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MEMO: Memorandum of Charrette activities in conjunction with Ripple Effect: Low Impact Development Conference, May 7-8, 2008, Springfield, MO (AES # 07-0904)

Introduction

The James River Basin Partnership (JRBP) teamed with the Upper White River Basin Foundation (UWRB) and The Killian Group to offer local developers, designers, and public officials the opportunity to participate in a design charrette focused on Low Impact Development (LID) design practices. The charrette is an extension of the Ripple Effect: LID Conference hosted by JRBP and UWRB.

The Killian Group was kind enough to offer their property in southeastern Springfield as a focus for the Charrette. The site is approximately 600 acres, bordered to the west and south by high volume freeways (U.S. 65 and U.S. 60) and dissected by the James River. A significant portion of the site is within the jurisdiction of the FEMA hundred year floodplain. Site access from the highway is an important component to how the site is developed. A large parcel to the southeast of the river was not considered for development in this charrette but is a piece of the property.

Applied Ecological Services, Inc. (AES) was hired to lead the charrette process and offer their own suggestions for developing the focus site.

EVENTS SUMMARY

Day of Charrette

The Charrette was kicked off by Holly Neill, Executive Director of JRBP and John Moore, Executive Director of UWRB, who placed the charrette in context to the Ripple Effect Conference, the region, and the people involved.

Geoffrey Butler, AIA from Butler, Rosenbury and Partners, Inc., representing the developer of the site, introduced the site to charrette participants; he identified location, opportunities, and constraints associated with development on the site. Briefly, some of his comments included:

- Difficult site to develop, already ten years into process.
- Access to Highway 65 crucial; design of highway interchange set in stone.
- Site access must include connection into City of Springfield and possibly to City of Rogersville
- Interested in what ideas are developed during the charrette process

The Killian Group had provided AES with base information for the site including aerial photography, infrastructure, topography, hydrology, and soils information, as well as development requirements for the site. Geoffrey brought with him the preliminary plans including the newly updated highway interchange layout.

Charrette participants were then introduced to Jacob Blue, senior Landscape Architect at AES. Jacob opened the charrette process by giving a quick description of the goals and objectives of the day. He presented AES's history and philosophy of conservation planning and design to the Charrette participants.

He went on to explain the expectations of the charrette process, asking participants to join a team with unfamiliar faces; participants then shuffled tables to form four random teams. Jacob explained that a critical component of the charrette is to break boundaries of thought and explore new ideas for the site.

He asked the participants to focus on the ecological productivity of the site, posing the question: how can the developers make money off of the ecological services of the site? He defined three positive potentialities for existing site conditions: areas already in good ecological productivity worth preserving, areas that could be more productive if enhanced ecologically, and areas of ecological productivity that could be created with inexpensive input.

The focus then shifted directly to developing an understanding of the site through the overlay process. Jacob explained the various overlay maps that would be used to inform decisions about site design. Overlay maps included vegetation types, soil suitability, topography, open water, floodplain, drainage channels, cultural influences, and existing infrastructure. Before diving into the process, Jacob offered some money-making ideas that the site ecology could possibly provide; including alternative stormwater management, wetland mitigation banking, carbon credits, and temperature regulation.

Finally, the charrette process was started with the creation of the first overlay map. The teams worked for 15-20 minutes on each overlay map, with AES staff helping to facilitate interaction and productivity among the groups. Each map either identified where resources were located or where conditions were unsuitable to build. After each overlay map was created, a final binary build/no build map was created in each group as a synthesis of the overlay maps. The final build/no build maps would inform the teams as they developed design plans.

After a break for lunch, the teams were given the developer's unit requirements and tips for beginning the design process. Throughout the afternoon teams drew, discussed, and developed strategies for site design. The day was ended with instructions for presenting the next day: each team would have to present their final design to the conference attendees at 3:00. They would have all night, morning, and afternoon to work as they pleased.

Day of Presentation

Teams worked throughout the morning designing, each team at its own pace. As afternoon came around, teams were hustling to put the finishing touches on their concepts for the presentation.

At 3:00, Jacob Blue of AES introduced the conference attendees to the charrette project, relaying nearly identical information to the conference attendees as he had the day before to the charrette participants. After the project background, goals, and charrette process had been explained, Jacob asked each group to come up to present their plans. Each team presented their concepts for design in 10-15 minutes, including questions from the audience. Each of the four groups proposed preserving the floodplain and drainage ways, clustering mixed use close to the highway and residential close to existing residential, and a network of trails connecting to the Ozark Greenways Trail system. Despite similarities to the designs, each group had innovative, exciting ideas about development that differed from other groups. Some of the ideas include the following:

- Community supported agriculture within the floodplain
- Wetland mitigation banking
- Recreational uses: canoeing, kayaking, hiking, biking, fishing
- Small airfield with hangers
- Phasing of construction based on existing infrastructure
- Using wooded, high slope areas for harvesting blueberries, blackberries, and edible nut-producing trees

Following the presentation of the groups' conceptual plans, Jacob presented the AES conceptual conservation development plan vs. the conventional development plan. He showed how the conservation development plan was influenced by the overlay mapping, and then compared the cost estimates between the conventional development and the conservation development.

The plans developed during the charrette process were displayed after the presentation, with members of each group on hand to answer any questions. Two of the plans were given to AES to document digitally and have been given to JRBP.

DESIGN PHILOSOPHY SUMMARY

Ecosystem Services and Sustainable Design

The goal of designing with ecosystem services or sustainable practices is not to impede or impair development but to provide a quantitative foundation for making development decisions. Rather than simply following the SOP of conventional development with documented cost and functional inefficiencies the Ecological System Design Approach tm is based on an analysis of the ecological constraints, potential ecosystem services available and the estimated cost of development types in different environs.

The easiest and most cost effective way to achieve the integration of ecosystem services as well as economic and functional efficiencies into the development of the Master Plan process is to develop a sustainable framework at the onset of the design process through The Ecological System Design Approach tm . This approach requires a little more work on the front-end but results in greater satisfaction and success at the time of project completion. The proposed method is seen here:

Natural Resources Inventory – Recording what's there

The design process starts with identifying the existing ecosystems services provided on a parcel or property and then ensuring they are honored by identifying them in plan or written documentation. Through the protection and enhancement of existing ecosystem services a proposed design can maximize the free services nature provides at very little cost compared with conventional engineered processes. The Ecological System Design Approach tm will contribute to the overall design team process by providing a baseline by which the design can be measured against. The process begins with a Natural Resources Inventory (NRI) and associated mapping of ecosystem services, such as: hydric soils, waters of the US, wooded lands, vegetation communities of local or regional ecological significance, etc. An NRI is a scientific evaluation of the site and its existing ecosystem services. It should be performed by a qualified ecologist and should be accompanied by a report and mapping documenting the site conditions. The NRI will give an evaluation of the site's condition, a measure of its ecological health, and general recommendations for the sites ecological potential.

Program Suitability Plan – Understanding the Site

The material prepared in the NRI is then used to develop a Program Suitability Plan (PSP). Multiple ecological constraints will be mapped and overlaid over each other and the site. Relevant material from off-site should also be mapped when appropriate. The overlaid maps are then synthesized into tiers of impact suitability. The tiers of impact suitability could be as simple as a binary comparison (buildable vs. nonbuildable areas within a property) or more complicated depending on the design team's desire for detail. These tiers are defined by ecological concerns, economic concerns, and efficiency concerns.

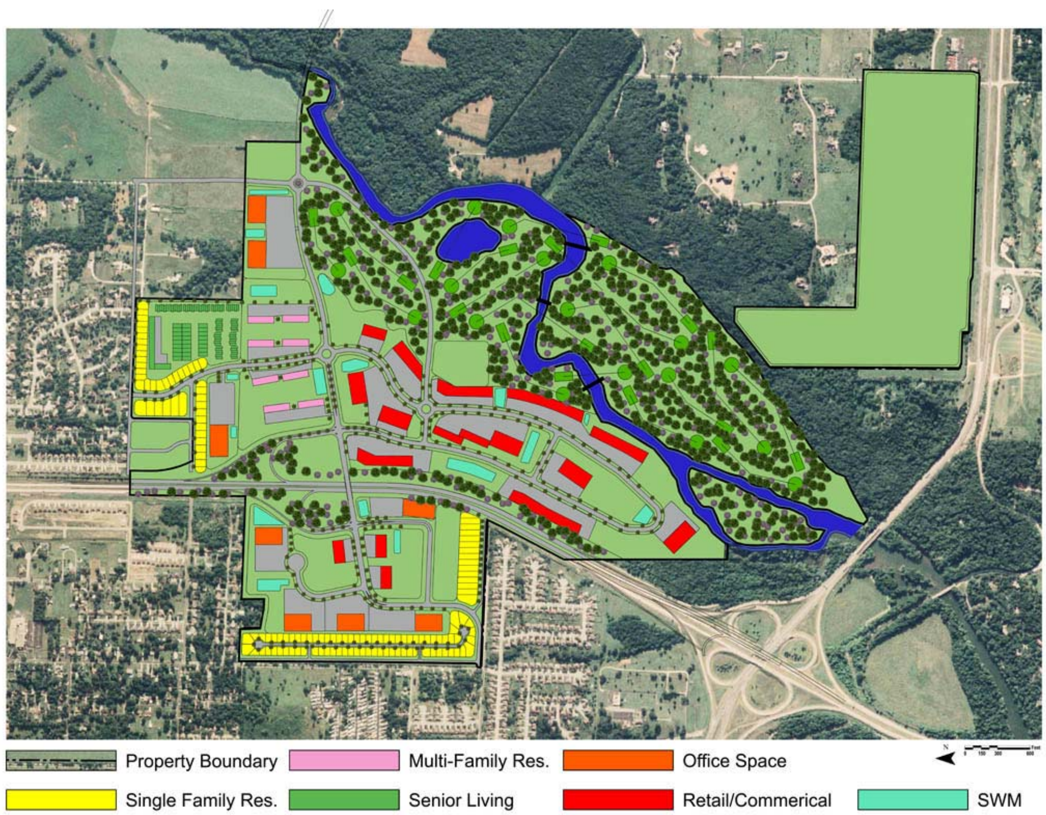
The preparation of a PSP ensures that ecosystem services are being paired with the design program elements to maximize the service potentials while minimizing design costs. This drawing is critical for the recognizing the most cost effective and efficient use of the site in order to achieve the most progressive design possible. An easily understandable example of this type of analysis might be the mapping of highly permeable soils and subsoils on a given site. It is in the best interest of the project to protect and enhance these areas for alternative stormwater management use rather then building on this portion of the site and creating detention ponds or other stormwater management systems elsewhere in the project area. Highly infiltrative soils can quickly and effectively remove stormwater from developments, golf courses, and other features and save land and money where conventional stormwater infrastructure would otherwise be engineered, permitting and constructed (as well as maintained at high cost).

Concept Design and Beyond

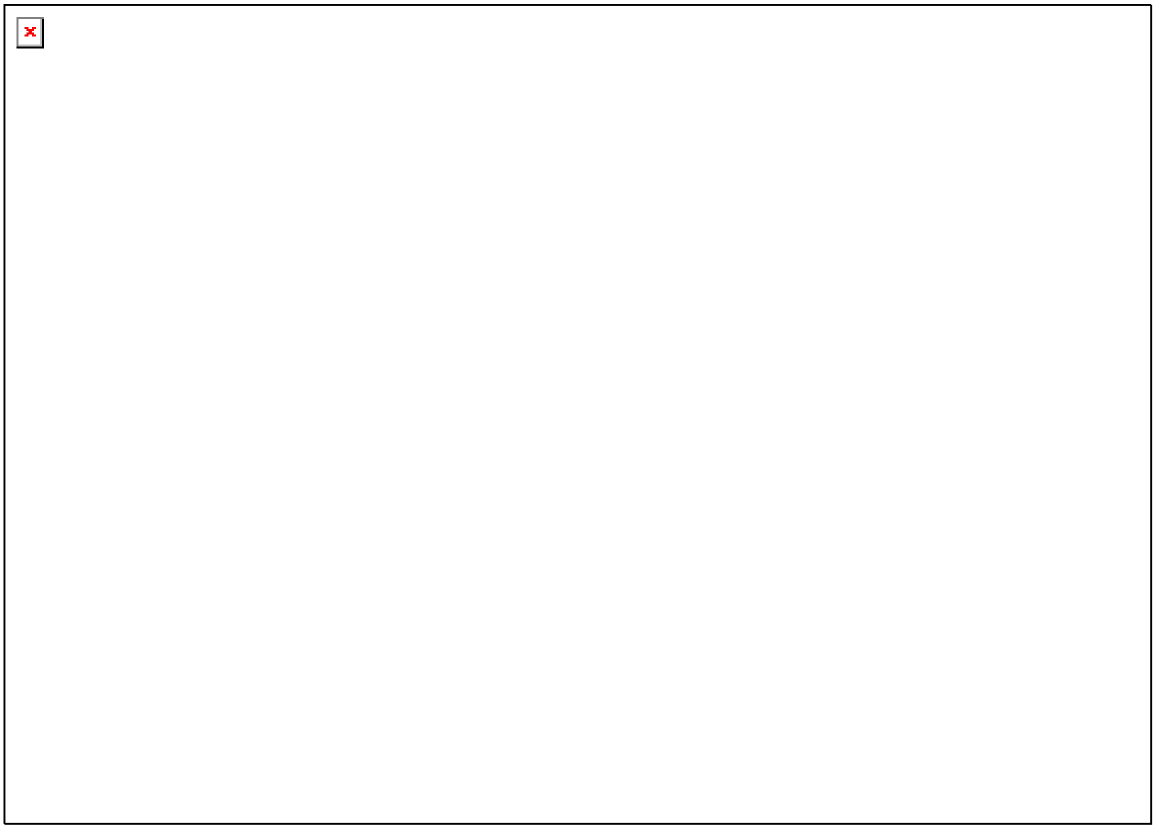
Now the project is poised to move forward and make decisions based on economic and functional efficiencies. As the design team develops the proposed design solution for the site they are able to compare their ideas against the PSP and NRI to see if solutions violate or impact either of these two constraints in such a way as to minimize the overall site effectiveness. For example, suppose the design solution calls for 3-4 acres of mown turn in front of a proposed corporate headquarters; the design team following the Ecological System Design Approach tm would evaluate that area of maintained turf against the PSP and NRI and ask, 'Is there another way to achieve this aesthetic that can minimize the maintenance, and maximize other needed functions?' The design team is prepared to look at how to design the site to achieve the program elements required for the site based on ecosystem services. Here conventional design practices are married with the result of hard site data resulting in both ecologically sensitive as well as aesthetically appropriate design techniques. Everything from landscape to stormwater design can be designed to achieve aesthetic and ecological goals knowing the most appropriate location for these goals, within the site, has been identified. Very often these projects result in the protection of greater open space with in the project, lower infrastructure costs, greater aesthetic value, higher habitat value, and easier agency approval.

But as discussed above the benefits are not just ecological protection; the project achieves a greater economic efficiency by minimizing unneeded or ineffective conventional infrastructure. The lower infrastructure cost translates into savings for the developer. Additionally, some developers are able to charge on lot sales because of the direct access or association with protected open space areas used for the ecosystem services design.

APPLICATION SUMMARY
By way of example for the Charrette and the conference AES prepared conceptual development designs using conventional design techniques and the Ecological System Design Approach [tm] the results shown below illustrate greater open space protection, with more developable units (a smaller unit size was employed in the ESDA design); lower infrastructure costs, and greater lot premium.



Conventional Design, AES May 2008



Ecological Services Design Approach, AES May 2008

Project Name	Springfield, MO							
	Conventional Development			ESDA Development				
Description	Unit		**Cost**	Unit		**Cost**	**Difference**	**Percent Difference**
Site Preparation			$3,092,107			$2,610,758	$481,349	-18%
Stormwater Management			$899,255			$475,356	$423,899	-89%
Paving			$1,774,957			$1,353,048	$421,909	-31%
Landscaping/Restoration			$3,689,022			$3,551,239	$137,783	-4%
Total Development	**Ac**	**601**	**$4,284,260**	**Ac**	**601**	**$3,517,678**	**$766,582**	**-22%**
Impervious Surface	Ac	204		Ac	92		112	-55%
Single Family Residential Units	DU	167		DU	150		17	-10%
Includes Single Family and Senior Living								
Multi-Family Residential Units	DU	174		DU	276		-102	58%
Town Home Residential Units	DU	72		DU	144		-72	100%
Retail	sf	956,000		SF	1,352,000		-396,000	41%
Office	sf	975,800		SF	1,310,000		-334,200	34%
Parking (Impervious Surface)	Ac	61		Ac	41		20	-33%
Parking (Spaces)	ea	8,226		ea	9,065		-839	10%
Includes Shared Spaces in the LID Concept								
Roadway	lf	32,266		lf	22,468		9,798	-30%
ROW Area	Ac	80		Ac	52		28	-35%
Total Project Area	Ac	601.13		Ac	601.13		0	0%
Total Developed Area	Ac	249.1		Ac	175		74	-30%
Without Golf Course								
Total Area of Open Space	Ac	352		Ac	426		-74	21%
Percent Open Space	%	59%		%	71%		0	
Total Developed Area	Ac	494		Ac	175		319	-65%
With Golf Course								
Total Area of Open Space	Ac	107		Ac	426		-319	298%
Percent Open Space	%	18%		%	71%		-1	

Comparison of Concept Plans, AES May 2008

The ESDA design results in a more centralized area of impact, greater connectivity between stormwater treatment systems, increased open space, increased units, but with lower impervious impacts; how is this achievable?

1. The ESDA design reduced the lot size of residential units because each lot has direct access to open space, and a connected internal trail system. Larger lots are not needed, and very often not desired, when direct immediate access is provided to the home owner.
2. By minimizing the footprint of commercial and parking needs and exploring more vertical arrangements are greater concentration of features can be designed in a smaller area. In the case of this example parking structures are not overly costly when compared to the gain in commercial area and number of lots. In fact the parking costs shown above for the ESDA design assumes at least one parking deck and the projected costs still remain lower than the conventional design.
3. Below ground infrastructure has been reduced. The costs of infrastructure material as well as installation make the conventional design approach economically inefficient. Features such as bioswales, infiltration basins, linear storage, and designed wetlands are much easier to construct, maintain, and in some cases and are more efficient at storing, infiltrating and moving water.
4. The ESDA design minimizes the impacts to severe steep slopes; reducing grading costs. Honoring the steep slopes maintains the topographic integrity of the site but also lowers grading costs, why move dirt if you don't have to?
5. A major benefit of the ESDA design is the removal of the golf course proposed within the floodplain of the James River. Instead of a costly golf course (costly to construct and costly to maintain) the ESDA design explored alternative revenue generating opportunities within this portion of the property, potential opportunities included: wetland banking, temperature banking, biofuel production, native plant nursery, and sustainable farming or timber operation.

When viewed through the lens of the Ecological Systems Design Approach we see that development can be a benefit to both the economic and the ecological conditions of a region. It provides a cannon against which design concepts can be measured and sets the framework for the reduction of 'engineered inefficiencies'. The ESDA is the common sense approach to design with immediate benefits to the developer and long term benefits for the user.