

Sustainable Development:
Case Studies & Lessons Learned

Prepared For

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UMore Development LLC

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EXECUTIVE SUMMARY

The following report contains a series of case studies that analyze how local and national developments have either successfully implemented sustainable principles, or encountered obstacles that prevented the implementation of sustainable principles. The purpose of the case studies is to provide the University of Minnesota and the City of Rosemount a guide as they collaborate on a plan to develop the 5000-acre UMore property. Case studies were selected by geographic proximity to UMore, similarity to UMore's land use plan, and attention to the six sustainable topic-areas identified in our memorandum of agreement: land use and the environment, energy, stormwater management, water resources, solid waste, and eco-industrial and economic development. Subsequently, during our research, we found it necessary to include two additional topic areas: community development, and financing.

Through our analysis of the case studies, we found that, although our cases varied in their goals or the specific technologies they utilized, the most successful developments were the ones that focused on creating the cultural climate in which sustainable principles could flourish. In each of the eight sustainable topic-areas, the success of the development depended more on the buy-in of local stakeholders and the vision of the leadership body, than it did the specific environmental technologies employed. We found that community participation and engagement, marketability and long-term vision, a stable leadership body, and the ability of that leadership body to pass its knowledge to a receptive homeowners association, were determinants to the success of a particular development.



FIGURE 1

INTRODUCTION

Project Overview and Purpose

UMore Park, a 5,000 acre University of Minnesota-owned property 25 miles southeast of the Twin Cities, offers a unique opportunity to leverage University resources to build a master-planned community that integrates the latest innovations in sustainable technologies with best management and operation practices from a range of health-, education-, and community development-related disciplines. In collaboration with local stakeholders and academic departments, the University has been defining the vision and strategies that will shape the development of UMore Park over the next 40 years.

This report adds one more brick to this collaborative ensemble. The University of Minnesota and the City of Rosemount seek to examine sustainable residential, commercial, and industrial developments in order to identify implementation options that support both the emerging development vision for UMore Park as well as Rosemount's 2030 Comprehensive Plan vision.

Capstone Memo of Agreement

“Provide a comprehensive assessment of options for implementing sustainability” that will create a “unique community identity with a culture of sustainability for the new community at UMore park, while ensuring its integration into the City of Rosemount and the surrounding region.” - page 1

Scope of Analysis

The Memorandum of Agreement (MOA) signed between the University of Minnesota, the UMore Development LLC and the City of Rosemount calls for an analysis of implementation options and strategies related to several topics:

- Land Use & Environment
- Energy
- Stormwater Management
- Water Resources
- Solid Waste
- Eco-Industrial & Economic Development

During the research process, two additional topics that proved essential to the discussion of implementation strategies emerged. Therefore, the final report also includes an analysis of both financing and community engagement strategies.

Methodology and Evaluation Criteria

The selection criteria employed to identify case studies included a search for:

- Applicability to the topic scope stated within the MOA
- Geographic similarities to UMore and Rosemount
- Land use plans’ suitability in light of the vision for UMore Park and Rosemount’s 2030 Comprehensive Plan.

Developments in Upper Midwestern exurban locations received first-consideration. However, as Midwestern case studies failed to cover the required scope-of-research, developments from outside the region were included. The primary case studies within this report cover two or more of the MOA’s primary topics. Topic-specific case studies were selected to address topical gaps within this report’s analysis.

Lens of Sustainability

This report’s working definition of the sustainability concept uses the official US Environmental Protection Agency’s characterization.

“Sustainability is based on a simple principle: everything that we need for our survival and well-being depends, either directly or indirectly, on our natural environment. Sustainability creates and maintains the conditions under which humans and nature can exist in productive harmony, that permit fulfilling the social, economic and other requirements of present and future generations.”



FIGURE 2

This definition brings into focus the notion of the “Three E’s” of sustainability. This concept puts forth the need for a balanced approach between seemingly contrary notions: environmental protection and preservation, economic development, and social values and equity; such a balance would eventually lead to a viable, livable future. An analysis of these relationship and interactions is woven throughout this report.

Findings

While various sustainable technologies are addressed with this report’s case studies, the analysis places greater emphasis on the political and social context in which these were implemented. To borrow an analogy from the world of Information Technology, the report devotes greater attention to the software of sustainable development than to the hardware of said sustainability (i.e. technologies).

As this report makes clear, there are many technologies currently in development, in their infancy, showing great promise and potentially high returns: this technological landscape changes constantly and is absolutely worth keeping track of, an effort the University of Minnesota’s academic departments are well-suited to take up. Nevertheless, it is the human and social framework – the software – that ultimately drives the hardware, and determines whether these technologies will be used to their best potential, or not.

Fortunately, the four main “software” findings of this report closely follow the chronology of the life-cycle of a real estate project. The degree to which developments successfully implemented sustainable principles appears related to their performance with regards to the following:

- First, the ability to engage local stakeholders early in the development process, by leveraging the strengths of the local stakeholders and businesses
- Second, the development of a marketable long-term vision that creates a unique and relatable identity for the real estate development
- Third, the designation of a leadership body to guide the development and maintain and sustain the identity and vision over the long-term
- And last, but not least, the presence of a strong homeowners association that can assume responsibility for internalizing and carrying the vision and its sustainable practices forward.

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EXISTING CONDITIONS



FIGURE 1

As we mentioned above in defining what sustainability entails, there are four elements whose interactions and connectedness form the basis for sustainable development. They are economic development, environmental protection, social considerations of equity (in the form of housing policies, for instance) and an overall measure of livability for the community aspiring to sustainability.

It is in this context that this document now reviews existing conditions for the City of Rosemount, based on its 2030 Comprehensive Plan, adopted in November 2009.

Population and Trends

Rosemount was incorporated in 1875, a business nucleus surrounded by a rural community of a few hundred residents. Population very gradually increased until the 1990s and 2000s, and particularly between 2000 and 2006, when Rosemount saw its population increase from 14,000 to 23,000 inhabitants (and an estimated 7,400 households), an increase of more than 60% in less than a decade! This booming trend appears to be confirmed by the latest population projections, putting the number of residents at 42,000 by 2030 (a sizeable increase of more than 50%), in line with the US suburban growth of the last 30 years. Importantly, a higher proportion of these new residents appear to have their center of employment outside of Rosemount, and probably in the Twin Cities: daily commuters with a travel time of 45 minutes or more went up from 8.3% to 11.3% between 1990 and 2000.

YEAR	POPULATION	
1900	807	^a
1950	1,375	^a
1960	2,012	^a
1970	4,034	^a
1980	5,083	
1990	8,622	
2000	14,619	
2010	23,750	^b
2020	33,050	^b
2030	42,000	^b

TABLE 1. POPULATION (SOURCE: COMP PLAN)

^a Combined Rosemount Village and Rosemount Township populations

^b City of Rosemount forecast

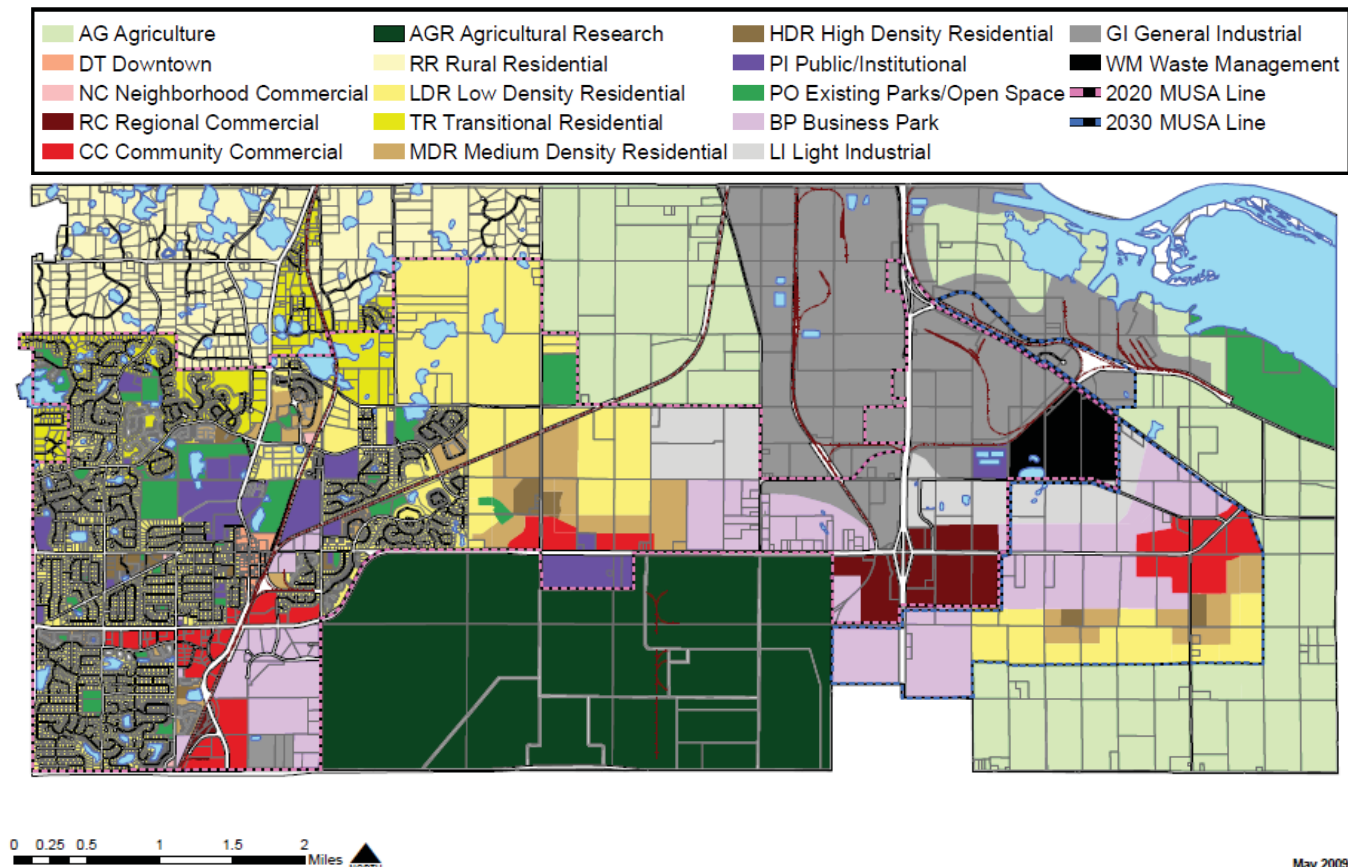
Young families and professionals predominate: the 25-44 age cohort represents between 36.5% and 38% of the overall population (using the 1990 and 2000 US censuses). The older age cohorts, particularly retirees, are underrepresented, with only 5% of the population.

The average household size is 3.08 residents (against 3.10 in 1990, not significantly different considering the population boom Rosemount experienced). More than half of these households are married families. In addition, the proportion of residents with high school diplomas is higher than the national average, at 65% - a highly educated workforce, with relatively high incomes, compared to national and regional numbers. The median family income in 2000 was \$68,929 compared to median Minnesota family income of \$56,874.

Land Use

Rosemount's 22,500 acres are basically divided into 3 major zones: a residential area to the west, industrial to the east, and agricultural to the south.

FIGURE 2. ROSEMOUNT 2030 LAND USE PLAN



May 2009



FIGURE 3

TABLE 2. 2005 LAND USES (SOURCE: METROPOLITAN COUNCIL)

LAND USE	ACREAGE	PERCENTAGE
Single Family Residential	2,555	11.30
Multi-Family Residential	320	1.40
Farmsteads	160	0.70
Commercial	140	0.60
Mixed Use	35	0.20
Industrial	1,700	7.50
Extractive	180	0.80
Institutional	375	1.70
Parks, Recreation, and Preserves	910	4.00
Major Vehicular Right of Way	335	1.50
Railways	50	0.20
Airports	0	0.00
Open Water	1,155	5.10
Agriculture	9,270	41.10
Undeveloped	5,365	23.80
Total	22,550	100.00

Current and Projected Densities for Rosemount and UMore Park

Though the densities projected for UMore Park show a greater granularity than for the Rosemount Comprehensive Plan, there is an obvious convergence of goals and interests in increasing the relative and absolute share of high density residential areas and units for the two.

	CURRENT DENSITIES FOR ROSEMOUNT		2030 ROSEMOUNT PLAN		UMORE PROJECTED DENSITIES	
	Acres Developed	Units per Acre	Acres Projected	Units per Acre	Acres Projected	Units per Acre
Transitional Residential	0	2	155	1	N/A	N/A
Low Density Residential	145	2.35	270	1	812	1-3.5
Low-medium Density Residential	24	7	150	5	592	3.5-12
High Density Residential	4	20	30	10	372	12-24

(source: Rosemount 2030 Comprehensive Plan; UMore Park AUAR January 2012)

Housing

Alongside population growth, the housing sector saw tremendous growth between 2000 and 2006, with a 43% increase in building permits delivered. By the same token, housing units in Rosemount are relatively young: only 12% of units are over 35 years old.

Nine Over-Arching Goals for 2030

An analysis of the Rosemount Comprehensive Plan must first highlight the nine goals the City set for its 2030 targets. They are to:

1. "Maintain a manageable and reasonable growth rate that does not adversely impact the delivery of services but allows the community to grow and become more diverse from now until 2030.
2. Preserve the existing rural residential areas designated in the Comprehensive Plan and increase housing opportunities in the community to attain a balance of life cycle housing options.
3. Promote commercial renewal and rehabilitation in the Downtown and along Highway 42 while accommodating new commercial development along appropriate transportation corridors such as Akron Avenue and County Highway 42; County Highway 46 and MN Highway 3; and County Highway 42 and US Highway 52.
4. Encourage additional high quality and tax base generating industrial development in the northeast portion of the community and within the Rosemount Business Park.
5. Preserve natural resources and open space within the community and ensure development does not adversely impact on-going agricultural uses until urban services are available
6. Promote use of renewable resources by creating sustainable development and building green.
7. Collaborate and provide connections between the City and surrounding cities, townships, Dakota County and public and private schools in the area.
8. Work with the University of Minnesota to create a neighborhood that can successfully integrate into the community while achieving goals of health, energy, and education.
9. Collaborate and provide services (such as libraries, community center, senior center, etc.) to all groups of residents."

To boot, vacancy was only 2.1% in 2000. Interestingly, this same period saw equal construction of multi-family and single-family housing, bringing the ratios to a solid mix of single, townhouse, and apartments units, respectively 40%, 45% and 15%. 96% of these units are occupied by homeowners.

Local Economy

Rosemount's top ten local employers in 2007 employed about 2,700 people, or about one-third of Rosemount's 8,000 workers at the time, with the Flint Hills oil refinery and the local education sector taking the bulk of these positions. In 2004, there was a job deficit of almost 1,800 positions in the region; in other words, some 1,800 workers likely commuted to another center of employment other than Rosemount.

This trend, supported by travel time numbers from the 2010 US Census, appears to be on the rise; it is addressed in the economic development portion of the Rosemount Comprehensive Plan as goal #4, (left).



FIGURE 4

Goals tied to Sustainable development

In light of the four elements constituting the basis for sustainable development, economic development, environmental protection, social considerations of equity and livability, Table 3 highlights each goal's targets.

TABLE 3. MATRIX OF ROSEMOUNT 2030 GOALS AND SUSTAINABILITY GOALS

	Economic Development	Social Equity	Environmental Protection	Livability
Goal 1	Yes	Yes		Yes
Goal 2		Yes	Yes	Yes
Goal 3	Yes			
Goal 4	Yes			
Goal 5	Yes		Yes	Yes
Goal 6	Yes		Yes	
Goal 7		Yes		Yes
Goal 8	Yes	Yes	Yes	Yes
Goal 9		Yes		Yes

Considerations of Social Equity and Livability

These goals translate into specific goals of sustainability, and particularly in Rosemount's housing targets and policies for 2030. The focus is on the creation of independent neighborhoods, with unique identities; the inclusion of natural corridors and buffer within said neighborhoods; average density of less than 2 dwelling units per acre in rural residential areas to preserve their specific identities; the promotion of Planned Unit Developments (PUD) distinguished by their commitment to environmental conservation (that is, developing strategies intent on preserving natural features and open space). Such an example in Rosemount would be the Harmony residential development: originally, a 519-unit mixed residential development located on a former industrial site, along Highway 3. The subdivision offers a mix of single family units as well as townhouses, urban villas, and vantage units.

Another focus of said policies is to create conditions propitious for a good mix of rental and homeownership units, in order to foster housing diversity. The same would be true for medium density housing stock, to provide diversity in terms of life cycle housing demand: whether for students, seniors, empty nesters, young adults or professionals, housing needs should match projected demand as closely as possible to avoid the risk of vacancy and foreclosures. Such housing diversity can be found at the Carbury Hills Townhomes in Rosemount.

Not only should housing be more diverse, it should also be more diverse geographically to encourage the idea of diverse and vibrant neighborhoods. High densities should be close to collector roads, as well as downtown and close to commercial areas. Senior housing should be mixed with housing for young families with children, to avoid creating pockets of single-use housing. In addition, the Rosemount Comp Plan, with a view to increasing regional connectedness, is intent on figuring out financing strategies of affordable housing with other regional agencies and partners - such as the Dakota County Community Development Agency (CDA), Habitat for Humanity and other partners.

Sustainable Environment Planning

For environmental and natural resources, the focus is to preserve existing resources and promote renewable ones. An inventory of these resources and natural areas will achieve a prioritization based on risks and development efforts. The goals are to protect wetlands; create an Environmental Advisory Committee (EAC); encourage tree planting; work with developers and redevelopers to decrease the use of non-renewable resources and limit pollution and carbon footprint; and expand greenway system and natural habitat corridors by offering development incentives to preserve these amenities.

Obviously, some of the housing policies evoked above have similarly important consequences on Rosemount's sustainable environmental goals, particularly when considering the promotion of conservation developments, with their limited environmental impact, or the development of natural habitat corridors. Other sustainable best management practices found in the 2030 Comp Plan include:

- A citywide focus on a recreational plan, including the implementation of a Parks System Plan for Rosemount's neighborhood; pedestrian-friendly neighborhoods with sidewalks and trails and overall higher accessibility (which also increases livability and neighborhood definitions); and medium density housing with private amenities and open space.
- An approach to new development that can best be described as physiographic determinism, very much akin to the recommendations brought forth by Ian McHarg in the 1960s or Randall Arendt more recently, and which highlight a cautious attitude on environmental issues, designed to identify preservable areas for zero development; maintain rural identity and character (particularly in

Northwest Rosemount); and overall limit the impact of new developments on the surrounding Rosemount environment. This approach takes into account existing natural resources and features, encourages developers to follow natural contours for street grid (thereby minimizing the cost of grading and topsoil removal); preserving steep slopes to reduce soil erosion; and the emphasis of clustering developments into new PUDs to preserve and maximize open space and natural land covers.

- The Comp Plan also stresses the importance of an existing environmental impact framework, in the form of a Wetland Management program, and a Tree Preservation ordinance.

Sustainable Economic Development

The stated goal of the 2030 Comp Plan is to expand the local job base to support local households and for all residents by creating a business-friendly environment for the creation and establishment of new and local employers, particularly in the wholesale, FIRE (finance, insurance and real estate) and professional industries (such as management and administration). A local approach to job creation should be considered part of a sustainable development strategy.

To that effect, the City of Rosemount intends to and has already actively been using a panoply of financing tools such as Tax Increment Financing (TIF). TIF strategies were utilized for Downtown redevelopment, the Harmony residential neighborhood, and Core Block East and the Waterford Commons development on South Robert Trail. The City also used Dakota County CDA grants and SAFETEA-LU funds for a Park & Ride “facility.”

Existing Conditions on UMore Park

The study area is located in Dakota County, Minnesota, (the third most populous county in Minnesota and one of the fastest growing); and south and east of the City of Rosemount and north and west of the City of Coates. It is delineated on its northern edge by County Road 42, Biscayne Avenue on its western boundary, 170th Street West on its southern portion and ends about half a mile from US Highway 52 (a corridor between the Twin Cities and Rochester) in a line that parallels the Highway, giving the study area a roughly rectangular shape that is 3.5 miles wide and 2.5 miles high. It is fifteen minutes from the Minneapolis-St. Paul International Airport.

The study area is composed of about 5,000 acres, including some 1,800 acres dedicated to a gravel pit operations in its western portion, deeded for the next 40 years. The matrix of UMore Park is essentially agricultural at this point, currently used for some of the University's agricultural research departments. It is a topographically flat area with scattered clumps of existing tree cover throughout, run through with a few unpaved roads.

Of interest is the presence of the Dakota County Technical College, carving some 100 acres from the study area in its north-central portion, and of the decommissioned Gopher Ordnance Works (GOW) in the eastern central portion of UMore Park. It was first opened in 1943 as a smokeless powder production plant and closed soon after the end of World War II. This site may require an environmental clean-up before it can be put to use for residential and commercial redevelopment.

The Work Done to Date by the University of Minnesota

This essentially blank slate has left open the possibility of future development, an option seized upon by the Board of Regents in 2005. Since then, a vast amount of foundational work was done through various consultants and the University of Minnesota's Academic Mission Task Force, created specifically for the purpose of fostering a specific type of development for the Park: sustainable development.

The original University of Minnesota Task Force developed specific values for this mission. They are:

- Sustainability: a model of community that can sustain and weather long-term changes in demographic patterns, real estate demand, costs of transportation, i.e.
- Energy: with a focus on renewable and local sources of energy
- Health: by emphasizing the proximity to parks and open spaces, trails and other outdoor amenities
- Education: through the presence of elementary and high schools (about 130 acres for each plan); existing research facilities on site; leveraging the existing facility of the Dakota County Technical College.
- Environmental stewardship: with a strong focus on parks and existing tree cover, trails, other outdoor amenities; last

but not least, a habitat corridor common to all land use concept plans.

- Connectivity: striving for an even distribution of mixed-use, commercial, civic and residential elements, easily accessible. This ties into the last point, which is,
- Economic contributions to the regional economy: in the form of industrial and eco-industrial parks, an enhanced transportation network (as well as the economic impact of the future gravel pit).

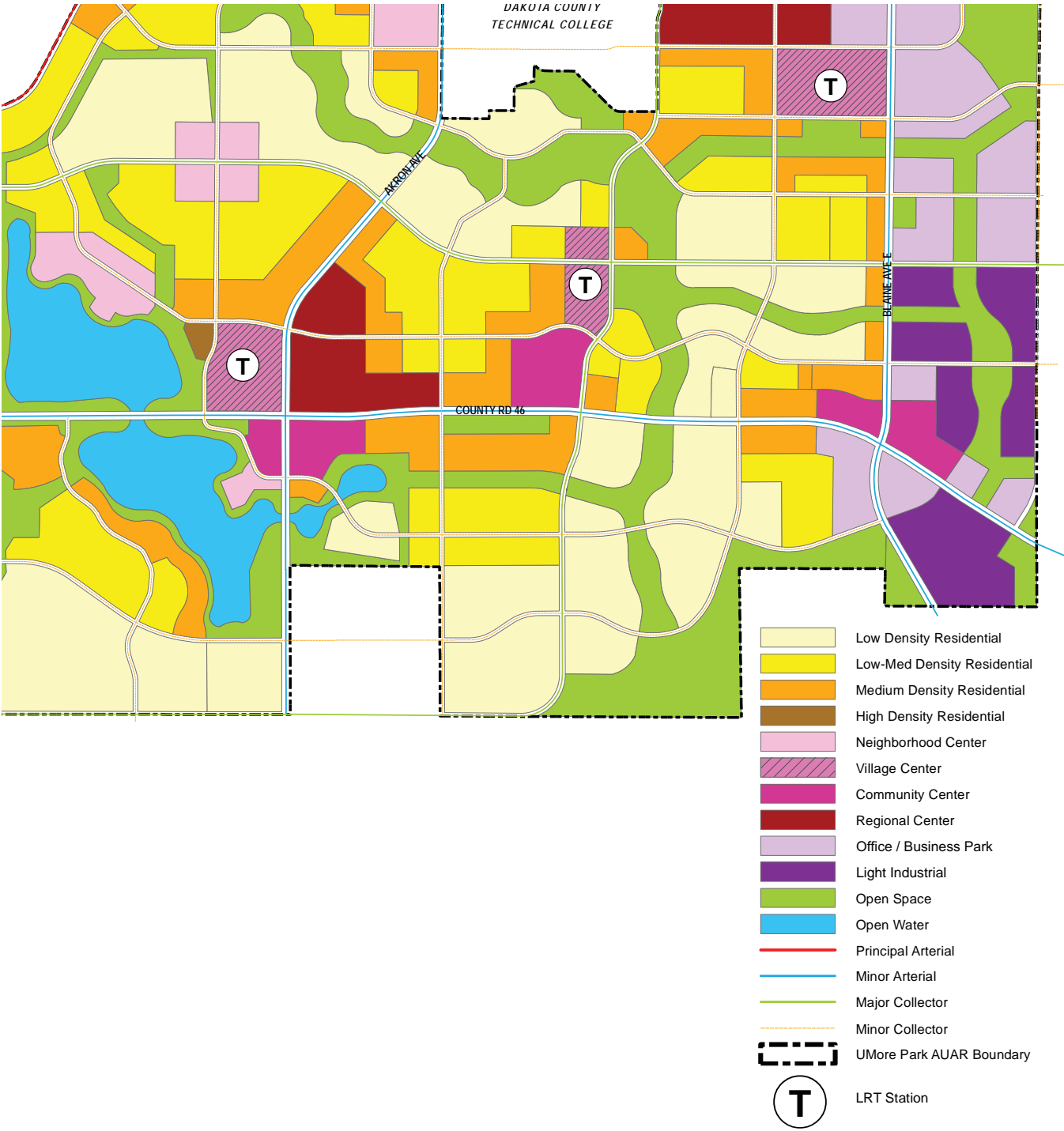
Design Elements

Iterations of land use concept plans over the last 7 years (since 2006) have shown many attempts to shape this sustainable vision. The latest instance, released in the UMore Park Alternative Urban Areawide Review (AUAR) in August 2011 by Hoisington Koegler Group Inc (HKgi) shows a New Urbanist concept, including village and community centers, mixed-use areas; elements of conservation development, with low-density residential areas, open space and water, and natural habitat corridors; and a full assortment of residential housing densities, ranging from 1.5 dwelling unit (DU) per acre to high densities as much as 24 DU/acre.

These design elements are added to light industrial areas, as well as office and business parks, with the stated goal of implementing an eco-industrial park, where local businesses can cooperate with each other and the local community to reduce and share waste streams, pollution and industrial by-products; and efficiently share industrial flows (such as information, materials, water, energy, infrastructure, and natural resources), thereby achieving sustainable development.

A later draft being developed by the UMore Park Academic Mission Advisory Board elaborates further on sustainability goal statements that emerged from the UMore Park/BioRegional process - including a workshop and public meeting in Rosemount - that helps to better define sustainability strategies for the future. It puts forth 10 sustainability principles (for instance, Zero Carbon and Waste, Sustainable Transport and so on), and elaborates on goals for each and every one of them, not unlike the steps that would be taken to elaborate a comprehensive land use plan. This document offers a glimpse of how economic development, environmental protection and social considerations of equity could go hand-in-hand to form a sustainable and livable UMore Park development.

FIGURE 5: UMore Park AUAR



Continuous Research by the University of Minnesota

In addition, and as evidenced by the list of academic faculty and students projects (of which this report is but one of many) that have been completed or are still in progress, the University of Minnesota is applying its intellectual and academic muscle to create new and practical solutions towards implementing sustainable development for UMore Park. These projects are reviewed annually during a meeting of the UMore Park Academic Mission Advisory Board.

To name but a few of them, and only those listed for the Spring 2012 semester:

Materials Performance in Sustainable Building - Blaine Brownell, College of Design

Energy and Indoor Environmental Quality Issues in Sustainable Design - Jay Johnson, College of Design

Ecosystems of Well-being - Dylan Skybrook & Kate Hathaway, Center for Spirituality and Healing

Housing Development and Management - Lyn Bruin, Department of Design, Housing and Apparel

Environmental Law Capstone: Brownfields Redevelopment and Litigation - Alexandra Klass, Law School

These are but the tip of the iceberg. Additional investigation spurs more educational research, which could have a direct economic and environmental impact on the future residents of UMore Park, such as research on smart energy grids.



FIGURE 6

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FIGURE 1

EcoVILLAGE

LOCATION	Loudoun Count, Virginia 10 miles south of Grand Rapids
AREA	180 Acres
FEATURES	<ul style="list-style-type: none"> • LEED Gold Homes • Reforestation of 11,000 trees • Alternative waste water treatment • Cohousing governance
OPEN SPACE	<ul style="list-style-type: none"> • 100 acres donated to Northern Virginia Conservation Trust • 85% of remaining area
DEVELOPER	EcoVillage LLC

HISTORY OF DEVELOPMENT

EcoVillage Mission Statement

"EcoVillage of Loudoun County combines the co-housing ideal of people living together in community with the ecovillage ideal of people living in harmony with Earth and its inhabitants. We aim to restore nature and expand human potential by creating a lifestyle that nurtures the human spirit and offers hope for future generations."

Values

- A simple lifestyle which incorporates respect, work, open communication, humor, free inquiry, fun, and creative expression nurtures the human spirit
- A wise and sustainable society restores biodiversity and integrates the community with nature
- Human health, community health and the health of our planet are interconnected and interdependent
- Every person has inherent dignity and worth regardless of age, sex, race, sexual orientation, abilities, financial resources, or spiritual or political beliefs
- Cooperation and teamwork is our model for interaction
- Collaboration is most likely to occur in an environment which respects individual rights to privacy
- Taking individual responsibility for our own needs and decisions as well as caring about the well-being of others supports community
- Our children deserve special attention, support and nourishment

(ecovillages.com/families_mission)

The concept of the EcoVillage was hatched by a group of four friends with green development experience. They sought to establish a co-housing community that embraced sustainable principles and deep neighborhood engagement. While exploring development sites, the founders of the EcoVillage of Loudoun County recruited other future residents and collaboratively defined a mission, goals, and a shared set of values that would guide the development.



FIGURE 2

COMMUNITY ENGAGEMENT



FIGURE 3

Mission and Goals Prominent within the Marketing Effort

The EcoVillage explicitly markets itself as a neighborhood devoted to environmental conscientiousness and community cohesion. The EcoVillage website, in its marketing effort, consistently highlights that potential homeowners are purchasing a lifestyle as much as a home in EcoVillage. The development's mission statement, values, and long-term goals, along with photos emphasizing the many local social events, appear prominently on the "for families" section of the web page. The ecological and social amenities of the EcoVillage are presented in tandem throughout the marketing material.



FIGURE 4

Knowledge Management

The EcoVillage has a resident-led process for educating potential buyers and mentoring future residents throughout the construction process. Therefore, new residents enter the community with a well-formed understanding of the mission, values, and expectations of the development.

Social, Educational, and Stewardship Events

Social and educational events are a keystone of the EcoVillage community. Committees of the EcoVillage assume responsibility for coordinating weekly events. In addition, residents are required to contribute a minimum number of service hours every month towards to stewardship and land management tasks.



FIGURE 5

Governance

The governance structure of the EcoVillage Community Association (EVCA) makes room for and facilitates deep involvement from multiple residents. The EcoVillage utilizes a sociocratic style of governance, which is comprised of a "General Circle", functioning in the manner of an executive management body, and several committees. Experts from outside the community are invited to join to the EVCA Board to provide guidance to the General Circle.

FINANCING

Energy Efficient Mortgage

The EcoVillage encourages the use of Energy Efficient Mortgages (EEM). EEM's may be secured to purchase or build homes that meet certain efficiency standards. These loan products allow borrowers to stretch the debt-to-income ratio as future energy savings are factored in at the outset. Energy Improvement Mortgages (EIM), a loan product in the same family, allows borrowers to include the cost of energy efficient improvements within the mortgage for the purchase of an existing new home.

Pre-Development Financed by Private Debt and Equity

The developer was unable to secure bank financing for the majority of the predevelopment costs, but rather cobbled together private financing and equity. The EcoVillage was able to secure institutional financing only after final subdivision approval. This financing was primarily used for roads.

The County required the developer to establish a maintenance fund, to which the HOA would later make annual contributions, to cover the costs of road maintenance.

Building Costs Financed by Individual Lot Owners

The developer chose to sell lots rather than construct homes. Upon purchase of a lot, owners may choose from six home building plans commissioned and approved by the developer. Lot owners pay for the privilege to use the building plans as well as the cost of any design modifications. The developer points to the decision to sell lots rather than constructed homes as a key reason behind the slow sales.

Common Space Property Taxes Assessed to Homeowners

The County assesses a taxable value of zero to all common open spaces. In lieu of taxing the land directly, homeowners are assessed an additional fee based upon the benefit of living adjacent to the land.

When sales fell short of projections, the developer shrank the size of the EcoVillage and passed on 100 acres to the Northern Virginia Conservation Trust. This reduced the property tax burden on individual lot owners

Open Space Stewardship Financed by Homeowner Dues

The EcoVillage, LLC manages revenue and expenses under the direction of the ECVA. The ECVA establishes stewardship priorities and oversees the execution of projects. The mandatory service hours for residents mentioned earlier, coupled with support from outside volunteers, lowers the cost of on-going maintenance.

LAND USE & THE ENVIRONMENT

Density

The EcoVillage is a conservation cluster development with a density of 2.3 lots per acre (28 lots among 12 developable acres). Therefore, residential construction is limited to discrete areas. This minimizes the disturbance of natural habitat and shrinks the footprint of road and utility infrastructure.

The developers hoped to construct multifamily housing to achieve greater density. However, Loudoun County would not grant a variance from the single family home requirement. To allow for greater density within zoning excludes multifamily housing, and each lot had to be designed to accommodate two dwellings. Therefore, lot owners may build two dwellings at the outset or choose to add a dwelling at a later date.



FIGURE 6. ECOVILLAGE SITE PLAN

Design for Social Interaction

Within the EcoVillage, homes and common spaces are situated to encourage interaction among neighbors. In addition to the proximity of the dwellings, the placement of homes and pathways encourage physical and social activity in common pedestrian spaces.



FIGURE 7

Environmental Restoration Supported by Partnerships

On-going land management is one of the central priorities of the EcoVillage Homeowners Association. Eighty-five percent of the EcoVillage's 80 acres have been designated as permanent open space. EcoVillage community members, supported by outside volunteers and partner organizations, have executed substantial restoration efforts. For example, the EcoVillage planted 11,000 trees to jumpstart reforestation of the site through material and technical support from the State of Virginia's Forestry Service. The EcoVillage's management plan emphasizes forestation, the restoration of riparian habitats, and the elimination of invasive species. The community's efforts have been so successful that the land has been designated as a Certified Home Wildlife Sanctuary by the National Audubon Society

Further highlighting the importance of partnerships, when the EcoVillage fell short of reaching early occupancy goals, 100 of the EcoVillage's original 180 acres were donated to the Northern Virginia Conservation Trust and placed under permanent conservation easement. This left the nascent EcoVillage community with a more manageable scope of stewardship responsibilities.

Environmental Guidelines and HOA oversight of private lots

EcoVillage Architectural and Environmental guidelines ensure ecologically friendly site and landscape design. The EVCA oversees activity on private lots to ensure that homeowners adhere to the EcoVillage's high environmental standards.

ENERGY

Site and Building Design Optimize Passive Solar Energy

Site and building plans take advantage of passive solar energy to reduce lighting and heating costs. The master plan delineates a unique solar envelope, or the zone of optimal sun exposure, for each lot. Buildings are designed and situated to take full advantage of this envelope. In addition, building and landscape activity may not “trespass” on the solar envelope of adjacent lots.

The developer identified a list of approved materials to ensure maximum energy efficiency, with regards to both on-going energy performance as well as the embedded energy of the home. For some features, a homeowner may choose an alternative product if it complies with the designated performance standard.

In order to ensure that builders possess the required expertise to execute the passive design features, EcoVillage Architectural and Environmental Guidelines require the construction manager and 30% of each contractor’s workforce to have LEED Accredited Professional Certification or Green Advantage Practitioner Certification.



FIGURE 8

Alternative Energy Sources

There is some variation among homes. For instance, the developer encourages the use of geothermal heating/cooling systems, yet some homeowners have elected to install photovoltaic or solar thermal panels. The regional utility provider pays residents for any energy they contribute back to the power grid.

WATER RESOURCE MANAGEMENT

Progressive Zoning

The developers chose Loudoun County, in part, due to zoning that allowed for progressive water management practices. The Loudoun County Rural Hamlet Ordinance allowed for the placement of ganged septic systems and drainage fields in lots designated for common open space rather than within the lot serviced by system, as was a standard requirement in many counties. The County also provided a variance for well placement. The Health Department's standard requirements call for wells to be placed on the lot they service. The placement of wells on common lands were permitted. These were essential prerequisites for the cluster design and to maintain small lot sizes.

The County and State also allowed the EcoVillage to use experimental septic systems designs. In some of the newer homes, builders were able to install composting toilets and grey water recycling systems to minimize the need for drainage fields.

The developer originally hoped to use constructed wetlands to treat wastewater. In the end, the developer determined the cost of wetland construction, coupled with the cost of the experimental protocol process, as required by the state of Virginia, to be prohibitively expensive.

STORMWATER MANAGEMENT

Native Vegetation Preservation and Restoration

Eighty-five percent of the EcoVillage is designated to remain as permanent open space. The EcoVillage's homeowner association oversees intensive restoration and reforestation efforts on much of this land. This serves to reduce the volume and rate of stormwater runoff. Particular attention has been paid to protection and restoration of riparian lands. This serves to reduce erosion and, therefore, the number of particulates and contaminants in the EcoVillage's stormwater runoff.

Organic Yard Management Requirements

All open spaces and private yards must follow Virginia's organic food laws for weed and insect control. This reduces the amount of toxic pollution in the stormwater runoff.



FIGURE 9

ECO-INDUSTRIAL & ECONOMIC DEVELOPMENT



FIGURE 10

Plan for Future Mixed Use

While the EcoVillage has no current commercial or economic activity, the master plan allows for such uses should the opportunity arise. The EcoVillage's agricultural land could be cultivated by current residents or leased to small-scale organic farmer. Zoning permits the construction of a small-scale office space on a few of the lots. These could be leased as workspace or as retail space to complement future on-site agricultural activity.

Common House

Residents are planning for the construction of a Common House to stage fundraisers, social events, and other activities to engage people from outside the development in supporting its environmental restoration efforts.

Long Commute to Employment Centers

Outside of agricultural activity, there are few local employers or opportunities to create linkages with other industries. Most residents work from home or commute forty-five minutes to various employment centers in the DC Metro.

Transit

The EcoVillage is a ten-minute drive from a MARC commuter rail that connects to the DC Metro.

FINDINGS APPLICABLE TO UMORE

- **Zoning that is amenable to sustainable development has the potential to attract niche developers who will assume leadership for pursuing high environmental standards.** Loudoun County's Hamlet ordinance and the allowance attached to it posed fewer regulatory barriers to the developer's vision for sustainable site design and utility infrastructure.
- **The build-to-demand model allowed the development to evolve slowly and wait for residents that were the right fit for the development.** Selling lots rather than pre-built home offered the developer the freedom to weather slow sales and wait for buyers that were the right fit for the vision.
- **High environmental and community standards may limit the pool of potential consumers, but will serve to attract allies more likely to commit to the vision of the development.**
- **A plan for cultivating leadership and involvement among residents is key.** The EcoVillage has a governance and sociocratic structure that necessitate and facilitate deep involvement from the local residents.
- **Partnerships with established stewardship organizations can support homeowners in pursuing ambitious land management goals.** Such partnerships within the EcoVillage allowed to plant several thousand new trees as well as pass on stewardship responsibilities that proved to be too unwieldy for the nascent community.

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FIGURE 1

WILD MEADOWS

LOCATION	Medina, Minnesota 20 miles west of Minneapolis
AREA	350 Acres
FEATURES	<ul style="list-style-type: none"> • Stormwater treatment chain • Restored native habitats, including wetlands, prairie and forest
OPEN SPACE	200 Acres
PRICE RANGE	\$400k-\$3MM for single family homes
DEVELOPER	The Bancor Group Inc.

HISTORY OF DEVELOPMENT



FIGURE 2

Pre-Development

The pre-development phase of Wild Meadows occurred during a development moratorium in the late 1990s. The Planning Commission imposed a moratorium in order to allow the City time to reevaluate and define its development priorities amidst a construction boom. The Bancor Group Inc., the would-be developer of Wild Meadows, closely followed the drafting of the PUD ordinance, PUD 1. PUD 1 codified a commitment to preservation of open space and environmental restoration. If any developer hoped to move forward with a new project, they would need to follow a conservation-development model. The Bancor Group presented *Prairie Crossing of Grayslake, Illinois* (page 68) to Medina as a paragon example of this strategy. The Commission, hoping to bolster Medina's reputation in the region by creating a similarly innovative development, approved Wild Meadows after a lengthy public review process. A host of conditions accompanied its approval. As this occurred in the early 2000s, during the peak of the housing boom, the developer was willing to assume these additional costs and burdens.

Medina required the developer to do the following:

1. Replace any natural features that would be destroyed during the construction process
2. Restore natural features that had been destroyed as the result of previous uses
3. Create prairies, wetlands, and savannah in undeveloped open spaces
4. Employ the same storm water treatment chain strategy that had been implemented in *Prairie Crossing*
5. Establish covenants that would preserve the open space in perpetuity
6. Establish a homeowners association (HOA) with bylaws that would ensure the on-going management of the site using "adaptive management"
7. Establish a stewardship account to be funded by the developer, lots sales, and HOA fees.

Pre-Construction

A turkey farm previously occupied the Wild Meadows site. Therefore, the developer inherited several of the residual environmental challenges caused by commercial farming. All of the bodies of water on the site were highly autotrophic. Much of the native diversity of the site had been destroyed by overgrazing. Neglect exacerbated these conditions as overgrown tree canopies and invasive species prevented the natural re-diversification after the turkey farm no longer occupied the site.

Adaptive management holds that conservation management plans should be iterative. The process begins by capturing baseline measurements of chosen indicators prior to restoration. Change in these indicators, measured at subsequent intervals, inform management strategy going forward. (source: Kim Chapman)

The Bancor Group hired Applied Ecological Services (AES), the environmental consulting firm responsible for the Prairie Crossing environmental accomplishments, to manage the conservation and site planning for Wild Meadows. The City of Medina made two key demands of the environmental planning and management process. The first was that AES would need to conduct a full natural resource inventory. Conservation and restoration work needed to preserve and enhance any existing environmental strengths. The second was that AES would need to establish an adaptive management plan (left).

COMMUNITY ENGAGEMENT



FIGURE 3

Marketing the Conservation Vision

While Medina had approved Wild Meadows for its ability to showcase conservation development for the City, conservation elements were not at the forefront of the developer's marketing efforts. The open space was a compelling amenity but other factors primarily attracted most buyers to the development: the development offers luxury home in a wealthy corner of the Twin Cities, within a high-performing school district.

Knowledge Management

Realtors were handed the responsibility of educating potential buyers as to the conservation elements of the development as well as the restrictions attached to the individual lots. The developer would remain the controlling member of the Homeowners Association until 50% of the lots were sold. When 90% of lots had been sold, the developer would begin to exit the HOA. During this time, the developer would coach the HOA on the stewardship requirements and responsibilities they would eventually assume. In addition, the HOA would be responsible for passing this information on to new homeowners. The agreement with the city also required the HOA to retain an ecologist to advise them on their land stewardship plan.

The developer maintained an active presence on the Wild Meadows HOA for the first two years. During this time, the developer was able to ensure that the conservation guidelines remained a priority. The HOA's commitment to the conservation guidelines broke down after the developer ended its involvement and homes began to transition to second or third owners. Many of the new buyers seemed unaware Wild Meadow's status as a conservation development. While new owners signed the conservation covenants at the time of closing, the full importance and implications of these seemed to get lost in the transition.

The Homeowners Association Assumes New Priorities

The priorities of the HOA shifted upon the introduction of new leadership. By 2008, active HOA members prioritized aesthetic improvements over faithful adherence to the conservation guidelines. For examples, several homeowners violated the conservation easements by installing tile drains in sections of their yards that failed to drain in early spring. They seemed unaware or unconcerned that installing these tile drains within conservation easements impacted the ability of the bioswales to retain water, and therefore disrupted an important component of the storm water management chain. The homeowners association also elected to make landscaping changes that disrupted some of the habitat restoration areas.

Pursuing Corrective Action: Financially and Politically Impractical

Though the law allows the City of Medina to take corrective action against violations of the conservation covenant, practical barriers often precluded the execution of such. Violations can easily escape detection as they do not require a permit. Further, seeking corrective action can be a resource-intensive process. At all times, the City must weigh the costs of pursuing remediation against the harm exacted by the violation.



FIGURE 4



FIGURE 5

FINANCING

- The developer paid the full cost of the infrastructure and restoration work. The sale price of homes within Wild Meadows ranged between several hundred to 3 million dollars. This high price point allowed the developer to cover the cost of the open space and restoration requirements while maintaining low-density.
- The developer assumed some income could be earned through the Wetland Banking. However, in the end, the developer failed to garner any substantive profit from this scheme. This was due to the high cost of restoring the wetland to the required standards, coupled with difficulty selling the credits.
- The Metropolitan Council split the cost of collecting data for adaptive management plan with the developer.
- The cost of on-going maintenance of the open space is covered by a trust established by the developer and maintained by HOA dues. HOA dues are roughly \$1,000 a year per household.

LAND USE & THE ENVIRONMENT



FIGURE 6

Site Plan

AES used a strategy referred to as “conservation design development” to site lots and roads. This strategy employs the following principles:

- Integrate homes with the natural environment
- Minimal disturbance of natural environment and good quality habitat
- Minimize the need for grading and soil movement
- Restrict developments to discrete locations to minimize infrastructure costs
- Meet or exceed all Federal, State and local environmental preservation and storm water management requirements.

The site plan faithfully adhered to these principals aside from a section of native forest that had to be removed in order to site a profitable number of lots.

Density Exemption

The Metropolitan Council exempted the land set aside for open space from Medina’s overall density requirement. A site plan of such low-density may not be approved in present-day Medina, as the Metropolitan Council less reliably grants said exemptions nowadays.

Native Habitat Restoration

200 acres of the 350-acre site are designated for preservation/restoration. AES thinned tree cover and removed invasive species in order to allow for the reemergence of native flora to the forest floor. AES created acres of prairie with diverse vegetative structure to provide suitable habitat for a variety of native species. During the construction phase, Medina reviewed all landscaping plans to ensure that no invasive or incompatible plant species would be introduced to the site and that the restrictions attached to conservation easements were followed.

Within two years, AES found that a variety of native flora and fauna returned to the site. Of particular note was the return of several species that are sensitive to habitat fragmentation. The contiguous layout of the restored open space as well as the integration of natural corridors between discrete sections

of open space facilitated this reinsertion.

Set Backs Caused by Initiating Habitat Restoration and Construction Concurrently

Environmental restoration and construction began simultaneously. This posed a few challenges. Some of the early restoration was inadvertently destroyed by the builders and had to be redone at no insignificant cost to the developer. Ideally, the environmental restoration work will have a lead time of six months to provide time for the ecology team to identify and clearly mark “safe travel zones” for construction equipment. This also provides the restoration work time to develop greater resiliency against potential disruptions caused by the construction process. However, few developers would be willing to assume the costs associated with a six month construction delay



FIGURE 7

STORMWATER MANAGEMENT

Innovative Storm Water Treatment Chain

Wild Meadows utilizes a storm water treatment chain method (see sidebar). Prairie Crossing was the first development in the country to implement such a method. Wild Meadows was just the second in the state to attempt this innovative passive storm water management system.

Stormwater Treatment

The storm water treatment chain employed in Wild Meadows begins with upland bioswales. These are placed in HOA managed open spaces as well in conservation easements throughout private lots. Covenants attached the sale of each property restrict the type of landscaping and alterations homeowners may make within these easements. These bioswales drain into wet and dry prairies, followed by emergent wetlands. Both serve to retain significant volume. The storm water change ends with open water. V-notch weirs attached to the open water serve as passive control for the rate of storm water runoff.

The results of follow-up monitoring at the one-year and two-year mark found that the storm water controls effectively managed the volume and rate of storm water runoff. The impact of the system on phosphorus and nitrogen levels were less conclusive.

Development Phase: Quality Control

Due to the fact that essential components of the storm water management chain fall within private lot boundaries, ensuring the builders followed the conditions of the conservation restrictions was essential. The developer, along with AES, assumed responsibility for educating the builders. Five separate builders and twelve landscape architecture firms were involved, and ensuring accurate communication and quality control posed some challenges. Overcoming these issues required substantial time investment on behalf of the developer. The City of Medina provided some direct oversight as well. All landscape architects were required to submit design plans and a planting list to ensure that they followed the easement restrictions and prevent the introduction of invasive species.

Post Development Quality Control Breakdown

Several homeowners violated the conservation easements by installing tile drainage. Homeowners may have chosen to do so in response to frustration over the fact that segments of their lawns failed to drain properly. They seemed unaware or unconcerned that installing tile drains within conservation easements impacted the ability of the bioswales to retain water, therefore compromising an important component of the storm water management chain.



FIGURE 8

FINDINGS APPLICABLE TO UMORE

- **The HOA land stewardship model has inherent risks and opportunities.** With adequate technical support and internal environmental champions, HOAs have less ability to successfully fulfill stewardship responsibilities. In fact, environmental principles can break down quickly if the HOA does not have the will or ability to maintain them. In such cases, the city may have little recourse. The harm caused by the violation of the environmental agreement may not justify the potentially high financial and political costs of pursuing corrective action.
- **Knowledge management is key to passing on the stewardship vision of the development.** After the developer exited the HOA, an adequate knowledge management plan failed to materialize. Many new homeowners were either unaware of the conservation restrictions attached to their lots and the open spaces, or were not persuaded by their importance. Therefore, HOA and homeowner actions after the developer exited compromised the stormwater management chain and the integrity of the restored native space.
- **Internal champions are essential to carrying the stewardship vision forward.** Without internal champions, new HOA leadership faced few barriers to assuming new priorities over conservation management.
- **Honor the appeal of traditional landscaping.** There can be a steep learning curve among consumers with regards to appreciating the value and unique aesthetics of native restoration. To make native restoration more palatable to a wider audience, the developer should frame native areas, points of entry, and highly trafficked areas with manicured landscaping.
- **The stormwater treatment chain method has demonstrated to be highly effective** for the rate and volume of runoff.
- **Keep important elements of the storm water treatment chain on public lands.** Conservation requirements can be difficult to enforce on private lots. Siting these features on private lots can pose barriers to protecting the integrity of the system.

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FIGURE 1

MILL CREEK

LOCATION	Kane County, Illinois 45 miles west of Chicago
AREA	1,500 Acres
FEATURES	<ul style="list-style-type: none"> • Community center and parks • Downtown mixed-use, office and retail space • Restored native habitats, and preserved wetlands and prairie
OPEN SPACE	650 Acres (43%)
DENSITY	1.6 DU/acre 27,400 sf/lot
PRICE RANGE	\$200-600K
DEVELOPER	ShoDeen Homes



FIGURE 2

HISTORY OF DEVELOPMENT

The Mill Creek development is located in unincorporated Kane County, Illinois, 45 miles west outside of Chicago. It is a 1,500-acre, large-scale, mixed-use community, with a large diversity of housing types, retail centers and community centers and amenities. It is also built using a conservation development approach, with over 40 percent of the site set aside as open space. In addition, most of the land use adjacent to the development is agricultural.

Kane County suffered major flood damage in 1996. In addition, its proximity to the Chicago metropolis has induced significant population growth, with a 60 percent population increase between the 1990 and 2010 US Censuses (from 317,000 to 515,000 residents).

Concerns over the impact of this population increase drove the County planners to develop watershed and resources management plans, including the establishment of a Mill Creek Watershed District, to control the growth and negative urban sprawl. These plans promote conservation design with the goals of improving local water quality and protecting open space to mitigate the potential for future flood damage. A large focus has been placed on prairie and wetland maintenance and restoration.

In 1998, ShoDeen Homes, a Geneva developer, applied to and was given the right to develop land in the Watershed District using the abovementioned conservation development design. Though unincorporated, Kane County remains in charge of most municipal services for the development, including street and right-of-way maintenance, and police (Kane County Ordinance #94-356).

FINANCING

Special Service Area

Special Service Areas (SSA) provide local governments with the power to levy an additional tax over a discrete zone within a larger district. They are often used to support and implement a wide-array of physical improvements such as roads, water, sewer, stormwater, curbs and gutters. In the case of the Mill Creek development, Kane County created the SSA to levy specific taxes to maintain and restore the Mill Creek Watershed District. The tax is collected through the property tax system, and is calculated on the basis of benefit, but is not a part of the Illinois real estate property tax system.

A copy of a contract between Kane County and a prairie restoration specialist:

Mill Creek 2011 RFP				
Description	Qty	U/M	Rate	Total
Herbicide Application - Weeds will be selectively sprayed or wicked with the appropriate herbicide where found on site. Annual weeds will be spot mowed as necessary to avoid using chemicals where possible. Herbicides will be limited to varieties (or equivalents) listed in specifications. Where a different herbicide may be needed, a request for approval will be submitted to Kane County. Stewardship visits will be timed to take place roughly three times throughout the growing season. Each complete visit will involve targeting weeds in all areas of the property. A complete visit may take several days to complete. The primary goal will be to eliminate weeds before they can go to seed.	3	Visit	15,900.00	47,700.00
Prescription Burn - After all permits and permissions are acquired & all adjacent neighbors are notified we will perform a prescription bur of roughly 1/3 of the property each season. Burn will be in accordance with guidelines set forth in specifications provided by Kane County. Additionally, a burn plan as outlined by the Illinois Prescribed Burning Act will be created and approved by Kane County before the burn will take place. In addition to \$290, burn manager will also be a Certified Prescribed Fire Manager as required by the Illinois Prescribed Fire Act. All crew members on the burn will of a minimum have been through the Chicago Wilderness burn training program.	1	Each	6,425.00	6,425.00
Vegetative Inventory - Meander survey of all areas will be performed two times during the growing season to get an accurate inventory of the species present. All findings will be compiled in a year end report and delivered to Kane County. We recommend doing this every three years, but it can be completed annually if required.	1	Each	6,625.00	6,625.00
Native Seeding - As needed, native enhancement seeding can be performed throughout all of the natural areas. Prices for items below are separated according to type of seeding and method of installation. Drill seeding is only recommended for continuous areas larger than 1 acre. Prairie Seeding by Hand	1	acre	950.00	950.00
Total				

FIGURE 3

Savings Produced by Conservation Design

A cost analysis completed in 2007 compared the development cost for 40 acres of Mill Creek with the development costs of 30 acres of a conventional development in Kane County with similar building density and location. The conservation site design techniques used at Mill Creek saved approximately \$3,411 per lot. Nearly 70 percent of these savings were the result of reduced stormwater management costs, while 28 percent were derived from site preparation and infrastructure costs associated with cluster design.

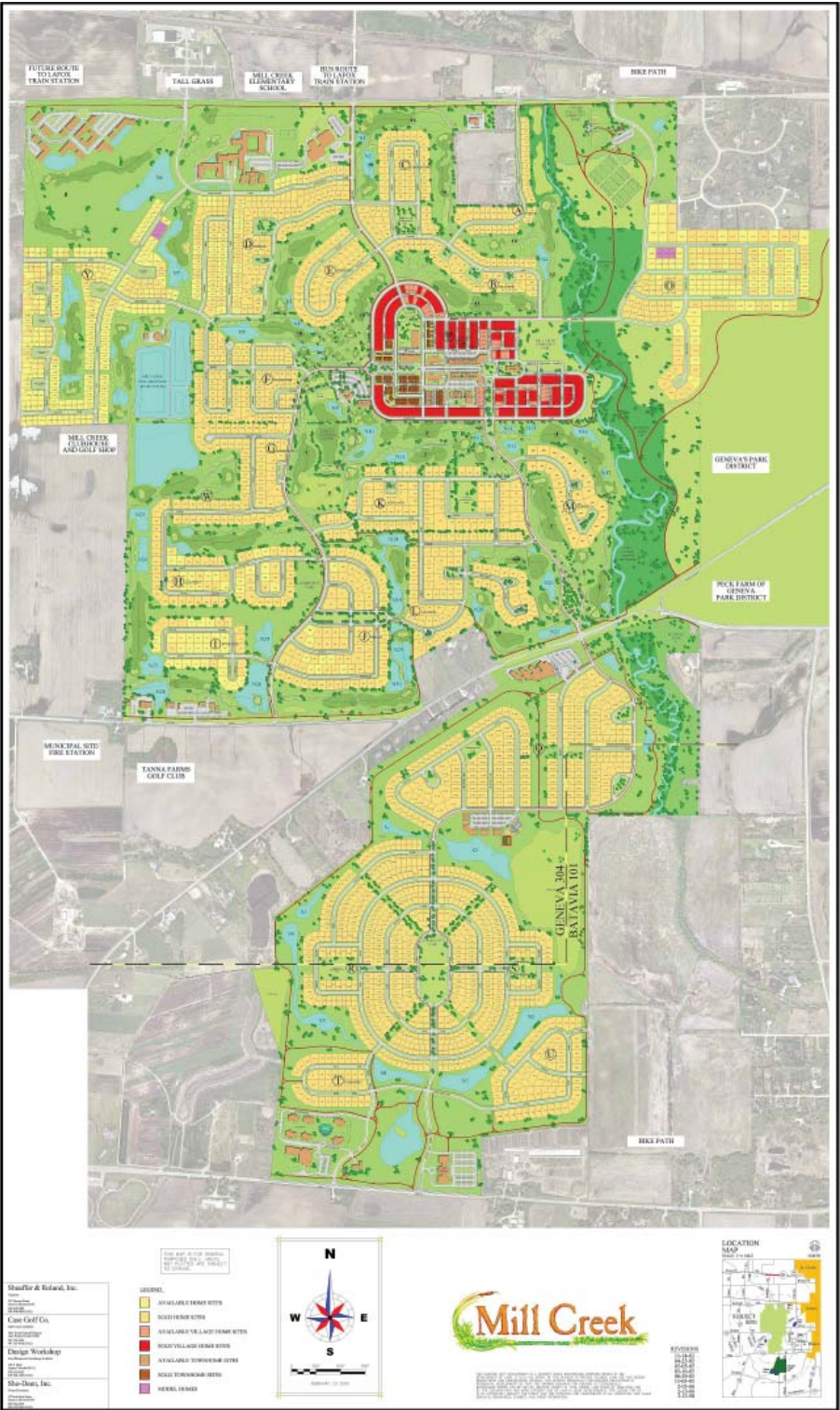
Conservation Design Positively Impacted Property Values

The conservation design at Mill Creek had a positive effect on property values. The 2007 study found that properties adjacent to walking and biking trails demonstrated a \$3,000 premium. Lots adjacent to, or with views of, open space demonstrated a premium of \$10,000 to \$17,500.



FIGURE 4

LAND USE & THE ENVIRONMENT



Cluster Design

The Mill Creek development was built using a cluster development design. This design strategy results in a lower ratio of impervious surface than conventional developments. Some of the preferred construction techniques used within cluster design reduce site preparation costs. These include minimizing topsoil removal during the grading process and reducing the length and width of streets.

Native Prairie Restoration

The county design requirements called for substantive native prairie and wetland preservation and restoration.

FIGURE 5

STORMWATER MANAGEMENT

Cluster design done well lends itself to successful natural stormwater management. The large segments of preserved open space coupled with constructed upland bioswales proved to effectively reduce the rate and volume of runoff.

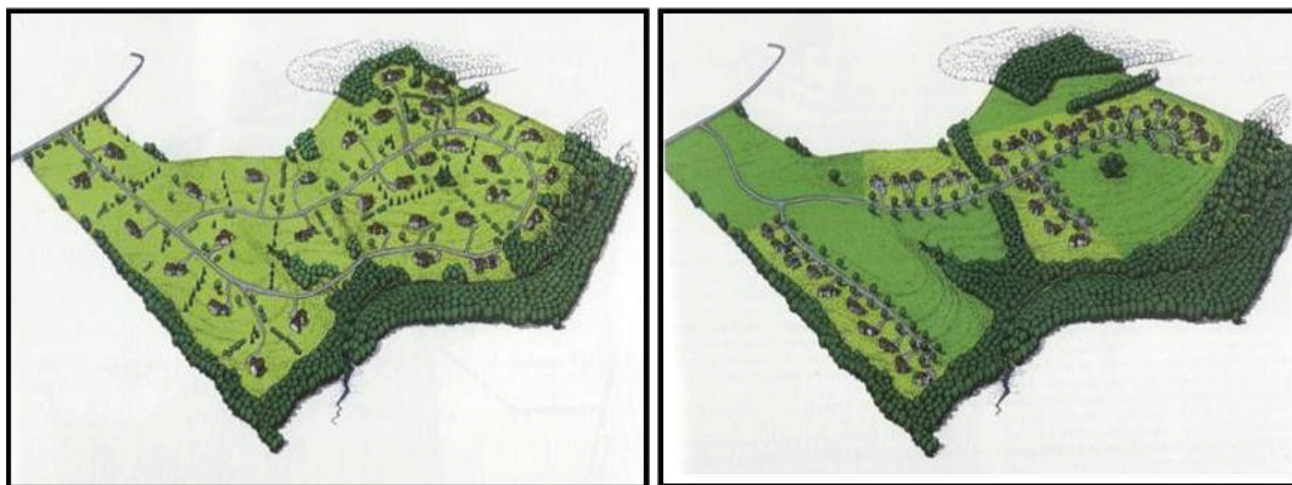


FIGURE 6. COMPARISON OF CONVENTIONAL RURAL DEVELOPMENT (LEFT) AND CONSERVATION DEVELOPMENT (RIGHT).

FINDINGS APPLICABLE TO UMORE

- **There are advantages to top-down land management strategies.** As Kane County retained control over land conservation stewardship and established an SSA, the local government possessed the resources and authority to ensure the on-going maintenance of restored habitats.
- **Stormwater management through the strategic preservation of open space and cluster design strategies produce both positive environmental impacts and financial savings.**



FIGURE 7

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FIGURE 1

PRAIRIE TRAIL

LOCATION	Ankeny, Iowa 16 miles north of Des Moines
AREA	1,100 Acres
FEATURES	<ul style="list-style-type: none"> • Currently 70-100 single family homes • Pop. 10,000 (expected) • Retail Commercial • Industrial near John Deere • Schools • Anchor Tenants: National Soybean Institute, Future Farmers • Community Farm
DEVELOPER	DRA



FIGURE 2

HISTORY OF DEVELOPMENT

Abridged Timeline

1942	Federal government munitions plant
1946	Iowa state acquires land for farm use
1967	Iowa state sells land on southeast corner for DMACC
2002	The Iowa General Assembly declares that the Iowa State University dairy research farm inhibits Ankeny's future growth, approves sale of land.
2005	City purchases land, immediately sells it to developers
2006	Participation process/charrettes/master plan created
TO DATE	Development slowly progresses

The history of Prairie Trail is remarkably similar to the history of UMore. During World War Two, Prairie Trail was a munitions factory where the government manufactured machine gun bullets. The plant was closed at the end of the war and the site was sold to Iowa State University for dairy research.

During the 45 years Iowa State owned the Prairie Trail site, the nearby city of Ankeny and the Des Moines metropolitan area experienced significant growth. The city of Ankeny grew entirely around the Prairie Trail acres. Two of the major stakeholders located adjacent to Prairie Trail are John Deere and the Des Moines Area Community College (DMACC).

In the late 1990s, an Iowa state senator and congressional representative wrote legislation that would allow the university to sell the land and keep the proceeds. Unfortunately, without any infrastructure, Iowa State University was unable to sell the land at market value.

In 2002, the University and the City of Ankeny decided that the best way to transfer the development rights was to have the Iowa senate pass a resolution authorizing the sale of Prairie Trail from the University to the City of Ankeny. The City of Ankeny would then immediately sell the property to a developer.

DEVELOPMENT HISTORY

In late 2003, the City of Ankeny released an RFP for a master developer and the transfer of development rights from the University to the City to the developer occurred in 2005.

Prairie Trail has developed slowly as construction has been measured in light of the economic downturn. Currently, although much of the site is undeveloped, schools, some office space, and medium-density homes have been built. Plans to develop to the specifications of the original land use plan are still in place.



FIGURE 3

FINANCING

In the late 1990s, the cost of infrastructure investment was a barrier to finding a developer for the Prairie Trail site. In 2002, when the University agreed to sell development rights to the City of Ankeny, it allowed Ankeny to pursue a sophisticated financing agreement with the developer. This agreement would ease the developer's cost burden of infrastructure investment.

Ankeny and the developer, DRA, coordinated to create a civic trust fund. The civic trust fund was an agreement that, for every \$1 the city invested into the Prairie Trail site, the developer would reimburse the city \$1.25. Cumulatively, the City pledged to spend \$20 million, and the developer \$25 million.

The fund allowed the City to use tax-increment-financing (TIF) and other resources to build infrastructure, including roads, power lines, and sewers, in Prairie Trail. The developer, in return, granted the city property within Prairie Trail including wetlands, parks, a police station, schools, a recreation center and other public facilities. The general idea was that, with the City's initial infrastructure investment, Prairie Trail's development would be quicker, and, subsequently, the City would recoup its investment sooner.

Section 1.4 Civic Facilities. The City agrees to facilitate and assist Developer in the planning processes for the design and construction of civic facilities including, but not limited to:

- public and stakeholder involvement processes
- acquisition and oversight of architectural services
- financial analysis and business plans for each facility
- site selection for each facility
- construction oversight

Section 1.5 City-owned Property. The City agrees to conduct an assessment and, as necessary, develop and implement a response to environmental conditions of the City-owned property to a level required by regulatory agencies.

Section 1.6 Essential Infrastructure. The parties shall jointly undertake the responsibility to design and plan the essential infrastructure to include streets, sewer, utilities, etc. necessary to develop the Property consistent with a mutually agreed upon Master Development Plan.

FIGURE 4

LAND USE & THE ENVIRONMENT

Land Use Plan Design

The Prairie Trail Land Use plan was created by DRA, the City of Ankeny, and the design team. Major stakeholders, including the Des Moines Area Community College (DMACC) and John Deere, were consulted as part of the planning process. The design team held charrettes to involve the Ankeny community. The resulting land use plan emphasized new urbanist features including smaller lot sizes, density, and a town center. Although the economic recession has slowed Prairie Trail's development, DRA and the City of Ankeny have remained loyal to their original vision of the site. Normal density in the Ankeny area is about 3 units per acre, but Prairie Trail was envisioned as 5 to 7 units per acre.

In addition, the Planned Unit Development (PUD) agreement between DRA and the City of Ankeny set standards for green space corridors.



FIGURE 5

LAND USE & THE ENVIRONMENT

Integration with Adjacent Land Uses

The plan integrated Prairie Trail land uses with those of the surrounding community. The plan had the John Deere plant, to the north of Prairie Trail, bordered by offices and warehouses. John Deere was so integrated into the land use plan that the facility agreed to the conservation measures established for Prairie Trail proper. To the south, Prairie Trail built 500 units of student housing in a 'Campus Precinct' adjacent to DMACC, and located the town center close enough to DMACC to capitalize off of the market potential of the student body. To further coordinate with DMACC, Prairie Trail established a scholarship fund. For every parcel sold, Prairie Trail dedicates half of every 1% to a fund administered by DMACC that will help pay for any student living in Prairie Trail to attend college.

Design

Design elements for Prairie Trail were either written in to the PUD agreement or a design guideline pattern book. Instead of zoning, through the PUD agreement, DRA and the City of Ankeny created precincts within Prairie Trail. Whether a use is permitted or conditional depends on its precinct. The precincts allow for flexibility of lot sizes, setbacks and alleys, independently of Ankeny's zoning code.

An architectural review board, comprised of the developer, elected officials and community members, enforces the PUD. The architectural review board is an officially acting board of the City of Ankeny, and oversees building materials and holds the development accountable to its original goals.

FIGURE 6



LAND USE & THE ENVIRONMENT



FIGURE 7

Transit

The Ankeny Express, the name for the Des Moines Area Rapid Transit (DART) Bus Rapid Transit (BRT) route, has the highest ridership of any community in the region. Once Prairie Trail develops enough to hit DART's ridership threshold, they plan to lobby for a route that arrives at Prairie Trail. Currently, the DMACC Express runs from the community college to downtown Des Moines.



FIGURE 8

STORMWATER MANAGEMENT

The Prairie Trail stormwater management plan incorporated the treatment train principle of Prairie Crossing, IL and Wild Meadows, MN. This method includes storage and management through riparian corridors, swales and small channels, native vegetation restoration, and the creation of water amenities including streams, ponds and wetlands.

One of the main challenges of the Prairie Trail stormwater management plan was incorporating water runoff from the John Deere plant into Prairie Trail's system. The team is still working on integrating John Deere runoff and extending it into Prairie Trail.

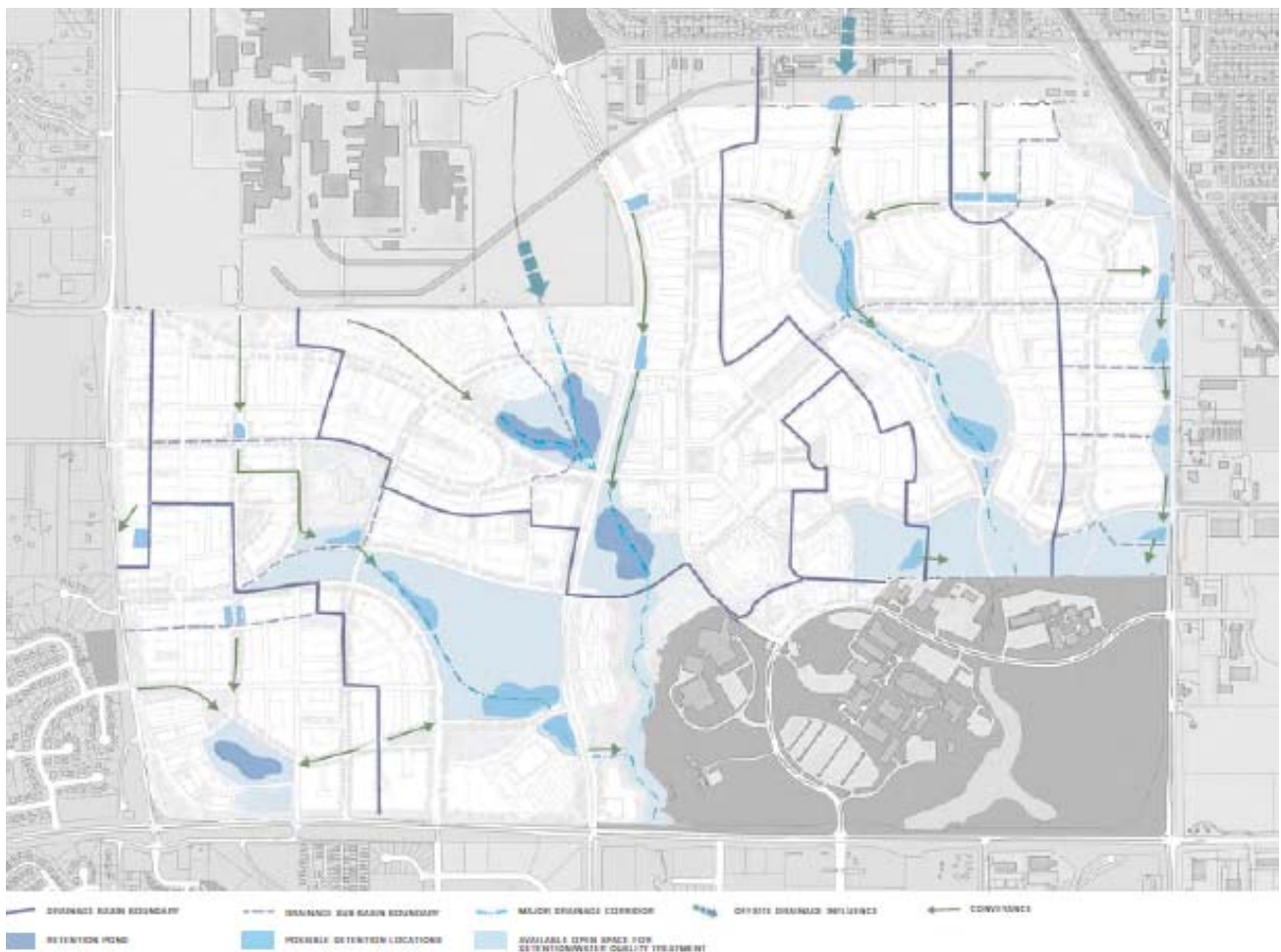


FIGURE 9

ECO-INDUSTRIAL & ECONOMIC DEVELOPMENT



FIGURE 10

Although the development is not eco-industrial, Prairie Trail's land use plan has a large business component. Currently, there are two main anchor tenants in Prairie Trail: the Iowa Soybean Association, and the Future Farmers Association of Iowa. These two tenants are large enough for Prairie Trail to plan development around them.



FIGURE 11

FINDINGS APPLICABLE TO UMORE

- **Cooperation at the onset** of the planning process between the university, the municipality, and the developer(s) can allow for more sophisticated and mutually beneficial agreements.
- Although development has stalled, the Prairie Trail developer has **stayed true to the original vision** of the site. This is important for marketing, branding and long-term vision and identity.
- **Leveraging local strengths, community and economic anchors** is an essential part of the success of any development. Prairie Trail has been very proactive in this area.



FIGURE 12

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FIGURE 1

BAILEY'S GROVE

LOCATION	Kentwood, Michigan 10 miles south of Grand Rapids
AREA	346 Acres
FEATURES	<ul style="list-style-type: none"> • Small lot sizes • Narrow Streets • Housing mix that includes single family homes, condos, and apartments • Elementary School • Commercial space
OPEN SPACE	<ul style="list-style-type: none"> • Existing wetlands integrated into plan • About 1,000 trees preserved and moved
DEVELOPER	Eastbrook Homes

HISTORY OF DEVELOPMENT



FIGURE 2



FIGURE 3

Bailey's Grove is a 364-acre master-planned residential community located in the City of Kentwood, a suburb that lies about ten miles out of Grand Rapids, Michigan. At the time of its planning, it was the first master-planned community in west Michigan. With an emphasis on community building, it boasts a healthy housing mix on small residential lots, pedestrian-centered design, and habitat preservation areas with recreational trails throughout. In addition to design that emphasizes livability and opportunities for social interaction, environmental preservation also serves as an anchor of community life. The developers saw great opportunity to leverage natural features within the site to support their vision for a development that engendered feelings of connection to both neighbors and nature among residents.

“Bailey’s Grove in many ways has set the standard for community development.”

*- Kentwood Mayor
Richard Root*



FIGURE 4



FIGURE 5

COMMUNITY ENGAGEMENT

Outreach

An intentional public engagement strategy was initiated at the outset of the planning process. In 1995, the time at which the development site was under consideration, Kentwood was one of Michigan’s fastest growing communities. From 1990 to 2000, the population of Kentwood had grown by 20%. This intense rate of growth concerned local officials. While enthusiastic about the growing popularity of Kentwood, they were concerned by the residual effects the sprawling, unwieldy suburban developments that were springing up elsewhere. In addition to congestion from increased traffic, the large lot sizes typical of such developments meant higher infrastructure costs and greater environmental degradation. To address this antipathy towards development-as-usual and garner allies, Mick McGraw reached out to public officials, community leaders, and environmental organizations to gather their perspectives on the design principles and community priorities that this new development should assume. “Champions” for the development emerged from these efforts, the most prominent being former Kentwood Mayor, Bill Hardiman. The opinions and recommendations were collected and incorporated into the final vision for the development.

Conflicts with City Departments

While many coalesced around this vision for Bailey’s Grove, achieving wide-spread approval proved challenging. Several city departments in Kentwood took issue with prominent aspects of the development’s plan, focusing particularly on the curvy streets and their narrow width atypical of development in the Grand Rapids area. As the street design would encourage pedestrian activity and soften the environmental impacts of the site, it was very much a lynchpin of the social and environmental goals subsumed within the vision for the development. However, Public Works feared that the skinny street design would make maintenance difficult and would prove unnavigable during times of heavy snow fall. Emergency services had concerns that the design posed a threat to public safety as large emergency service vehicles would have difficulty navigating the curvy, narrow streets. In the end, the plan was approved by the Kentwood City Commission, but with little support from Public Works and emergency services.

LAND USE & THE ENVIRONMENT

Compact Development



FIGURE 6

Lot sizes in Bailey's Grove are smaller than what was usual for suburban development at the time of its planning. Throughout the 1990s, typical suburban development had densities of around two units per acre, whereas Bailey's Grove was constructed to have about 4.5 units per acre. In TABLE 4, there is a comparison of these densities and the amount of land needed to accommodate the same number of dwelling units as Bailey's Grove. These smaller lot sizes were an important component of the social and livability goals within the vision for Bailey's Grove, as it brought homes closer to together and increased the opportunity for neighbors to interact. Small lots also reduced the need for developable land as they concentrated development thus preserving valuable green space. This also reduced the cost of the infrastructure required to service the development. Accommodating higher densities within existing zoning regulations required extensive, and often conflict-laden, negotiations between City of Kentwood and the developer during the creation of the Planned Unit Development (PUD) agreement.

	Homes per Acre	Total Number of Units	Total Area
Traditional Development	2 residential units	1,638 units	819 acres
Bailey's Grove	4.5 residential units	1,638 units	364 acres

TABLE 4

Pedestrian-friendly Design

The higher density, along with many other landscape features produced a pedestrian-friendly neighborhood. A greater number of amenities and neighbors within close proximity encourages residents to walk rather than drive. The result is fewer personal automobiles on the road and more opportunity for social interaction between pedestrians. The compact design of the development also allowed for the preservation wild habitat and the inclusion of outdoor recreational spaces and trails. Pedestrian walkways throughout these green spaces encourage residents to appreciate the value of the natural amenities.

LAND USE & THE ENVIRONMENT

Housing Mix

The mix of housing types and sizes available on the site, which was created to appeal to a range of income levels and lifestyles, supports the social goals within the sustainability vision. The site design integrates this mix of housing, which range from single apartments to five-bedroom single family homes, throughout the development to encourage social interaction among a diverse resident base. The variety of housing also retains residents by offering options that appeal to customers no matter their age. This supports community building as it maintains relationships between community members while also welcoming newer residents. This has also been financially beneficial for Mick McGraw, who has witnessed residents move within the site to different homes.



FIGURE 7

STORMWATER MANAGEMENT

Within the design of Bailey's Grove, stormwater management was an important consideration. McGraw and Jensen conducted an inventory of natural stormwater management features and then designed the site to maximize the use of these. Through this process they were able to preserve much of the natural tree coverage, wetland areas, and other native habitats. The preservation of these natural amenities, if maintained, will reduce the volume and rate at which stormwater enters the municipal sewer system. The development's compact and pedestrian friendly design further improves efficacy of the stormwater management system is reduced the footprint of the impervious surface.



FIGURE 8

FINDINGS APPLICABLE TO UMORE

- **Greater emphasis on livability and community** may be a more appropriate marketing angle than strictly promoting environmental stewardship. Interestingly, Bailey's Grove demonstrates that the design features that strengthen the community are also beneficial to the environment.
- **Early outreach to city departments is essential.** The implementation of environmentally-friendly design features, especially those that greatly impact the physical landscape, may produce unintended consequences for essential municipal services. Early collaboration provides greater opportunity to find acceptance and amenable solutions.
- **Finding local 'champions' for compact, livable communities** is a valuable tactic in the development approval process. These champions should be sought out as soon as possible within each and every one of the stakeholder groups.



FIGURE 9

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FIGURE 1

PRAIRIE CROSSING

LOCATION	Grayslake, Illinois 46 miles northwest of Chicago
AREA	667 Acres
FEATURES	<ul style="list-style-type: none"> • 398 Single family homes • 36 Condos • Community farm • Charter school • Retail commercial
TRANSIT	2 Metra Rail stops
OPEN SPACE	60%
DEVELOPER	Prairie Holdings Corporation

HISTORY OF DEVELOPMENT



FIGURE 2

Abridged Timeline

1987	Land purchased
1993	Planned unit development approvals
1994	First house sold
2003	Home-owner association transferred
2004	Condo presales
2005	Last single-family unit house sold

Prairie Crossing 10 Guiding Principles

1. Environmental protection and enhancement
2. A healthy lifestyle
3. A sense of place
4. A sense of community
5. Economic and racial diversity
6. Convenient and efficient transportation
7. Energy conservation
8. Lifelong learning and education
9. Aesthetic design and high quality construction
10. Economic viability

Prairie Crossing was developed as a response to a traditional 2,400-unit development planned in what was then unincorporated Lake County, Illinois. The site had previously been farmed with crop rotation. After about a year of legal wrangling, local developers purchased the land envisioning a new type of development. They created 10 principles to guide the development (left).

Prairie Crossing Holding Corporation acted as its own builder. The rationale for this decision was that it not only allowed Prairie Crossing control of both the pace and form of the development, but that there were financial benefits to not contracting out construction services.

COMMUNITY ENGAGEMENT



FIGURE 3

Bottom Up Identity Building

Because Prairie Crossing began as a local response to development, the identity of Prairie Crossing has an inherent legitimacy within its community. The 10 guiding principles were established by Grayslake residents and local stakeholders as not only a marketing tool, but a vision for the community they wanted to create. This allowed Prairie Crossing to project a clear identity and purpose. According to the Prairie Crossing environmental team lead, Mike Sands, the development was marketed as much for its commitment to fostering a social community as it was through its commitment to environmental principles.

Ultimately, these two ideals go hand-in-hand: conservation and community-building both emphasize stewardship and responsibility. Both ideals attract residents who want to buy-in to the Prairie Crossing vision.

Transferring the Vision: From the Developer to the Residents

Education and outreach was part of a knowledge-management effort on the part of the developer to ensure that the original identity of Prairie Crossing was sustained regardless of resident turnover.

As the development was being marketed based on the 10 guiding principles, the developer also focused on making sure residents incorporated those principles into their ownership of the community. The developer utilized educational and social tools to cement the importance of the principles to the residents. The developer hosted events to bring residents together to engage on sustainable issues, and invested in community workshops to teach members about the guiding principles.



FIGURE 4

COMMUNITY ENGAGEMENT

Sustaining the Vision: HOA Internalizes the Principles

Because of the educational efforts on behalf of the developer, when control was handed over to the HOA in 2003, the HOA formally adopted the same 10 guiding principles and used them to guide their activities and priorities.

Now, when the HOA has its annual meetings, members grade the development based on those 10 principles. This ensures that the commitment to sustainability is passed down from generation to generation.



FIGURE 5



FIGURE 6

LAND USE & THE ENVIRONMENT



FIGURE 7: Map of Prairie Crossing

Development at Prairie Crossing was in response to a traditional 2400-unit development and the original plans are a synthesis between compact development and conservation development. It would be mostly low density, but have medium-to-high density elements near transit stations.

Interaction with City

To adhere to new urbanist principles, Prairie Crossing worked with the village at Grayslake to grant code variances for building setbacks, road widths and some other engineering related items.

Transit

Two Metra stations are within Grayslake with direct access to downtown Chicago.



FIGURE 8

ENERGY



FIGURE 9

Prairie Crossing focused on energy efficiency over renewable energy. Although there is some renewable energy at Prairie Crossing, it was implemented only after the initial design and construction stage.

Home Efficiency Design Standards

Homes at Prairie Crossing use roughly 50% less energy than normal houses to heat and cool. Because Prairie Crossing acted as both the developer and the builder, it was able to implement the housing design standards to the specifications of the developer.

Houses were built using energy efficient technologies including:

- Using 2x6s instead of 2x4s to allow for thicker insulation
- Roof with insulation batts with vented assembly
- Basement with fiberglass batt insulation
- Windows double-glazed, argon-filled glass
- 90% efficient condensing gas furnace
- 75% efficient power-vented gas water heater
- Supply fan ventilation system with distributed exhaust; independently controlled

Prairie Crossing in that it acted as its own builder; most developments design their own units and create a pattern book for residents and builders to pull from. Instead, as it intended to be an environmental community, Prairie Crossing wanted the ability to easily change the design or materials of the units as environmental technology improved. Acting as the builder allowed them to do this without the builder as the middleman - it streamlined adaptability to new environmental technology.

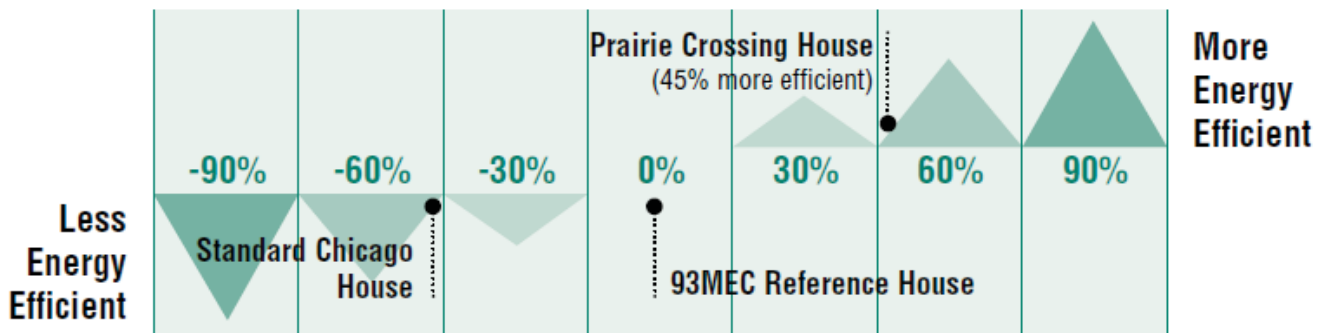


FIGURE 10

ENERGY



FIGURE 11

Renewable Energy Generation through Partnerships

There is a wind turbine at Prairie Crossing. The wind turbine was developed as part of an Illinois pilot program that has now been formalized. The turbine provides 30,000 to 40,000 kilowatt-hours (kWh) per year, and powers the organic farm's greenhouses, lights, and washing and cooling system. Any excess energy is sold to ComEd (the local energy provider) and incorporated into the power grid.

Working with the energy provider was a challenge. The return on investment is dependent on the sizing of the system. According to the developer, it is a losing proposition to sell energy back to the grid at the wholesale rate. The system only makes financial sense if you cut down the size of your retail purchase rather than running a surplus and selling it back to the energy company.

Some Prairie Crossing homes have after-market solar installations, hot water and photovoltaic panels (PV). Large public buildings (the Prairie Crossing Charter School) are LEED certified.

The developer stated his regret to have missed an opportunity implementing other renewable energy systems: both geothermal and water heat technologies were still in their infancy and unprofitable in the early 1990s, as Prairie Crossing was being developed.

SOLID WASTE



FIGURE 12

Residents are encouraged to compost their yard waste. The homeowners association picks up the yard waste and brings it to the community farm. This policy incorporates a social element into the fabric of the community, while reducing the cost burden on local waste collection.



Fig. 13

STORMWATER MANAGEMENT

Prior to development, the site had been farmed using crop rotation. The natural prairie habitat had been utterly eliminated.

A stormwater management plan was required as part of the initial PUD agreement with the Village at Grayslake.

Design

The plan, designed prior to the construction of Prairie Crossing, established was the innovative approach, coined by the contractor as “the treatment train”. The treatment train established the design guidelines that were later used by the Wild Meadows case study in Minnesota (see page 38 for more details on the “treatment train”).

Maintenance

The maintenance of this system can be folded into normal aesthetic maintenance and prairie restoration activities. In Prairie Crossing, these activities are spearheaded by the HOA. The environmental science team lead for Prairie Crossing estimated that most HOA members have no idea of the stormwater management benefit of their work.

Because the guiding principles were marketed so successfully, self-selection occurred where people more interested in maintaining those values were the ones who chose to live at Prairie Crossing. This affected stormwater management because the value of prairie restoration was lauded, and the stormwater management maintenance was then intertwined with that value.

Stormwater system maintenance has been successful because aesthetic beauty and environmental restoration are better incentives to those not familiar with stormwater management principles. The integration of these activities allows for maintenance to be performed in-house, and environmental and aesthetic principles are not only more common, but more easily translated than stormwater management, such activities are more likely to be continued by a future HOA.

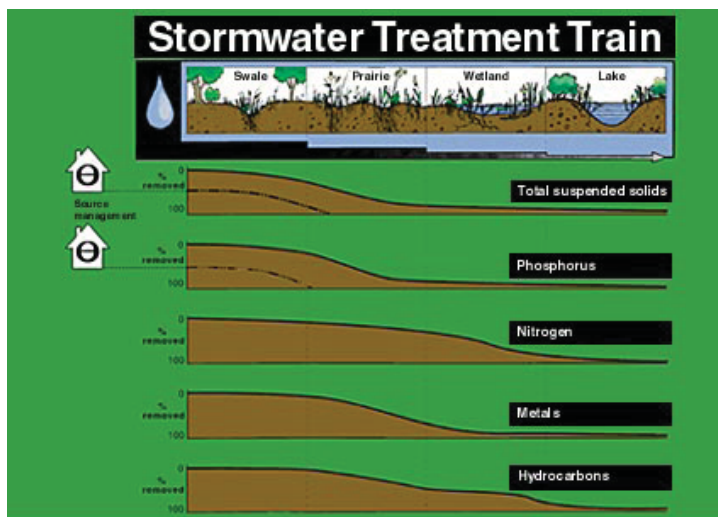


FIGURE 14



FIGURE 15

FINDINGS APPLICABLE TO UMORE

- **Founding Principles** can create a unique vision and identity for the development
- **Community Engagement and Education** are important tools to transfer the knowledge and ownership from the developer to the residents.
- **The homeowners association** can become the driver of a successful development, assuming aesthetic responsibilities as well as sustaining the long-term vision and identity of the development.
- Prairie Crossing Holding Corporation was **both developer and builder** on the project. They thereby eschewed the middleman, ensuring better quality control and adherence to their vision. It also enhanced their ability to adapt to rapidly changing sustainable technologies, with more savings in the offing.
- **An Inclusive Stormwater System:** rather than focusing on the scientific principles underlying good stormwater techniques, the developer ensured that ownership and maintenance of the system would be transferred to the residents by emphasizing the community benefits instead. Residents related much more easily to aesthetic and environmental considerations, and stepped in to take care of it.



FIGURE 16

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FIGURE 1

TOPIC: ENERGY

MUELLER

LOCATION	Austin, Texas
AREA	700 Acres
FEATURES	<ul style="list-style-type: none"> • 4900 Residential Units (25% Affordable) • Commercial (30% Locally Owned) • Industrial (Anchor Tenants) • Public Utilities (Energy, Hospital) • LEED ND
OPEN SPACE	140 Acres
DEVELOPER	Catellus Austin Energy

HISTORY OF DEVELOPMENT



FIGURE 2



FIGURE 3

Abridged Timeline

1942	Robert Mueller Airport opens
1946	Voters approve bond to build new airport
1967	City and Design group develop a Mueller redevelopment master plan
2002	City selects Catellus Development group as master developer
2005	Mueller Energy Center developed
2007	First retail stores open, Dell Children's Medical Center opens, Construction begins on single-family homes
2011	Pecan Street Project: Pilot Smart Grid

COMMUNITY DEVELOPMENT



FIGURE 4



FIGURE 5

Like many of our case studies, the Mueller Development in Austin began as a series of goals for the development. These goals included: fiscal responsibility; economic development; East Austin Revitalization; compatibility with surrounding neighborhoods; diversity and affordability; and sustainability. The development, on a former airport site three miles outside of downtown Austin, immediately established a commitment to environmental principles, but also to economic and social principles. Economic and social principles are especially important to highlight in a downtown development with a tenuous economic climate and a wealth gap.

These principles are communicated then through a variety of ways. The Mueller Development website contains educational material about green resources, new urbanist principles, and the definition of sustainability. The most significant way Mueller advertises its sustainable vision is through public art.

The solar flowers, which light up blue at night, immediately identify and brand Mueller as a development with a commitment to environmental principles. Located along Interstate 35, and a bike and pedestrian path, the solar flowers contain panels that generate just enough power to sustain themselves, while also providing shade to pedestrians.

MUELLER ENERGY CENTER



FIGURE 6

The Mueller Energy Center is a combined heat-and-power plant located on the Mueller Development in Austin, Texas. It was built in 2006, and is attached to the Dell Children's Medical Center. The plant converts waste heat into free energy and "provides steam heating, chilled water, cooling, and onsite electric production to the Seton's Dell Children's Medical Center and nearby buildings". According to a 2009 American Public Power Association report on combined heat-and-power plants, the Mueller Center was also "built with redundant supply in mind, including two parallel feeds from two substations in addition to the main supply of power from the energy center's 4.5-MW turbine and an emergency diesel generator." The Dell Children's Medical Center was able to acquire a LEED-Platinum ranking. The whole project received \$995,000 in Department of Energy financing.

There are a few differences between the Mueller/Austin Energy relationship and what is envisioned at UMore. First, Mueller was built in downtown Austin; the land value is therefore very different. Secondly, Austin Energy, a public utility, is one of the most environmentally friendly energy providers in the nation, and its largest seller of green energy, as well as the first energy provider to establish a green building code. Nevertheless, the ability to use on-site power and integrate energy infrastructure makes Mueller an applicable case study.

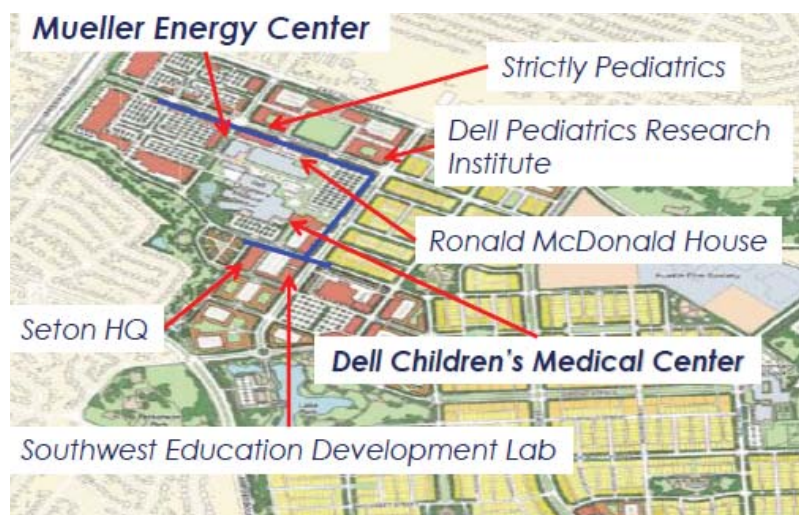


FIGURE 7

PECAN STREET SMART GRID PILOT PROGRAM



FIGURE 8

Pecan Street Incorporated is an energy research and development organization affiliated with the University of Texas at Austin.

By collaborating with Pecan Street, the University of Texas, the National Renewable Energy Laboratory and the Environmental Defense Fund, the Mueller development was awarded a \$10.4 million grant by the Department of Energy to install smart grids. The smart grids will cover distributed clean energy, energy storage technologies, smart grid water, smart grid irrigation systems, appliances, electric vehicles, advanced meters and home energy management systems, and electricity pricing models (Pecan).

Mueller was able to be part of this innovative pilot program because it successfully marketed its commitment to sustainability, as well as its high level of cooperation and collaboration with energy providers, the scientific community, and other local stakeholders.

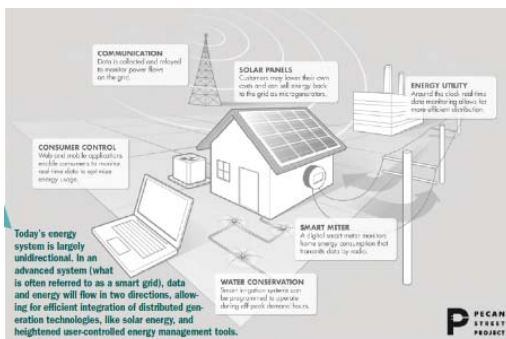


FIGURE 9



FIGURE 10

FINDINGS APPLICABLE TO UMORE

- The ability to **coordinate with an energy company to provide on-site power generation** not only has environmental, but economic benefits as well. With eco-industrial development being a goal of the UMore site, the ability of a combined heating-and-power plant to provide both energy and jobs should be a goal to seriously consider.
- The **marketing of Mueller as a sustainable site** is intrinsic to its success. The solar flowers, for example, immediately identify Mueller's values. This helps promote the self-selection of stewards that are more willing to buy into these values.



FIGURE 11

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FIGURE 1

Topic: ECONOMIC DEVELOPMENT

SERENBE

LOCATION	Serenbe, Georgia 35 miles of southwest of Atlanta
AREA	1,000 Acres
FEATURES	<ul style="list-style-type: none"> • Land Preservation • Agricultural Economic Focus • High Density Residential • Green Buildings • Arts and culture center
OPEN SPACE	At least 70% of the acreage
DEVELOPER	Citizen-funded and owned

SIGNIFICANCE

Serenbe is a compelling case study for sustainable conservation development because it developed based solely on the strength of the vision of a few committed citizens intent on protecting rural land and lifestyle in the Chattahoochee Hill countryside in Georgia.

Though this case study has value for more than one specific topic, it is of particular interest from an economic development viewpoint. Serenbe's vision of a sustainable rural economy has pushed it into innovative local economic development strategies involving community-building around cooking values with the help of Community-Supported Agriculture (CSA), local organic farming practices and local restaurants.



FIGURE 2

VISION + PRINCIPLES

Guiding principles for the development of Serenbe were set early on by its founders. They powerfully combine both environmental and social considerations of conservation and livability, and are as follows:

- “Nature... because people can live more fully when connected to nature’s wonders
- Passion... because living passionately is the most rewarding of lives
- Creativity... because creative people live lives of great passion, and can help the rest of us do the same
- Community... where people are accepted for who they are, not what they are.”

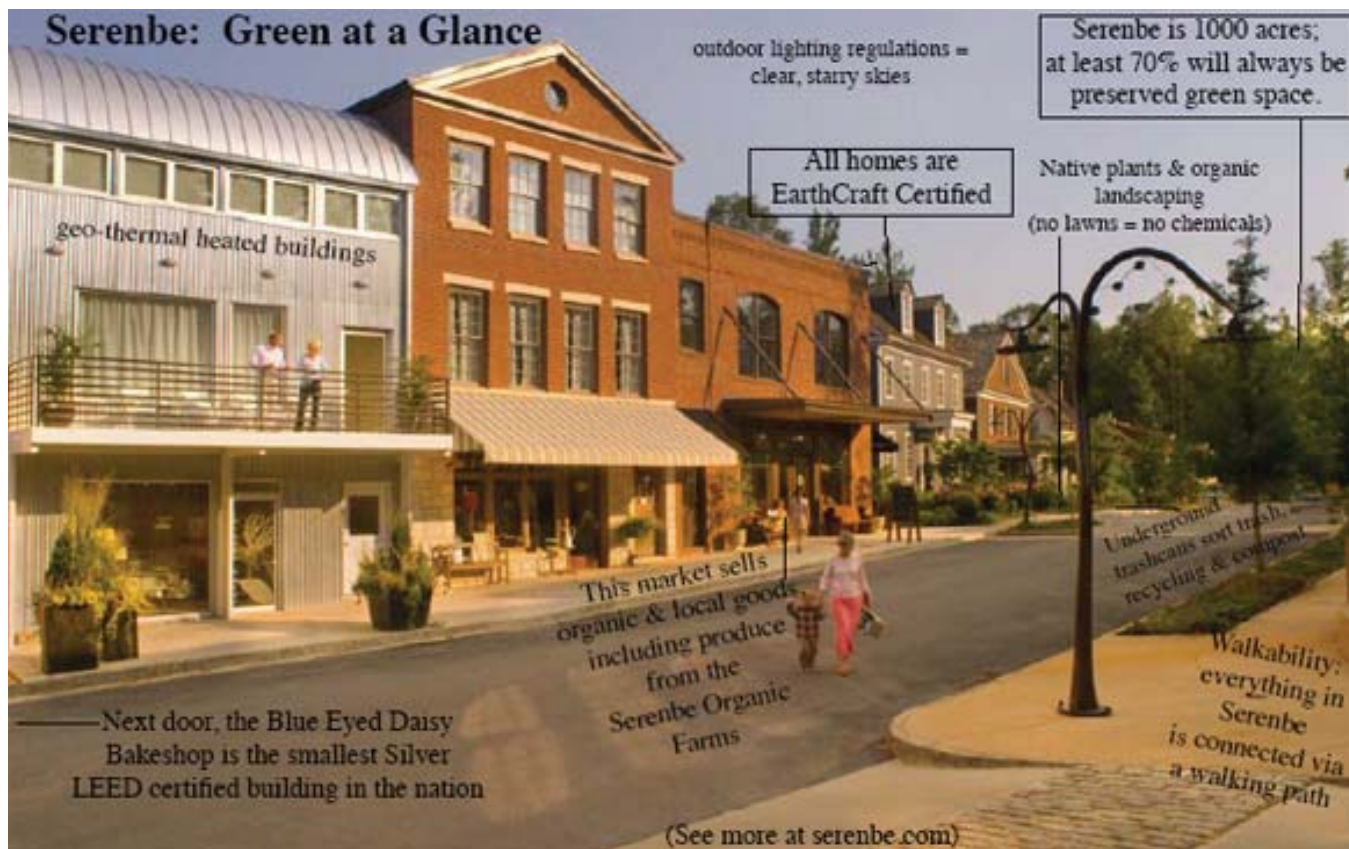


FIGURE 3

LAND USE & THE ENVIRONMENT



FIGURE 4

Design

Serenbe is a very committed conservation development, with over 70% of its acreage dedicated to open space and natural habitat.

Organic Farming and Local Food Demand

Serenbe has devoted 30 acres to farming. The Serenbe Farms is an organic farm which provides organic produce locally in the Chattahoochee Hill country and all the way to Atlanta. The Farm's mission is to "bring good, local food to everyone".

It is certified organic and biodynamic with a thriving CSA program and Saturday markets. The Serenbe community is also home to three thriving restaurants which act as anchors for the organic farming activity and incorporate the local food supply into their menus. Their demand, and that of local and surrounding residents who have signed up with the CSA program, ensures the success of the Serenbe Farms and of its rural lifestyle. To boot, local dollars are kept local and benefit both the Farm and the restaurants, creating a virtuous feedback loop of economic and financial development, while at the same time enhancing the quality of life of the local residents.

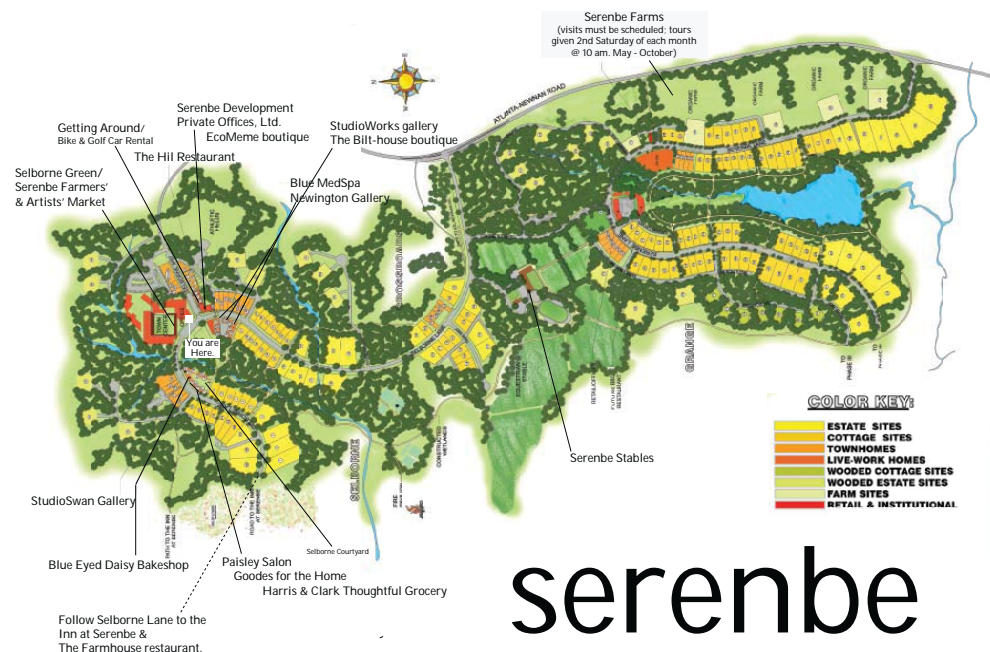


FIGURE 5

serenbe

FINDINGS APPLICABLE TO UMORE

- This case study provides an example of an economic development structure that **leverage local strength and local rural activities**, without the recourse to technology that can be seen for the Madelia Model in Minnesota.



FIGURE 6

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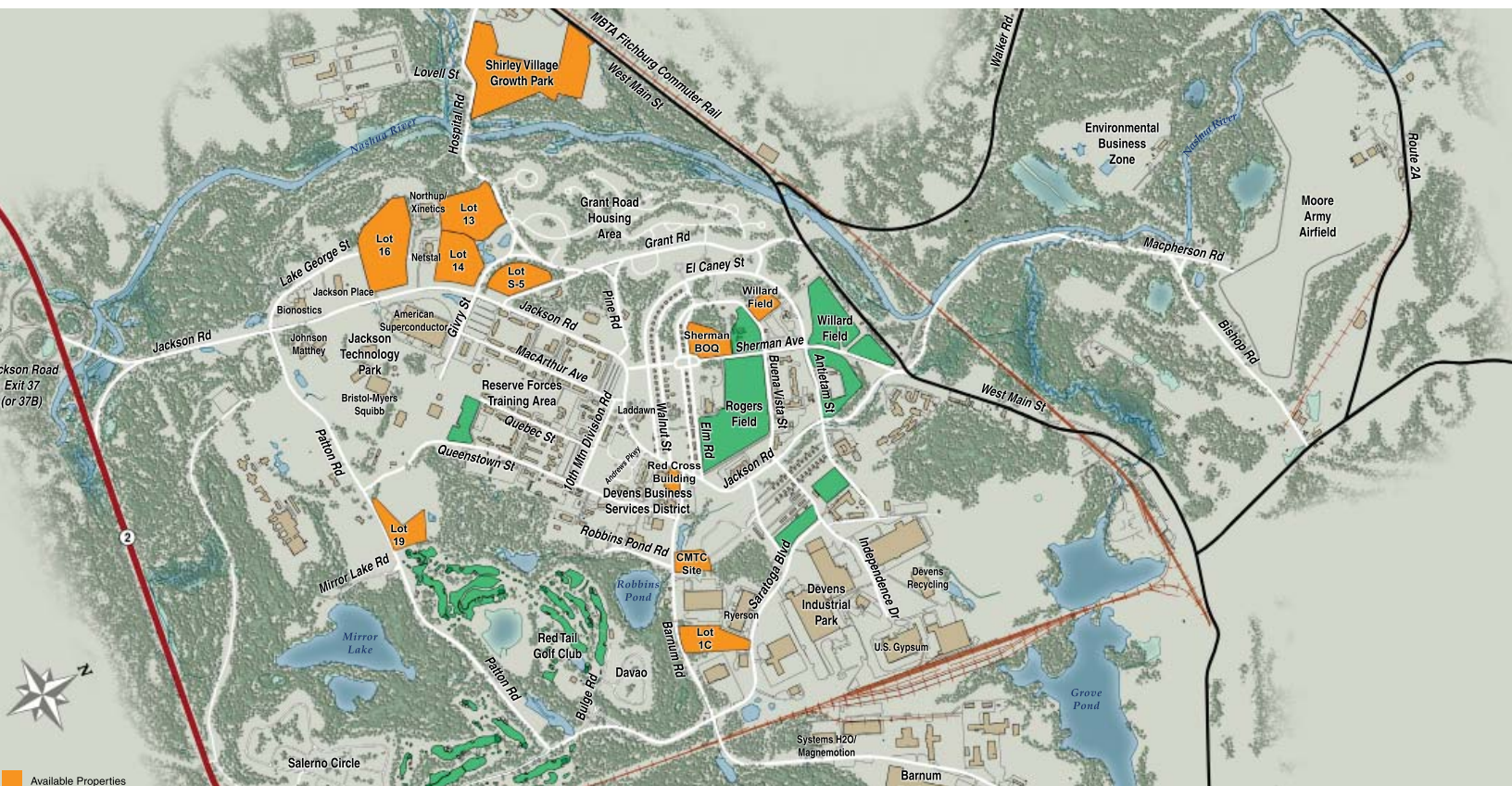


FIGURE 1

TOPIC: ECO-INDUSTRIAL & ECONOMIC DEVELOPMENT

DEVENS ECO-INDUSTRIAL PARK

LOCATION	Devens, Massachusetts
AREA	4,400 Acres
FEATURES	<ul style="list-style-type: none"> • Superfund site • Recycling center • Heavy and light Industrial • Education and community centers
OPEN SPACE	2,600 Acres
DEVELOPER	MassDevelopment

The Devens Eco-Industrial Park (EIP) is one of only a handful of successful eco-industrial developments in the United States and is recognized internationally as such. It was selected as a case study for UMore Park precisely because its development has teachable lessons could be applied to UMore's eco-industrial and economic development goals.

BACKGROUND

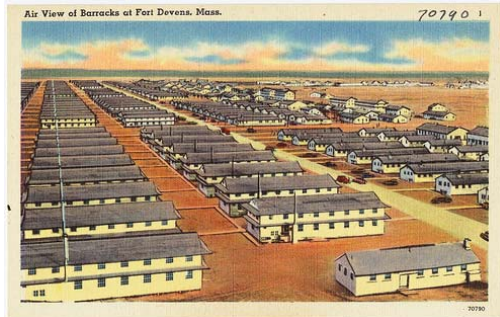


FIGURE 2

The unincorporated community of Devens, MA, sits 40 miles northwest of Boston. The site was the home of a US Army base, Ft. Devens, which closed in 1996 after 79 years of operation. After the closure of the base, the bulk of the land was purchased by MassDevelopment, a quasi-public finance and development authority. The Commonwealth of Massachusetts tasked this authority with redeveloping Devens into a residential and business community. .

In addition to MassDevelopment, the Devens Enterprise Commission (DEC) was established. The DEC was the regulatory and permit granting authority for the Devens area: its funding comes from permitting fees. It also acts as the local planning board, conservation commission, board of health, zoning board of appeals, historic district commission. Its original purpose, stemming from its bylaws, was to fight the blight that was threatening the area as a result of the base closure.



FIGURE 3

The closure of the military base initially had a traumatic impact on the community of Devens. Economically, many local small- and medium-sized companies dependent on the base activity closed and unemployment ensued. Socially, the Army families and children departed. Environmentally, the base was listed as an EPA Superfund site, having contaminated local groundwater, soil, and sediment with heavy metals, as a result of the base activities over 80 years.

IMPLEMENTATION

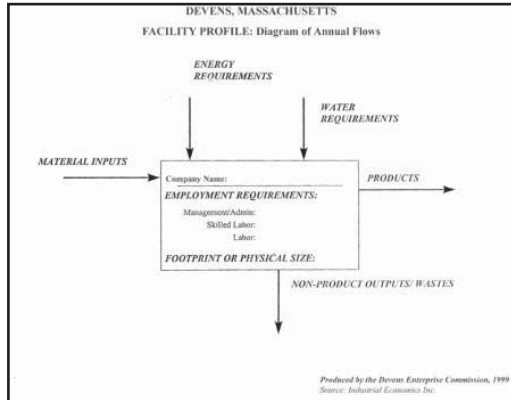


FIGURE 4

Eco-Industrial Principles

An eco-industrial park is a daunting endeavor from a planning perspective. It is an industrial park where businesses and the local community work together to reduce waste streams and pollution, stress an efficient use of (local) resources, and work towards goals of both sustainable economic development and increased environmental conditions.

The creation of an eco-industrial park at Devens meant two things: first, existing industrial activity would have to be altered to fit into the industrial ecosystem concept, and second, future industrial activity moving into Devens would have to either be made aware of the opportunities presented by the EIP, or go so far as to fit into this new industrial approach.

Both activities implied the need for a collocation of geographically proximate industries, and fostering informational and geographic connectivity between said industries. To boot, the planner for Devens, Peter Lowitt, had an inkling that another pre-requisite to success would have to be the active participation of the local authorities in order to promote collaboration and networking between businesses. This meant making sure individual managers and plant managers would have an opportunity to talk formally and informally to each other.

Local Community and Business Engagement at the Onset

The DEC elaborated a long-term vision for the site to avoid blight through consultation with local stakeholders: for 5 months in 1999 and 2000, surveys were distributed to companies operating in Devens. The data collected in the survey was strictly confidential, but showed clear interest in ecological and environmentally friendly trends. A potential vision was established: a long-term vision of a self-sustaining Devens community applying industrial ecology principles into the already existing industrial activity of the area. This vision was a snapshot of some of the businesses, industries, non-profits and governmental organizations of Devens, and formed the framework for its future planning project.

From this point on, a steering committee was established, and met monthly for 2 years with representatives from the

Commonwealth of Massachusetts, the State Environmental Protection Agency, local Devens citizens, local business interests, and local and state non-profits.

The approach was a fairly typical public participation process. In order to get all the stakeholders on board for the first stages of the Devens EIP, all the participants agreed a Devens vision was needed after the Army base closure. In fine, a design Charrette focused on industrial ecology, zero-emissions goals, and a no waste system, kicked off the implementation phase of the project.

An Early Framework

The land use legal framework for Devens was developed early on to respond both to the ecological damage to the area and to prepare the ground for the inception of the EIP plan. It included:

- An overlay district focused on water resources and wetlands protection requirements
- Clean-up sites and open space sets aside early for remediation and environmental conservation
- Regulations and best practices governing earth and topsoil removal, renewable energy facility requirements, greenhouse gas mitigation
- Policies regarding green roofs and composting, the reuse of existing buildings
- A transportation management initiative, including a push to maintain the proximity between the EIP and housing, schools, and other municipal services
- Social equity projects, such as the creation of affordable housing units.

The Process

According to the DEC, and based on their experience implementing their EIP, the focus of a successful eco-industrial park should be on five major characteristics, which are:

- *Material, water, and energy flows*

The mapping of these flows, as well as those of waste streams and by-products, enables local business stakeholders and facilitators to readily understand where waste can be cut, savings made and economic opportunities created for the various business participants of the program.



From the beginning, the Devens EIP was divided into smaller units, each with a core identity and purpose: i.e. one for environmental industries, one for logistics and transportation, one for core (or anchor) businesses. The business unit included an innovation and technology center and community facilities as part of the added value offered by the DEC to increase livability for employees.

Connectedness did not stop there. The regional and inter-city connections existed with local municipalities, and contributed to the demand, housing and employment of the EIP.

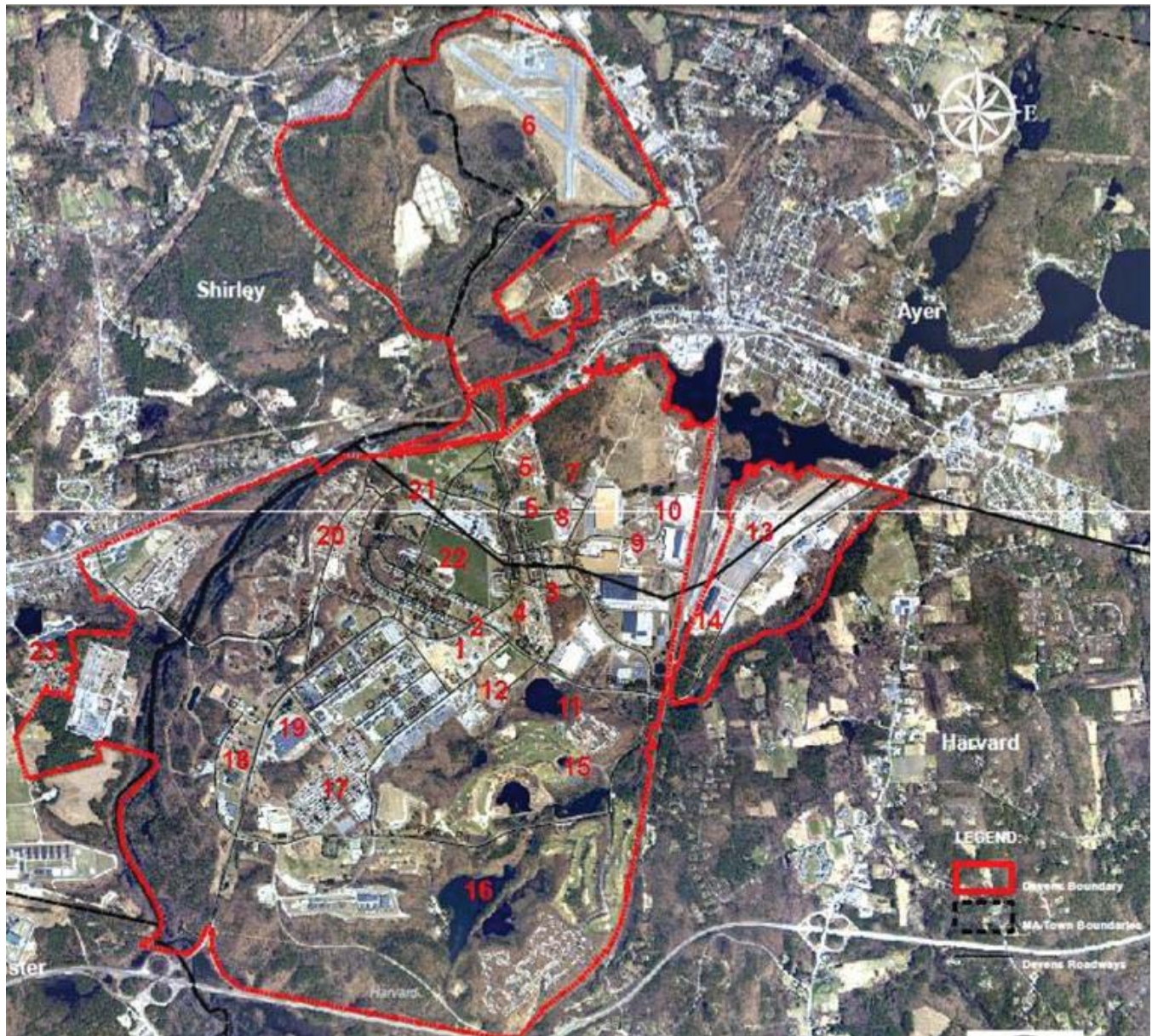


FIGURE 6

- *Strong Informal Ties Between Plant Managers*

Educating businesses on opportunities is key, and an effort was made to forcibly remove the silos in which most of the EIP businesses operated. This was achieved through a strong educational pursuit. A business networking program was created called the “Reuse Program”, and it emphasized informal ties among business managers, and hosted semi-monthly luncheons with guest speakers addressing a variety of best operations and management topics. The program still operates and is meeting its goals of developing closer ties and fostering collaboration in the EIP.

- *One or More Anchor Tenants*

Leveraging local strengths is part and parcel of the Devens EIP strategy for success. The steering committee quickly established from the onset that their existing wastewater treatment facility was their best opportunity to build upon and attract waste streams from other business partners in the Park and in the surrounding region.

Other attempts were made to secure a power generation facility as a second anchor. This has not been successful. Power generation would have fit nicely with the reuse of other flows (electricity can be generate from heat and steam by-products), and provided local power at better rates for residents and businesses alike

- *Focus on Collaboration*

As mentioned earlier, the importance of collaboration cannot be stressed enough: it adds resources, expertise, and new perspectives to the local residential and business community. It offers a synergistic approach with the whole greater than the sum of its parts

Cooperation can also enhance quality of life for residents and employees: the Devens EIP offers many amenities, such as child care, a conference center, community rooms and a cafeteria that can be shared by all the businesses of the Park, and helps avoid the formation of business silos.

Education and Knowledge Management

A “Reuse Plan” for the conversion of the Ft. Devens area was planned early on, as part of the long-term vision established by the steering committee. Peter Lowitt, the planner for the Devens Enterprise Commission, was the primary driver of this educational program named Ecostar.

The idea was to create a “Great Exchange” program. The program was originally a web-based solution to spread knowledge and improve waste and by-products streams, their re-use potential, how best to recycle and re-purpose them. The success of the program eventually stemmed from a more informal approach.

As mentioned earlier, the Ecostar program started by mapping and spreading the word on local business resources, best operating and management practices (BMPs) for the Devens businesses, and set up awards and recognition for the best practitioners. Both the recognition program and the branding were voluntary: businesses were not forced into it.



FIGURE 7

Ecostar established 25 “environmental standards” to measure the degree of performance of the members. In effect, the standards act more like guidelines than metrics and assess the business’ vision statement, employee morale, action guide on water and energy conservancy, and so on.

The lack of specific, proper metrics was explained by the fact that it did not bring much to the conversation, particularly during periods of economic upheaval, such as the Great Recession, which wreaked havoc with the vacancy rate at the EIP, and with the streams of waste and by-products.

Out of this wealth of experience came the EcoStar Guidebook, which took three years to develop and creates a strong foundation for a series of educational workshops and forums to support the business community in their efforts to green their operations and processes.

Originally meant solely for use within the Devens EIP, and funded with seed money from the DEC, the program was so successful that it was spun off into its own a 501(c)3 non-profit organization with a broader mission than the support of the EIP. It pursues more sources of funding like grants, and has converted to the Devens Eco-Efficiency Center.

The role of the Eco-Efficiency Center remains focused on educating sustainability principles and BMPs, and draws from its successful experience in Devens. It also offers technical assistance on how to implement the BMPs, and keeps the momentum going in Devens by fostering a network between eco-industrial participants. . Its approach with businesses is simple: the reduction and elimination of waste is a “no-brainer” for the businesses’ bottom lines, and in their best economic interest. Its services include:

- Strategic workshops
- Monthly roundtable forums
- Recycling assistance
- Energy efficiency assistance
- Walk-through review to get businesses started on
- Green business certification, using the ecostar sustainability indicators
- Educational tours

In addition, the Center promotes environmental health and safety. Lessons learned are shared and people involved in the Center’s program meet monthly to further community spirit and a common purpose and collaboration. The Center remains a

local endeavor and targets local interests – basically the Ft. Devens' surrounding communities. The staff in charge of the Center strongly believes that the best results are achieved locally, by slowly but surely nurturing local interest and buy-in, rather than scattering energies trying to achieve too large goals. Contrary to the principle of ecological industry they believe it is better to foster trust, personal relationships and interactions, in order to achieve a more narrow, more efficient goal.



FIGURE 8

RESULTS (AS OF 2006)

Since the closure of the military base, many of the existing buildings have been renovated or reconstructed as housing developments. A growing business park was redeveloped as an eco-industrial park with the guiding principle of sustainability and a triple-bottom line approach to development —economy, ecology and community.

In addition, the DEC and the Devens EIP are internationally recognized for their success, and held as models for new EIPs around the world. Some of their results speak for themselves:

- 4.2 million square feet of commercial real estate were built since the inception of the project
- 106 residential units were built as well, to match growing demand
- 4300 jobs were created
- All of the above contributed to a large increase in property and other taxes
- The remediation and cleanup of the site successfully goes on
- An estimated \$124,000 were saved between 1996 and 2006 applying stormwater BMPs
- Less quantifiable, but no less important, park tenants have internalized the values of the EIP and see themselves as part of a system of businesses collaborating for mutual advantage and to the overall advantage of both their bottom line and the environment. The “mental” distance between firms has been diminished through a long, steady process of education about things eco-industrial and sustainable development.

FINDINGS APPLICABLE TO UMORE

- Capable **project champions** helped foster a successful vision and project **early on**. Existing industry was leveraged, earning buy-in by focusing on the return on investment of these BMPs for all stakeholders.
- The same is true for the local community buy-in and other partnerships with the State of Massachusetts and non-profits, using an incremental approach and a long-term vision stakeholders could relate to.
- The DEC has a **business-friendly regulatory environment** with, for instance, an expedited permitting process of an average 70 days (against 1 to 3 years for the Commonwealth of Massachusetts), in order to attract businesses to the EIP.
- **A local focus is more efficient** at accomplishing sustainable practices and development, at developing trust and relationships, at offering long-term vision and goals and at implementing them.
- For a successful EIP, make sure that the **services offered** to the businesses include a clear **intermediary**: a **facilitator/coordinator/educator** for all things related to sustainable practices, who will foster **on-going connectivity and collaboration** between business and plant managers, and create and maintain a tight-knit network. The upshot is that businesses naturally tend to stay in their economic silos, and they need a third party to make them **aware of economic opportunities** outside their field of expertise.
- In addition, this intermediary could be in charge of **managing the knowledge** necessary for a successful perpetuation of the EIP's activities. This knowledge, as well as **education and momentum** are essential elements of the success of the Devens Eco-Industrial Park.

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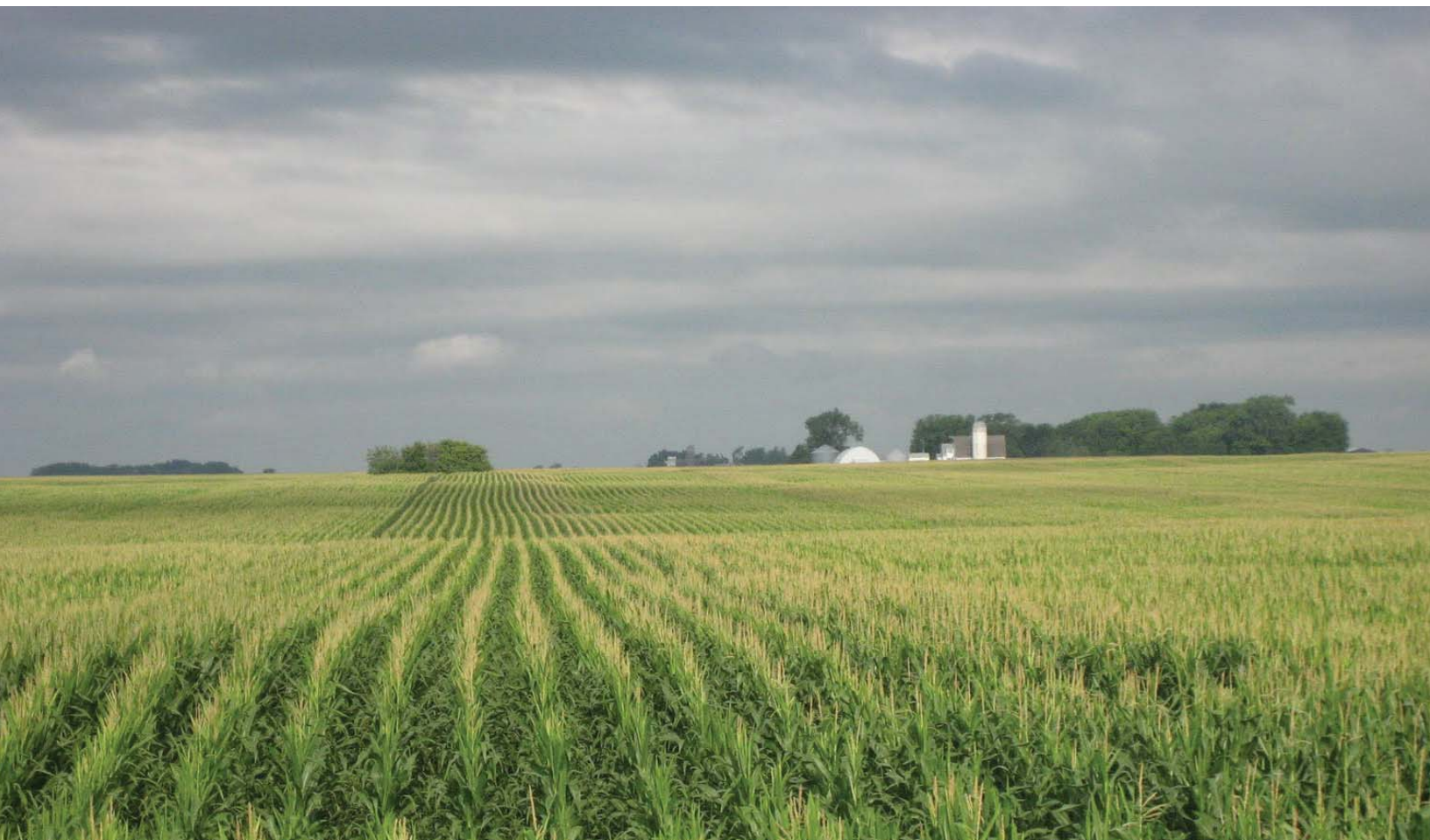


FIGURE 1

TOPIC: ENERGY
ECO-INDUSTRIAL & ECONOMIC
DEVELOPMENT

MADELIA, MN

The Madelia Model serves as a case study for future sustainable energy, economic and eco-industrial development. It is being developed right here in Minnesota.

HISTORY OF DEVELOPMENT



FIGURE 2

Since 2003, the City of Madelia, a small rural community in south-central Minnesota, has been working on the concept of the Madelia Model, a plan to get people to think beyond ethanol and toward a renewable energy solution able to sustainably answer many rural needs, economically, environmentally and socially. The long-term vision for the project is to integrate sustainability and renewable energy into rural development, a model which will serve as an example for other small towns.

Madelia's economy is typically rural, based on the agricultural exploitation of the surrounding farmland using a typical 2-crop rotation, corn and soybean. This pattern has some downsides, as they have become increasingly reliant on the heavy use of fertilizers and pesticides, which affect air and water quality in the region. In addition, the lack of biodiversity of these crops affects the quality of the topsoil, causing soil erosion and even dust storms when high winds and drought conditions exist.

The premise of the Madelia Model is that *“from a 25-mile radius around [it] can be grown, or collected from natural or industrial sources, enough biomass to fuel the community and provide feedstock”* and natural fertilizers for bio-based processing. The model's goal is to provide sufficient financial incentives to local farmers for them to grow biomass in the form of perennial crops (or third crops) in addition to the usual 2-crop rotation.

This would have the benefit of improving water and air quality in the area, limiting soil erosion and dust storms, and decreasing the amount of nitrogen and other chemicals flowing into the local watersheds and the Mississippi in the long-term. Not least, it could have the potential to revitalize rural activities and stimulate local economic development.

The Madelia Model is in development phase as of this writing, and is currently working to establish a gasification demonstration facility that would process mixed prairie grasses into fuel for the local community.

THE LONG-TERM VISION



FIGURE 3

The project's long-term vision closely espouses sustainable guidelines, including the 3 Es (economic development, social equity and environmental conservation) of a working definition of sustainability, with the ultimate goal of sustaining a thriving, livable Madelia.

These principles are:

- First, focus on local economic development, with:
 - “Local ownership of renewable energy opportunities;
 - Nurture industries and businesses that provide living wage jobs;
 - Opportunity for all community members to benefit and profit from the Madelia Model; and
 - Incentives for employees of businesses and industries to live in the Madelia community.”
- Second, with a strong emphasis on environmental conservation:
 - “Manage the landscape in a diversified and sustainable manner through alternative perennial (third) crop;
 - Utilize local products for value added processing;
 - Create and utilize sustainable and renewable energy; and
 - Clean air and water with no noxious fumes or pollutants.”
- Third, using a social and community-oriented approach:
 - “Have stable and consistent leadership;
 - Consistent community support for those in leadership;
 - Maintain a safe, healthy and attractive family environment;
 - Available space for recreational opportunities; and
 - Respect for all citizens.”

THE PROCESS TO DATE

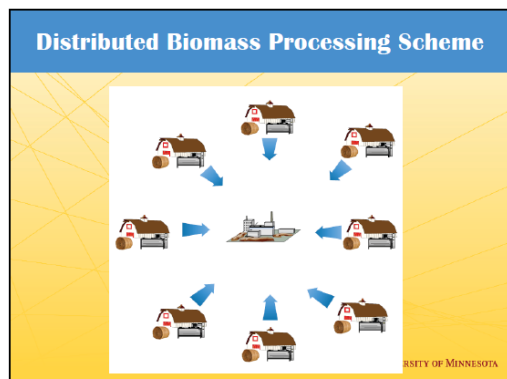


FIGURE 4

The first practical step was taken in 2005, with a resource assessment, which developed a flow analysis to determine how the Model's renewable energy and materials streams would work for Madelia. In addition, a major effort was made to exhaustively assess and inventory local sources of biomass material (in a 25-mile radius of Madelia). The result was a summary of all resources available to the community that fit the Model, and what best management and operation practices would be under this new Model.

The second step consisted in understanding the local needs for fuel (both for transportation and heating), and to establish an economic model to determine the financial viability of said Model. It was quickly determined that the 25-mile radius principle would be satisfactory: the Model did not support materials flows traveling any further, as transportation costs for these bulky materials would negate any financial benefit beyond the local economic sphere.

In essence, the very nature of this biomass production model is to have a distributed production of third crop and other biomass materials, and to limit their flow to a centralized processing site. This processing facility could be the main anchor of an industrial (and/or eco-industrial) park, transforming biomass and other agricultural products into fuel and higher value commodities such as cellulose to plastics.

The third step, to date, has been to focus on financing and community engagement, as mentioned below.

FINANCING & COMMUNITY ENGAGEMENT



FIGURE 5. PROJECT TEAM MEMBERS FOR THE
MADELIA MODEL

Interestingly, these two elements have had to go hand-in-hand in order for the Madelia Model to progress to a stage where it actually can be implemented. Indeed, the staff in charge of the project made it very clear from the get-go that the project could only ever be successful with the buy-in of the local Madelia farming community, if it could see an economic benefit to the different agricultural patterns that the project proposes.

To start with, this project was funded and helped in technical ways by a number of organizations, including the former Minnesota Office of Environmental Assistance, the Minneapolis-based *Institute for Agriculture and Trade Policy* (IATP), the University of Minnesota Extension Service, which plays a major role on the technology development and implementation side, as well as Blue Earth River Basin Initiative, and funding from the McKnight Foundation and the Bush Foundation.

These organizations, in partnership with Madelia community leaders - including, importantly, a city-owned electric utility (Madelia Light and Power) - facilitated and keep facilitating a public participation process that includes focus group sessions with area residents. These discussions were originally aimed at identifying community principles for the project to both residents' buy-in, and that the project would meet with their energy and transportation needs. The process is ongoing as the technology is being developed, with the meetings occurring regularly, in partnership with the City of Madelia and its Chamber of Commerce.

THE TECHNICAL PROCESS

The actual process of converting biomass into usable fuel for transportation and heating is an emerging technology, still in development by the University of Minnesota. It utilizes Microwave-assisted pyrolysis (MAP), which has very good temperature control. It is a closed system with no air or nitrogen gas added for fluidization; with a minimum of gases generated; no need to prepare the biomass in any way (by grinding, i.e.).

So far, the process offers fairly clean fuels, which still require refining, but do not contain high level of contaminants, making it fairly inexpensive to process. Most importantly, the process is low capital cost and highly scalable, to the point where prototypes have been loaded onto trailers and transported to biomass production sites for testing.

FIGURE 6

Microwave Assisted Pyrolysis (MAP) System



FINDINGS APPLICABLE TO UMORE

The potential for success for the Madelia Model is significant. It could provide renewable energy to the community; reduce local waste streams and pollution; provide cleaner air and water; create local employment opportunities and industrial development; and retain and sustain rural practices and culture for the long-term.

- The Madelia Model offers a potentially **stable local energy alternative** and one less likely to be subject to the fluctuations of the international energy markets.
- Capable **project champions** have helped foster a powerful vision and project **from the very beginning**. The local rural community is being leveraged, in order to create buy-in by focusing on the return on investment for them, using the BMPs of the Madelia Model.
- **A local focus is more efficient** at accomplishing sustainable practices and viable economic development, and at offering long-term vision and goals and at implementing them.



FIGURE 7. CENTRAL MN ETHANOL PLANT

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FIGURE 1

LESSONS LEARNED

Our goal, through the analysis of local and national developments, was to identify salient and implementable features that could be applied to Rosemount and UMore. What we found was that, despite the many differences in the original visions of our case studies, or the environmental technologies they used, each development was similar in how they either created or failed to create the atmosphere in which their particular development could flourish. Rather than focus on the ‘hardware’, a particular tangible technology or financing agreement, our analysis of the case studies tended to stress the importance of the ‘software’, the ability of the development to realize its vision, whatever that vision may be. Our findings included four common themes. These themes follow the chronology of the life-cycle of a real estate development.

They are:

- **Local Stakeholder Involvement**
- **Marketable Long-Term Vision**
- **A Leadership Body to Guide Development**
- **A Strong HOA**



FIGURE 2

LOCAL STAKEHOLDER INVOLVEMENT

A common theme among our case studies was that, often, a major determinant of the success of the development was the ability for different stakeholders to be included at the beginning of the process. UMore and Rosemount already have a close working relationship, and recognizing the importance of involving local stakeholders is not exactly the most novel finding, but our case studies re-affirmed its significance to the development process.

Some examples of how local stakeholder involvement has been utilized in our case studies include:

- The cooperation between the City of Ankeny, Iowa State University and DRA Developers in **Prairie Trail** where the City was able to solve the problem of prohibitive infrastructure costs by creating a sophisticated financing agreement with the developer.
- The coordination between businesses in the **Fort Devens** Eco-Industrial Park, where a consortium of local industry has pooled knowledge and commitment to implement sustainable processes.
- Potential hurdles were identified and tackled when Mick McGraw, Eastbrook Homes, and **Bailey's Grove** cooperated with Kentwood's city departments.

The involvement of local stakeholders is also important when fostering regional legitimacy for a particular plan. We found that the more stakeholders that are involved on the front end, the more legitimacy the vision has in our next finding.



FIGURE 3

A MARKETABLE LONG-TERM VISION

Once all the stakeholders are at the table, our next finding is that the most successful developments were the ones that created a marketable, **unique**, long-term vision. Developments with a unique vision were better able to guide not only the physical development of the property, but craft an identity. Subsequently, a strong identity for the development helps foster the self-selection of residents that share the same vision and ones that are more willing to become stewards of that vision down the road.

For most of our residential case studies, the marketable long-term vision fell into one of two categories: the low-density, ecological, '**conservation development**', or the medium-density, '**compact development**'. The developers of the conservation development were more likely to stress environmental and social harmony and a holistic approach to living with nature. The developers of the compact development often advertised New Urbanist features such as reduced lot widths, walkability, and a diversity of housing stock. The marketing strategies were most successful when they adhered to this singularity of vision because they attracted residents who valued the ideals and were most willing to take responsibility for propagating them.

Because the UMore plan is a synthesis of both the conservation development and the compact development, the best example of a successful marketable long-term vision comes from **Prairie Crossing**. Like UMore, Prairie Crossing workshopped 10 principles to guide development and create an identity. These principles are used again and again in Prairie Crossing, and are intrinsic to the community it created.

A marketable long-term vision is important to attract the residents necessary to implement and maintain the vision.



FIGURE 4

A LEADERSHIP BODY TO GUIDE DEVELOPMENT

In our case studies, one major theme we identified was the existence of a stable leadership body that oversees the development of the marketable long-term vision. Creating a vision is an important step, but without a body to hold everyone accountable to adhere to the vision, the original intentions might become muddled. There is no one-size-fits-all leadership body, and often developments have multiple bodies that reinforce each other. Either way, it is important to have a constant voice throughout the development process to articulate the vision and manage the stakeholders.

From our research, such bodies include:

- In **EcoVillage**, it was the county in the form of a rural-hamlet ordinance.
- In **Prairie Crossing**, it was the developers.
- In **Fort Devens**, it was a public-private partnership.

The leadership body is not only important in the initial development of the site, but often is tasked with translating the vision to the residents.



FIGURE 5

A STRONG HOA

In our case studies, we found that the first step to a successful development was to interact with local stakeholders to leverage local strengths. Then, successful developments used the local knowledge to craft a long-term vision for the development. Afterwards, a leadership body was necessary to translate that vision into reality. In our research, we found that developments with homeowners associations that fully internalized the original vision were integral to that vision being maintained.

The maintenance of sustainable principles after the initial development of the site is a major obstacle to the success of the development. In **Wild Meadows**, the failure of the homeowners association to communicate and internalize stormwater runoff principles resulted in the entire treatment train being altered and rendered ineffective. Thus, the question is how to promote an active homeowners association that has local legitimacy, and is committed to the sustainable vision.

We found that good marketing upon the onset of the development is a partial solution to the problem. When a unique, sustainable identity is created and taught, it will attract people who share those same values. The self-selection of residents will, in turn, create a community that is willing to take the responsibility to advance those values.

However, a marketable long-term vision alone is not enough to ensure a strong HOA. In **Prairie Crossing**, the developer spent many years hosting community events and educational seminars to communicate sustainable practices and to build a social network. Because of their careful attention to community development, when the developer handed over power to the HOA, the homeowners association adopted the developer's 10 guiding principles as their own. Such actions help ensure that environmental knowledge will be transferred and managed, and sustainable practices will be both maintained and improved by future generations.

FINAL THOUGHTS

Adaptability

UMore was inherently different from any of our case studies because of its 40-year development span. Demographics, transportation patterns, finances, and technologies are all sure to change during the development of UMore, so accounting for adaptability to these changes is an important component of any plan. Some environmental technologies, especially in the field of renewable energy, is either just emerging or just becoming financially viable.

A Unique UMore Identity

There seems to be a natural tension between integrating UMore with the City of Rosemount and preserving UMore's identity as a sustainable development. In our research, we found that many of the most successful developments were ones that were able to market a singularity of vision and appeal directly to potential residents attracted to its specific values and ideals. Of course, on the other hand, because development could occur over 40 years with many different developers, it is important for Rosemount to be involved as a stable leadership body.

The natural tension can be eased if UMore is articulated more as a Rosemount neighborhood—similar to the independent neighborhoods Rosemount proposed as part of its most recent comprehensive plan. Like other city neighborhood or district, UMore could strike a balance between fostering its own unique identity and mixing in with its community.

A Sustainability Review Board

When applying our case studies to UMore and Rosemount, we found that, because development is to occur over 40 years, potentially patchwork, and with many different developers, there might be the need for a formalized leadership body to both guide development and ensure adherence to the 10 guiding principles. Our most successful case studies were ones that formalized a commitment to those principles. One way to achieve the dual tasks of establishing a leadership body and maintaining clarity of purpose is to create an oversight body of local stakeholders.

This review body could be akin to an architectural board and make non-binding recommendations to the Rosemount City Council. This 'sustainability review board' would use UMore and Rosemount's 10 guiding principles to evaluate development proposals on UMore. This would ensure that local stakeholders are consistently involved and invested in the process, an emphasis on sustainable principles remains paramount to development, and that there is a stable, formalized, leadership body to enforce those principles.

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