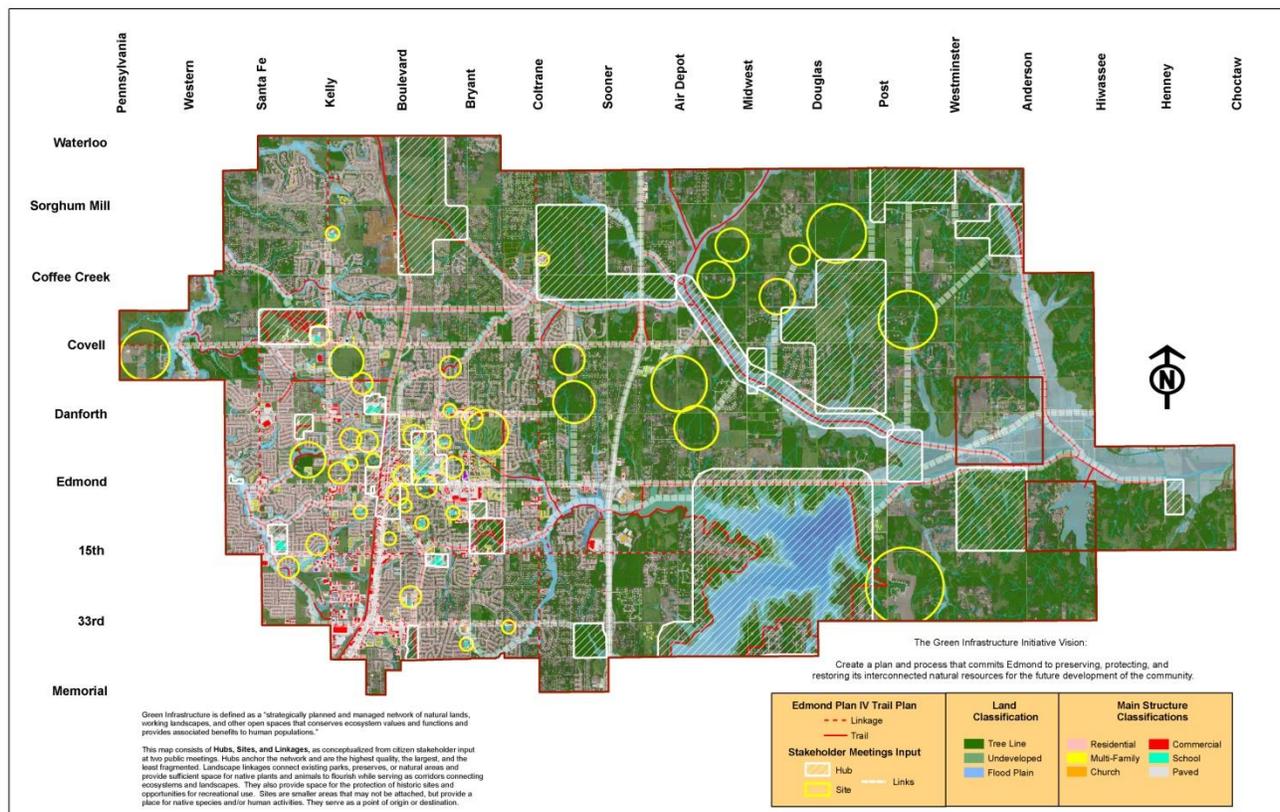
Additional Comments on Decentralized Wastewater Treatment

- Decentralized treatment of **wastewater** would call for much smaller facilities that are more economical to build and operate. The smaller footprint would be easier to blend into the background and keep the treatment process less visible.
- The latest technologies allow for “point of use” treatment. This means that the treated wastewater discharged from decentralized sites could be used at or near the wastewater origin point. This would reduce the amount and distance of piping required to get wastewater to a central location for treatment and then return treated wastewater back for irrigation and other potential **reuse**.

Stakeholder Input – Exercise 2

The following is a summary of the map results referred to in Figure 7 (pg 32). Stakeholders were asked to produce their own conceptual map for a green infrastructure network, identifying areas for hubs, links, and sites across the City. The map below is a graphical representation of this draft. The map shows structures and pavement in contrast to what is on the ground in more undeveloped regions. The graphical representations of white polygons, yellow circles and white lines are potential locations where there could be Hubs, Sites and Linkages.

GREEN INFRASTRUCTURE NETWORK CONCEPTUAL STAKEHOLDER MAP



Below is the table representation of the text that was pulled from our notes and flip charts. It gives a good idea of where priorities rest. For linkages, all of the groups mostly followed the floodplains, sidewalks and the Master Trail Plan, but there were some links that were atypical. Also, the corridors for I-35, Covell Parkway, I-44 Turnpike and Route 66 were identified.

Group 1 – A comment was made that there should be a hub in each quadrant of the City.

Hubs	Rational
Arcadia Lake	water quality, flood control, recreation and trails
New Park at Post Rd & Hwy 66	recreation, sports, health, trail plan, floodplains
Parkhurst Ranch	trail terminus, floodplain
I-35 and 33rd	remnant forest, trail linkage
Nature Center at Arcadia Lake	educational
Harper Ranch / Iron Horse	located North -Central, north trail link, floodplain
Mitch Park	located West Side , trail links, multi-use park
Downtown	cultural center, Community Center
Bickham – Rudkin Park	located South Side , multi-use park
Hafer Park	located in the Center , trail system connectivity

Group 2

Hubs	Rational
Arcadia Lake	water quality, flood control, recreation and trails
Mitch Park	located West Side, recreation, trails
Hafer Park	recreation, trails, watershed
Woodland Park Development	large acreage under single entity, opportunity to trade
Harper Trust Land	1600 acres under single entity
North of Quo Vadis	large remnant forest area
East of Robinwood Estates	trail plan, open space, remnant forest
Sites	
Parkhurst Ranch	70 acre prairie
Chitwood Farms	prairie land
UCO Campus	multi-use, centrally located, under one entity
Downtown Regional Detention	trail plan, potential for multi-use, impacted by large area
Bickham-Rudkin Park	recreation, sports, health, trails
All Smaller Parks	recreation, sports, health

Group 3

Hubs	Rational
Arcadia Lake	recreation, water quality, wildlife, remnant forest, trails
Softball Complex – New Park	recreation, sports, health, trail plan, floodplains
Harper Trust Land	remnant forest, close proximity to populated areas
Mitch Park	trails, wildlife, water quality, floodplains
Quo Vadis	remnant forest, trail plan
Hafer Park	recreation, parks, trails
Hiawassee - West	remnant forest, preservation, water quality
Centennial	remnant forest, school location, preservation
Coffee Creek	flood plain, prime farmland, trail plan

Group 4

Hubs	Rational
Community Parks	recreation, sports, health, trail plan
Arcadia Lake	recreation, water quality, wildlife, remnant forest, trails
Soccer Fields, Ballpark & Golf	recreation, sports, health, trail plan
University of Central Oklahoma	multi-use, centrally located
Downtown	cultural center, Community Center
High Schools	educational
Parkhurst Farm	working farmland
Sites	
All Public Schools	educational
Nature Center at Arcadia Lake	educational
Old Schoolhouse	educational
Neighborhood Parks	recreation, sports, health
Salyer – 2500 N Kelly	prairie land
Regional Detention Sites	trail plan, potential for multi-use, water quality

Group 5

Hubs	Rational
Downtown	cultural center, Community Center
University of Central Oklahoma	multi-use, centrally located
Buell Hollis Pecan Grove	centrally located, historical significance, cultural value
Mitch Park, Pelican Bay	recreation, sports, health, trail plan
Ball Fields	recreation, sports, health
Arcadia Lake	recreation, water quality, wildlife, remnant forest, trails
Route 66	historical significance, economic value, sensitive lands
Centennial School	remnant forest, school location, preservation
Sites	
Bickham – Rudkin Park	recreation, sports, health, trails, strategic location
Service Blake Soccer Complex	recreation, sports, health, trail plan

Implementation Notes

We must match available resources to the network needs. There are many pieces of different sizes, shapes and purposes. They will be stitched together to create a functional whole by a diversity of people, tools, agencies and organizations. We must work together to accomplish our common goals.

We should consider policy, practices, and programs of all scales. A multidisciplinary approach should be used across all ownerships at the local, regional, state (and perhaps multi-state) levels. We will need to use specific

Tools to align with **Ownerships**, and in turn line these up with our **Network** goals.

Network will be designed by:	Land Ownership will include the following:
<ul style="list-style-type: none"> Objectives 	<ul style="list-style-type: none"> Private
<ul style="list-style-type: none"> Hubs, corridors, cores, sites 	<ul style="list-style-type: none"> Public
<ul style="list-style-type: none"> Priorities 	<ul style="list-style-type: none"> Local
<ul style="list-style-type: none"> Opportunities and urgencies 	<ul style="list-style-type: none"> State
	<ul style="list-style-type: none"> Federal
	<ul style="list-style-type: none"> Institutional

Tools include the following:

- Physical applications on the ground.
 - Restoration
 - Constructed Wetlands
 - Buffers and Trails
- Public policy and regulation.
 - Planning and land use management
 - Development codes
 - Design standards
 - Storm water management
 - Vast array of federal regulation
 - Impact Fees
- Incentives
 - Tax incentives and estate management
 - Ecosystem services
- Conservation
 - Land acquisition
 - Transfer of development rights
 - Conservation easements

What Might This Look Like?

Tools Perspective

(Example)

	Local	State	Federal	Private
Land Acquisition	Fee Simple	Historic Preservation Easement	Farmland Protection Policy Act	Conservation Easement
Regulation	Buffer or Landscape Ordinance	Water Management Permitting	Endangered Species Act	Private Mitigation Banks
Incentives	Tax Incentives	BMPs	Wetland Reserve Program	Environmental Trading
Funding	Bonds	Open Space Funds	Transportation Enhancements	Land Trusts

Network and Objective Perspective
(Hypothetical Example)

	Programs	Practice	Policy
Hub A (Mitch Park)	Park Expansion	Park Restoration	
Hub B (Parkhurst Farm)	Conservation (Easement)	Agriculture and Forestry BMPs	Cluster Development Regulations
Corridor A (Spring Creek Trail)	Rails to Trails	Buffer Restoration	Storm Water Regulations

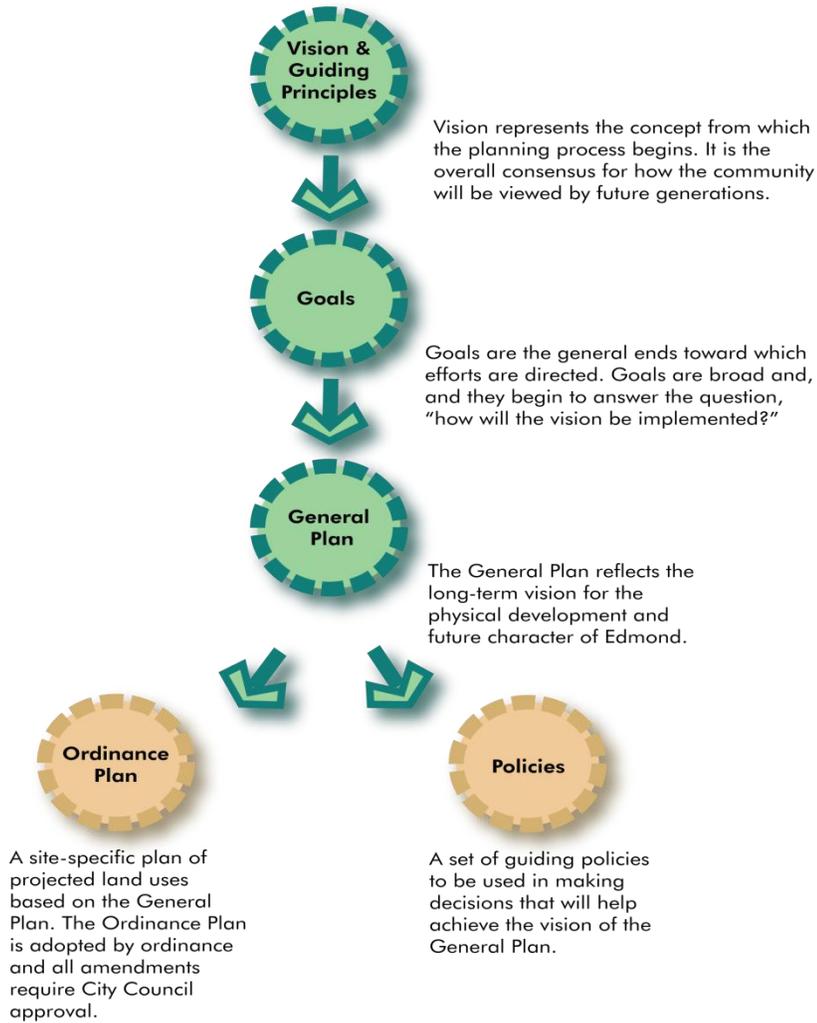
EDMOND PLAN IV

On the following pages are specific tables and passages copied from Edmond Plan IV, which explain Edmond’s different planning components, and how those components are used. The relationship between the Edmond Plan and Ordinances is shown in an illustrated graph. Also,

- Issues are identified from Edmond Plan IV, Chapter 2 that will impact the growth of Edmond.
- Table 8.1 provides a description of the General Plan land use categories.
- Goals and Policies of Edmond Plan IV are identified under ***Land use: Sustainability*** and ***Land Use: Environment***
- Implementation Tools are explained
- Appendix C from Edmond Plan IV illustrates a point system for *Sensitive Area Conservation Assessment*.

These tables are shown primarily to demonstrate that Edmond already has a backbone on which to build a Green Infrastructure network.

Plan Component	Definition	How it is Used
Goals & Policies	Goals are desired outcomes that support the community’s vision and guiding principles (as established by <i>Tomorrow’s Edmond</i>). Policies are intended to guide daily decisions to see that the goals of the Plan are achieved.	<ul style="list-style-type: none"> ■ Goals establish the foundation for the General Plan and Ordinance Plan. ■ Provides a basis for evaluating development proposals and other decisions to ensure consistency with Edmond Plan IV. ■ Provides the basis for the Plan Assessment/Amendment Forms used to evaluate development proposals.
General Plan	An illustration of the City’s long-range vision for future development (to 2030). Rather than parcel-specific land use, the General Plan identifies the development intensity and character desired for certain areas ranging from natural to urban center. The General Plan is coupled with future thoroughfares, the proposed trail system and local drainage basins to provide an overall image of anticipated growth in the City of Edmond.	<ul style="list-style-type: none"> ■ Establishes the anticipated and desired future character of Edmond. ■ Guides the Ordinance Plan by determining the desired development characteristics for specific areas. ■ Ensures conformance with the overall vision during the evaluation of amendments to the Ordinance Plan. ■ Guides right-of way acquisition for parcels adjacent to major roadways by illustrating the functional classification identified in the <i>Edmond Transportation Plan</i>. ■ Identifies opportunities for trail development and open space protection.
Ordinance Plan	The governing parcel-specific land use plan of the City. The Ordinance Plan is designed to allow for incremental change from current conditions to the desired future identified in the General Plan. The Ordinance Plan is updated regularly and may require amendments with changing market conditions. Amendments to the Ordinance Plan require formal City Council approval.	<ul style="list-style-type: none"> ■ Provides the basis for the districts used by the Zoning Ordinance (Title 22), which officially regulates the development of land and buildings in the City of Edmond. ■ Ensures conformance to Edmond Plan IV during evaluation of rezoning requests.



Relationship between Edmond Plan IV and Zoning Ordinance (Title 22)

Preface: How to Use Edmond Plan IV

0-17

Issues

Edmond is a community with numerous assets and a strong sense of character. Edmond Plan IV is designed to enhance those assets and address challenges that may be faced within the coming decades. **Issues that will impact the growth of Edmond include:**

- Continued growth in East Edmond threatens to erode the rural and natural setting that has become one of the most recognized features of the community.
- Much of the current growth in the community consists of large lot developments with little relationship to each other or the surrounding area.
- The availability of water and sewer limit the type and location of growth that will continue to occur throughout Edmond.
- Lack of available water, sewer and other important services such as fire protection and law enforcement requires increased emphasis on public safety.
- Floodplains and natural areas offer abundant opportunities for trails and spaces for passive or active recreation. Unfortunately, acquiring these spaces for purposes of open space preservation or recreation has proven difficult and expensive.
- Interstate 35 is the natural location for substantial new development that has the potential to be either an asset if developed appropriately, or a liability if developed in a traditional, sprawl pattern.
- Arcadia Lake offers a major amenity to Edmond and the surrounding area, but it suffers from lack of a strong access and limited development potential. On the other hand, this area could also be a tremendous asset to the community, particularly if combined with the heritage and nostalgia related to nearby Route 66.
- Policies in Edmond have a strong focus on neighborhood protection that has preserved a quality of life expected by area residents. The same policies have also resulted in an emphasis on addressing site specific land use issues, rather than implementation of an overall vision for the community.

Category	Description	General Land Uses	Open Space Types	Typical Residential Density	Utilities
Natural	Open space and natural areas not suitable for development due to topography, hydrology, vegetation, or sensitive environmental features.	Natural preserves, recreation and camping	Floodplain, remnant forest, natural areas and regional parks	N/A	Well/septic
Rural	Sparsely settled rural areas where land is primarily used for natural reserves and low-density residential.	Natural preserve, recreation and camping, low-density residential	Remnant forest, natural areas, parks	Less than 1/2 dwelling unit per acre (minimum 2 acre lots)	Well/septic
Rural Suburban	Areas developed at very low densities to allow uses that do not require municipal services.	Low-density residential, recreation	Natural areas, remnant forest, parks, greenways, playground	Less than 1 dwelling unit per acre	Well/septic or utilities optional
Suburban Mixed Use	Low to medium intensity development consisting primarily of single-family subdivisions with limited amounts of medium density residential and commercial, uses where appropriate.	Low to medium density residential, neighborhood commercial, office, public facilities	Natural areas, remnant forest, greens, parks, and playground	8 dwelling units per acre	Utilities required, curb and gutter
Urban Mixed Use	A more intense mix of uses that can accommodate a variety of residential and commercial uses. Office and retail uses may be more intense than in the Suburban Mixed Use area and can accommodate businesses that have a regional rather than a neighborhood trade area.	Medium/high density residential, commercial, office, public facilities, light industrial.	Greens, squares, plazas, parks, and playgrounds	12 dwelling units per acre	Utilities required, curb and gutter
Center	These areas reflect the most intense urban development in the City and are intended to create active mixed-use centers.	High-density residential, commercial, retail, office, public facilities	Squares, plazas, parks, and playgrounds	16 dwelling units per acre	Utilities required, curb and gutter

Table 8.1 Characteristics of General Plan Categories

Land Use: Sustainability	
GLUS	To promote a pattern of growth that supports long term sustainability by encouraging infill development and redevelopment in existing urban areas; land development patterns that are less auto dependent; responsible and cost effective delivery of transportation, infrastructure and other community services; and respects both the urban and rural characters of Edmond.
PLUS 1	Commercial activity should occur in a clustered development pattern to maximize pedestrian and vehicular access
PLUS 2	Clustered commercial activity is most appropriate at intersections.
PLUS 3	Amenities such as entries, parking, detention and signage should be connected and shared to enhance on-site convenience and pedestrian traffic
PLUS 4	Infill development and reuse/reinvention of previously developed sites are encouraged as the most appropriate pattern of growth.
PLUS 5	Beyond infill, promote growth in areas where adequate public facilities and services exist.
PLUS 6	Undertake annexation and extension of services in a coordinated and timely manner to protect public interest and assure continued orderly growth and development.
PLUS 7	Development should promote pedestrian and bicycle activity through sidewalks, bike paths and trail improvements with particular emphasis on connectivity, and accessibility.
PLUS 8	Promote connectivity and accessibility between neighborhoods and districts through street, sidewalk, trail, open space and visual connections.
PLUS 9	Street design should follow the Transportation Plan and reflect intensities and character anticipated in the General Plan for the site and the surrounding area.
PLUS 10	Capacity of streets, infrastructure and services such as law enforcement and police protection should be a consideration instrumental to an amendment to the Specific Plan or a zoning change.
PLUS 11	Private streets should be discouraged.
PLUS 12	Although private streets are discouraged, there should be assurance of legal long-term ownership (Property Owners Association) and evidence provided of the financial capacity to maintain the private streets and common detention for the long term.
PLUS 13	Mixed use development should be encouraged, particularly in medium to high intensity environments.

Land Use: Environment
To maintain the “green” feeling of Edmond by protecting, preserving and appropriately utilizing ecologically significant sensitive areas; incorporating natural areas such as remnant forests and floodplain as well as open space into the built environment; and establishing a series of park and recreational uses connecting neighborhoods, districts and special areas of the community.
Open space should be considered critical to the character of Edmond and should be incorporated into all development in a manner appropriate to the anticipated intensity of development.
Primary conservation areas, such as floodplains, should be maintained in a natural state free from development with the exception of recreation or other low-impact uses.
Secondary conservation areas including remnant forests, substantial woodlots, and other natural areas should be preserved and utilized in site development to the extent practical.
Open space is best maintained in a coordinated, connected and accessible system of natural areas, greenways and recreation spaces.
Conservation subdivision techniques should be promoted as a tool for preserving and fully utilizing open space.
When appropriate, primary conservation areas and secondary conservation areas should be preserved through dedication, conservation easements or other means of acquisition and management.
Protect natural scenic areas and corridors and utilize natural spaces as a means to reduce or eliminate incompatibility between uses or development patterns.
Site design should incorporate Best Practices and innovative techniques to creatively manage soil erosion, reduce runoff and address pollutants during site construction and as an integrated trait of the site after buildout.
Engineered designs should improve the effectiveness of natural systems rather than negate, replace, or ignore them. Technological solutions should emphasize the use of nonstructural or natural engineering approaches. These approaches should be consistent with natural resources and processes and preserve and enhance the natural features of Edmond.

Implementation Tools

The most effective way to implement Edmond Plan IV is to ensure that all approved development applications are in accordance with the vision, goals and policies. The City has several tools including regulations, procedures and guidelines to see that future development conforms to the ideals of Edmond Plan IV. Some of these tools are summarized in **Table 9.1**.

Table 9.1 Implementation Tools

Implementation Tool	Type of Implementation Tool	Description & Use
Zoning Ordinance (Title 22)	Regulation	The City’s Zoning Ordinance is Edmond’s primary tool for regulating development. Because the Zoning Ordinance regulates such things as land use, building height, lot area, setbacks and buffering, its conformance to Edmond Plan IV is key to achieving the desired future character and form of the community. Furthermore, state law requires that a city’s zoning ordinance must be in accordance with a comprehensive plan (§11-43-103). Rezoning requests should not be approved unless the proposed rezoning complies with Edmond Plan IV.
Plan Assessment Form	Procedure	The Plan Assessment Form is a standard form completed by City staff to evaluate all development applications for compliance with Edmond Plan IV. The Plan Assessment Form will use general planning criteria (such as health, safety and welfare issues) to determine how well each development application fits with the goals and policies of Edmond Plan IV. The completed Plan Assessment Form with staff findings will be submitted to Planning Commission and City Council with the standard staff report.
Plan Amendment Form	Procedure	Applicants seeking an official amendment to the Ordinance Plan will have to complete a Plan Amendment Form to demonstrate how the plan amendment complies with the overall vision of Edmond Plan IV. This form is completed by the applicant and submitted to Planning Commission and City Council with the standard staff report and Plan Assessment Form. Approval or denial of a requested plan amendment should be based its ability to fit with the goals, policies and General Plan of Edmond Plan IV.

Table 9.1 Implementation Tools (Cont'd)

<p>Sensitive Area Conservation Assessment</p>	<p>Guideline</p>	<p>Conservation of valuable environmental areas such as remnant forests, farmland and floodplains is an important goal of Edmond Plan IV (as documented in the General Plan, vision, goals and policies). In an effort to conserve environmental resources, the City has established a Sensitive Area Conservation Assessment (see Appendix C). The Conservation Assessment establishes a guideline for the desired conservation area of a development site. The recommended conservation area is based on a point system that values the size and the type of resource (forest, floodplain, farmland) that is conserved compared to the overall size of the development site. The recommended conservation area is intended to be a flexible guideline and is not enforceable through the standard development process.</p>
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Sensitive Area Conservation Assessment

The primary objective of conserving sensitive areas is to benefit the quality of life for future generations. Areas of focus for conservation include – remnant forest areas, prime farmlands, forested areas, and flood plains. The system for facilitating sensitive area conservation is designed to retain flexibility while encouraging environmentally responsible development.

This system is intended to achieve these corollary purposes related to the health safety and welfare of the community:

1. Maximize space for aquifer recharge areas on hard to develop lands including those with remnant cross timber forests, rocky shallow soils, and steep slopes.
2. Preserve forested areas to reduce the destruction of sensitive natural resource areas that provide habitat to sensitive species.
3. Reduce the quantity and improve the quality of stormwater runoff from expected development.
4. Minimize impervious surface area maximizing recharge and reducing soil erosion by using appropriate stormwater BMPs.
5. Reduce the capital cost of development

The recommended conservation area is based on a point system that translates different conservation land types into quantifiable but flexible units. The optimal goal is to meet a point value equal to your total acreage multiplied by two (acres x 2 = recommended points). The following table can be used to quantify the areas being claimed for conservation to see if they meet the recommend point value.

Conservation Category	Point System
Remnant Forest Areas	20 points/acre
Prime Farmland	10 points/acre
Forested Areas	10 points/acre
Flood Plain	5 points/acre

APPENDIX B

Stakeholder Meeting 2
March 26th, 2010

In addition to communicating the information garnered from the 1st Stakeholder meeting and reviewing the goals and direction of the initiative, software tools were discussed, as well as additional input for the initiative.

Software Tools

The following are two concepts that were introduced as a way of prioritizing environmentally sensitive areas. In the first slide (below) different weights have been assigned to system components, based on their relative importance. There is an interior forest weight, streams weight, sensitive species, distance to roads, etc. Using Geographic Information Systems, we can overlay them, and based upon a grid, achieve a composite ecological score. That composite in turn can be used in conjunction with other Planning layers to help define potential priority areas.

This was the method used in the Composite Grid Analysis discussed in this report.

The next slide describes i – Tree, another software tool that might be used. This is free software that has been made available through the USDA Forestry Service. The i-Tree tools software suite can highlight innovative green infrastructure initiatives by quantifying the structure of community trees, and the environmental services that trees provide. If sellable carbon offsets are implemented as part of future climate legislation, communities will be able to sell measurable carbon reductions that would result from their green infrastructure deployments.

Assessment and Priorities
Value of Network

- Suitability analysis
- Ecological significance
- Comparative conservation value
- Vulnerability
- Degree of protection
- Feasibility
- Degree of urgency

Interior Forest X Int. Forest Weight
+
Streams X Streams Weight
+
Sensitive Species X Sensitive Species Weight
+
Distance to Roads X Dist. to Roads Weight
+
Etc. X Etc. Weight
= Composite Ecological Score

i – Tree
<http://www.itreetools.org/>

What is i-Tree?
urban forestry analysis and benefits assessment tools
quantify the structure of community trees and the environmental services that trees provide
report on individual trees, parcels, neighborhoods, cities, and even entire states
i-Tree users can link urban forest management activities with environmental quality and community livability
i-Tree provides baseline data that you can use to demonstrate value and set priorities for more effective decision-making
i-Tree Tools are in the public domain and are freely accessible

Stakeholder Input – Exercise 3

At the end of presentations, the group in attendance was divided into 6 small groups.

They were asked to identify one thing in the next 6 months that they would do if they had Walt Disney's magic wand... and had unlimited funds and staff. They were asked to not limit their dreams, but also if there were more practical, or do-able projects, that would be fine too. This was a brainstorming exercise, useful for capturing new ideas from varied participants.

Table I

1. Preserve Stream banks and buffer zones
2. More connections, identify more links
3. Incentive building codes
4. Develop/build trails (brochures on benefits)
5. Slogan – logo – brand for infrastructure

Table II

1. Incentives for rainwater capture/reuse
2. Incentives for permeable paving/commercial sites
3. Mandate permeable paving public sites
4. Evaluate / protect upstream watershed into drinking water create riparian buffers
5. Protection of long term water requirement
6. Conserve/Protect current supply buffers
7. New development mandated to “donate” either property or monies to land conservancy (fees, permits)

Table III

1. Plan/Design Green Infrastructure components at route 66 park
2. Utilize trails funds to develop green infrastructure "trails"
3. Expand/Enhance streamline setbacks or design standards
4. Update Plan IV assessment forms (to recognize green infrastructure)
5. Plan, design and develop west Edmond regional detention and national park
6. Enhance cluster development regulations to ensure/incentivize sensitive site preservation

Table IV

1. Incentives for land owners & Developers
2. Beginning of link to Route 66 park from B-R park
3. Look at links (form a study group to address the links as described, and determine whether or not they are practical. If not, identify alternatives, and come up with a second plan.
4. Prioritize hubs, assist Edmond by indentifying important links to develop first (Charles suggested defining the outstanding features of each type of link as different hubs/links have different compelling features.

Table V

1. Start reviewing city codes
2. Conduct inventory and prioritize sites
3. Take it to the people (Developers, community groups, citizens)
4. Incorporate LID concepts in the planning/design for new park
5. Start examining stream setbacks

Table VI

1. Stream & Creek setback
2. Making the lake sustainable water source
3. Experiment District
4. Route 66 Trail
5. (See illustration of street/tree/pedestrian walk)





Contacts

Edmond Land Conservancy

<http://elc-ok.org/index.html>

Edmond Urban Forestry

<http://www.edmondok.com/trees>

Edmond Planning and Community Development

<http://www.edmondok.com/index.aspx?nid=447>

