

~ CONSERVATION ~

Estate Residential Guidelines and Conceptual Images

Conservation Template Description

Conservation estate developments are laid out in a similar pattern to conventional ones, but are otherwise very different. Although the same gross density is maintained and actual lot sizes are the same, the area impacted by development is much smaller as only the ground necessary for structures and septic systems is disturbed by equipment. The remaining areas are preserved or restored to a native landscape.

The goal for stormwater is to preserve and replicate the natural site hydrology. This is achieved by minimizing disturbed areas, using existing natural drainageways, and utilizing native landscapes to filter and retain runoff. Retention areas are designed as natural elements of the overall landscape. Because the stormwater system responds to the natural features of the site, potentially important or remnant habitat can more easily be protected. There is no concentrated direct discharge of stormwater into nearby streams or wetlands.

Design features are also used to enhance conservation estate development. Turf grass is limited to lawn areas immediately surrounding the home, while deep-rooted native plants occupy outer lawn areas and land within conservation easements. Swales along roadways are naturalized and planted with native species throughout the site.

The conservation estate road system is similar to the conventional, but here the cul-de-sac has a vegetated island in the middle, which becomes part of the stormwater retention system. Also, bicycles and pedestrians may use non-automobile transportation trail easements, which allow low-impact access to natural areas and other nearby developments. Thus, the conservation design encourages and allows residents to use modes of transportation other than the automobile, if they so desire.

Structures are moved slightly closer to the road to increase the amount of contiguous conservation easement land in the rear of lots. Conservation easements can be maintained by a land trust, local municipality, local community cooperative group or other organization. Monitoring of proper maintenance of natural areas can pose challenges in some cases.



Naturalized infiltration systems are aesthetic and ecological amenities, and provide ample space for public open space opportunities.

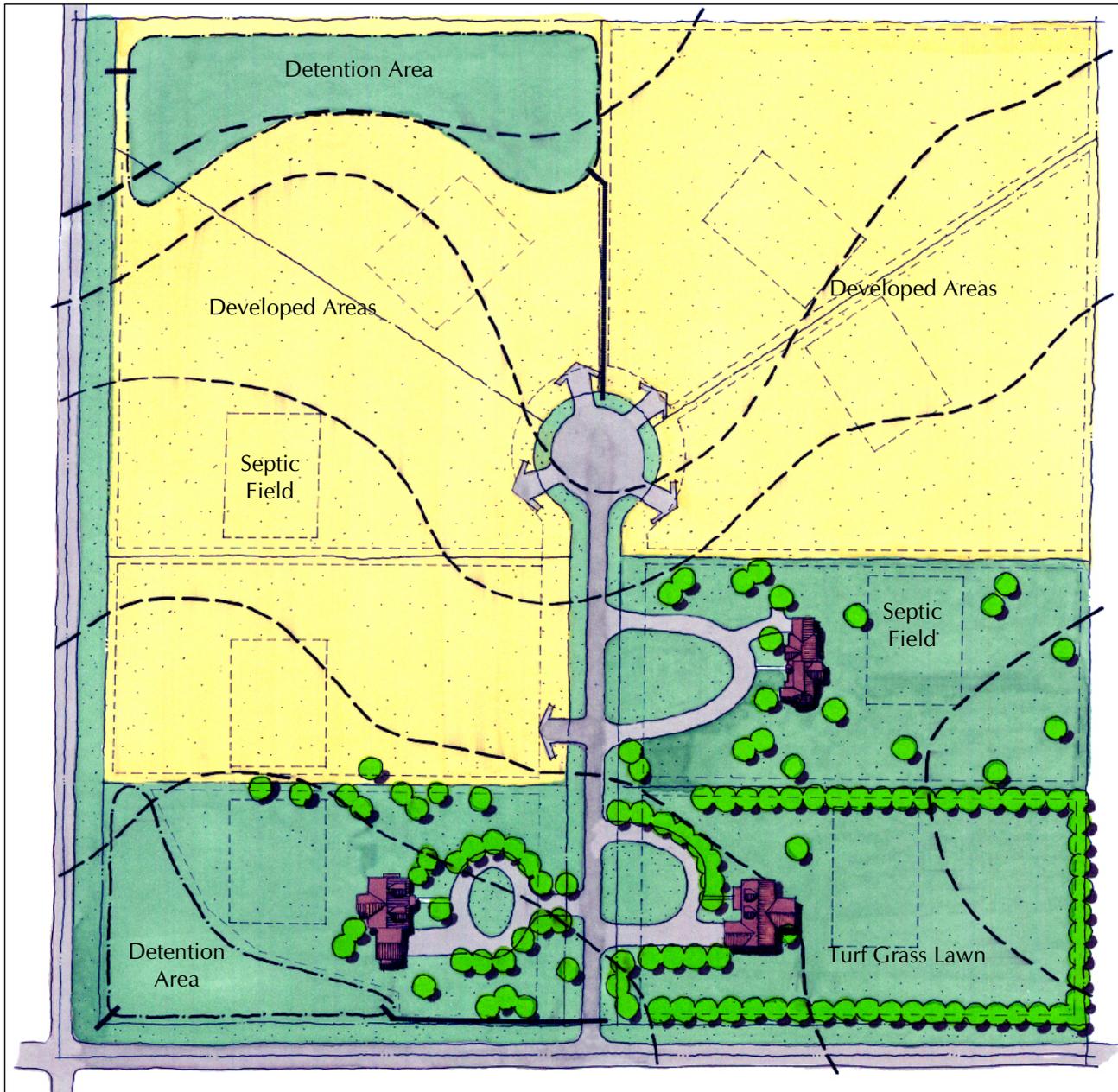


Conservation estate residential developments have human-scale roads designed for slow and safe automobile travel speeds and other transportation modes, including bicycles and pedestrians.



Conservation estate residential landscaping uses native plants instead of turf grass for their aesthetic qualities and their beneficial impacts on ecological (habitat) and hydrologic systems.

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Housing



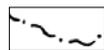
Development Lot Line



Contour Lines



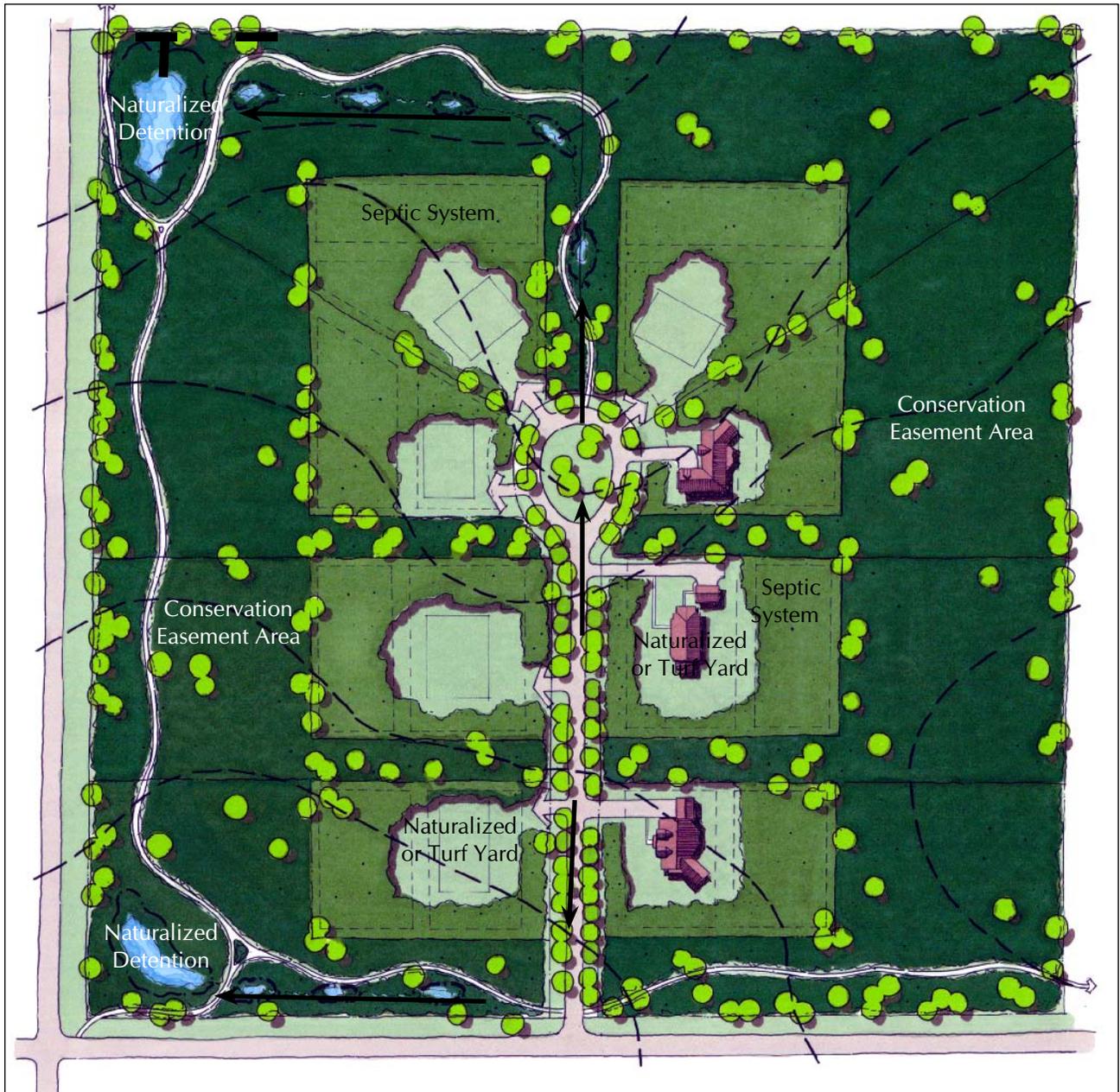
Stormwater Infrastructure



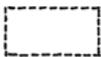
Detention Pond Boundary

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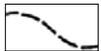
Estate Residential Template



Housing



Development Lot Line



Contour Lines



Canopy Trees



Stormwater Flow Direction



Stormwater Level Spreader

Estate Residential Template Standards

	<i>Conventional</i>	<i>Conservation</i>
<i>Number of Lots</i>	<i>8 (35.3 acres or 88.2 % of site)</i>	
<i>Open Space</i>	<i>No officially designated open space (detention is part of lots).</i>	<i>No officially designate open space but 20 acres protected through conservation easements</i>
<i>Parcel Size</i>	<i>40 acres</i>	
<i>Gross Density</i>	<i>0.2 units/acre</i>	
<i>Zoning</i>	<i>E3-PUD</i>	
<i>Lot Width</i>	<i>300 feet</i>	<i>200 feet</i>
<i>Lot Depth</i>	<i>600 feet</i>	<i>300 feet</i>
<i>Lot Area</i>	<i>180,000 sf</i>	<i>180,000 sf</i>
<i>Setbacks</i>	<i>Front – 35 ft; Rear/Side – 10 ft; Corner – 35 ft</i>	<i>Front – 35 ft; Rear/Side – 10 ft; Corner – 35 ft</i>
<i>Roadway</i>	<i>24 feet</i>	
<i>Roadway Area</i>	<i>1.6 acres (4.0% of site)</i>	<i>1.5 acres (3.8% of site)</i>
<i>ROW</i>	<i>66 feet minimum.</i>	
<i>ROW Area</i>	<i>4.7 acres (11.8% of site)</i>	
<i>Wastewater</i>	<i>Private septic system.</i>	
<i>Water Supply</i>	<i>Private well.</i>	
<i>Allowable Detention Release Rate</i>	<i>0.10 cfs/acre</i>	
<i>Required Permanent Pool Storage</i>	<i>0.75 inches/impervious acre</i>	

AGRICULTURE TEMPLATES



Rissman Organic Farm - Waterman, IL

Agricultural Lands: Land that is cultivated and manipulated for the production of food crops and/or livestock for sale beyond the immediate use of the farmer or landowner.

This booklet has been prepared as part of the Blackberry Creek Watershed Alternative Futures Analysis project funded by a grant from USEPA to IDNR and Kane County. Under this project, two “visions” for the watershed have been developed and evaluated. One vision is composed of “Conservation” template land uses that conserve a high level of watershed integrity. The other vision is composed of “Conventional” template land uses that generally will have a negative impact on watershed hydrology and biology.

This booklet presents descriptions and evaluation results of the Conservation and Conventional versions of the Agricultural Template. Watershed scale results are presented in the Alternative Futures Analysis Report.

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Agriculture Guidelines and Conceptual Images

Conventional Template Description

The conventional agricultural template assumes typical industrial, row-crop agriculture, that includes the use of fertilizers, herbicides, pesticides, tillage of the soil, and single crop plantings. "conservation tillage" and no-till farming are becoming more common in Illinois. However, conventional tillage practices still occur on many farms. Conventional crops generally consist of either soybeans or corn, but crop types do vary depending upon local soil types and climate.

Farming within the floodplain is common and often occurs up to the edge of streams and wetlands. Runoff from agricultural fields is not regulated or buffered from the stream corridor.

Isolated wetlands and hydric soils that have been drained to reduce wetness are often plowed and used for crop production even though the crop is lost in many years due to continued wet conditions.

As soil resources are depleted of their organic and nutrient content, increasing amounts of fertilizers are required. Irrigation is also becoming increasingly necessary to support production.

Stream buffer requirements for conventional agriculture only apply when the land use changes from agriculture to urban uses. Therefore, stream buffers often do not exist. The conventional template does not show potential or existing conservation easements, and assumes the maximum allowable amount of land utilized for conventional agricultural production.



Conventional agriculture requires pesticide and fertilizer application, which impacts air, soil, and water quality.



Conventional row-crop agriculture typically relies on one or two crops (corn and soybeans in the case of Illinois), applied over large parcels of land.



Stream buffers of 5 to 15 feet may occur as some recognize the streambank stabilization benefits of buffers. However, crops are often planted right up to the stream edge.



Conventional agriculture generally does not take into account the natural features of the landscape, including wetlands.

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Agriculture Guidelines and Conceptual Images

Conservation Template Description

The conservation agriculture template includes a variety of techniques and environmentally sound agricultural practices that may improve or at least have less impact on the hydrologic systems of a watershed. Sustainable agriculture is an attempt to mimic more closely ecological and hydrological systems using natural features and elements of the landscape. The type of production is sensitive to the soil, moisture, and other conditions of the land.

Where streams and wetlands occur, the conservation agriculture template includes a continuous stream corridor of native plants and riparian wetlands. Conservation easements are typically used to protect the stream corridor and floodplain, although other options exist. Adjacent and isolated wetlands are restored, as is the original meandering of stream systems.

For crops that require plowing, plowing occurs along contours and includes periodic filter strips to reduce erosion and soil loss. Although the stream corridors and wetlands are protected from conventional farming, they may still be used for native seed and plant production. Organic farming is resurrected as the primary or sole farming technique, with respect to pesticide and fertilizer application. Bison and other “designer” meat sources, grazing, perennial crops, and native prairie landscape and plant production are other potential agricultural uses that could be implemented as well.

Prior to the introduction of industrial farming practices, farmers typically generated more than one or two different products including crops. This template suggests a range of opportunities, rather than identifying the particular alternative options each farmer might choose. The template is divided into several different types of sustainable agricultural vignettes, including such things as sustainable forestry, intensive crop production, grazing, orchards, native seed production, green houses, and row-cropping. The defined land areas within the conservation template provide space and opportunity for value-added agricultural practices and other trades as well.



Organic farm photo simulation from the conventional agricultural template, adding a variety of field sizes, filter strips, and providing stream and woodlot corridor buffers for wildlife.



Conservation agriculture includes such alternatives as community supported agriculture.

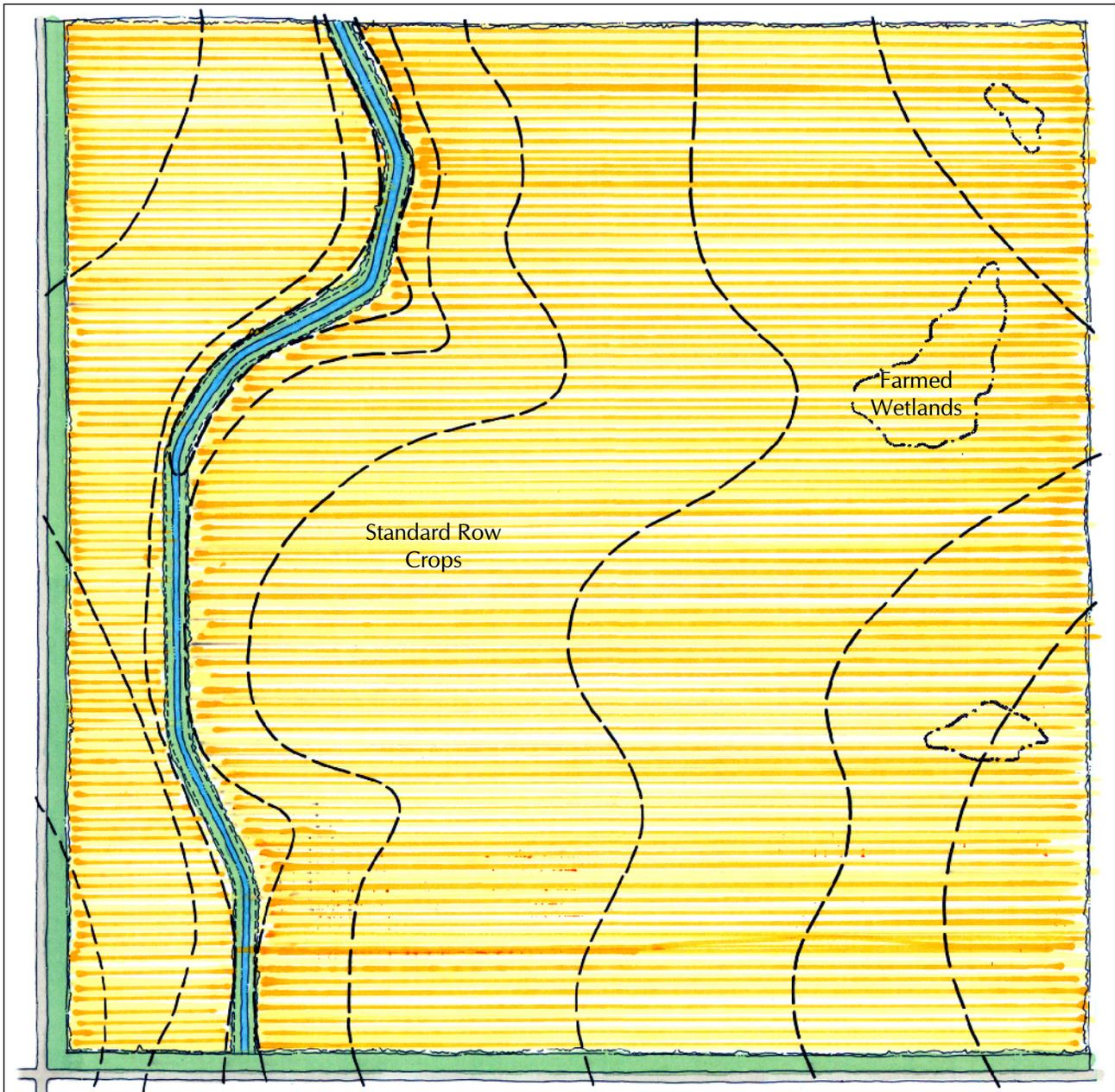


Animal production on Conservation Farms involves free-range, and non-factory farming conditions.



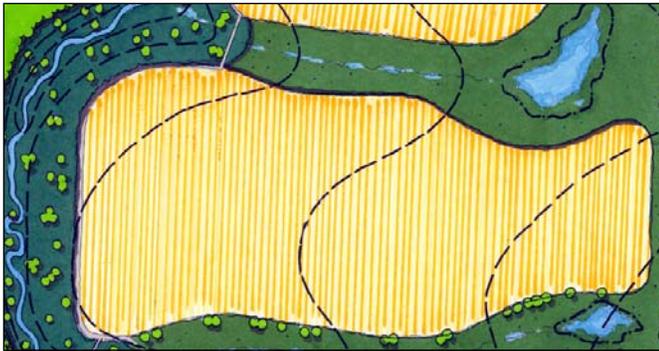
Biodynamic farming and permaculture are environmentally friendly forms of organic, non-chemically based agricultural practices.

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Agriculture Template



-  Channelized Stream
-  Row Crops or Grazing
-  Contour Lines
-  Wetland Boundary

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Contour Plowing, Perennial Crops, or Grazing.



Farmstead & Intensive Non-Row Crop Production - Agritourism such as "pick your own" and pumpkin farms.



Re-Meandered Stream for habitat and restoration of natural stream-floodplain relationship.



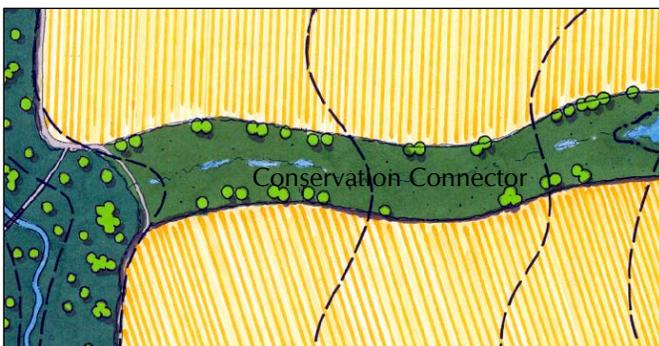
Restored Wetlands for wildlife habitat, hunting, fishing, and native seed production.



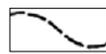
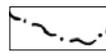
Floodplain Buffer used for native seed production.



Sustainable Woodlot for wood production, wildlife habitat and hunting.



Conservation Connector for buffering & drainage.

-  Canopy Trees
-  Contour Lines
-  Wetland Boundary

Agriculture Template Characteristics

	<i>Conventional</i>	<i>Conservation</i>
<i>Water Requirements</i>	<i>Crops are typically rain-fed with center-pivot irrigation used in areas with sandy soils.</i>	<i>Crops are also typically rain-fed with various features and practices that conserve moisture and use it efficiently.</i>
<i>Nutrient Requirements</i>	<i>Nitrogen, phosphorous and potassium delivered through chemical fertilizers and applied in full recommended rates for optimal crop production.</i>	<i>Soil fertility maintained through crop rotations using legumes, grazing animals, composted manure, with some naturally sourced purchased organic products.</i>
<i>Pest Management</i>	<i>Chemically based.</i>	<i>Integrated pest management, biological control agents, or other organic control substances when needed.</i>
<i>Weed Management</i>	<i>Chemically based.</i>	<i>An attitude of management rather than complete elimination using techniques including timely cultivation, mowing, cover crops and human labor.</i>
<i>Soil Erosion Control</i>	<i>Conservation tillage and terracing occasionally used.</i>	<i>Timely field work, contour planting and tillage, grass or native planted buffers and waterways, crop rotations, restored wetlands, perennial crops and hedgerows.</i>
<i>Drainage</i>	<i>Drain tile, ditching</i>	<i>Limited tiling, crops targeted to moisture conditions, improved soil structure and organic matter resulting in better infiltration and less runoff.</i>

STREAM CORRIDOR TEMPLATES



Nippersink River, Illinois

Stream Corridors: Linear corridors along streams, creeks and rivers. The conservation template depicts a healthy stream corridor, and includes wetlands and floodplains adjacent to the stream. The conventional template depicts a degraded stream corridor, and is limited to a minimum buffer of 0 to 50 feet, depending on the drainage area and adjacent land use.

This booklet has been prepared as part of the Blackberry Creek Watershed Alternative Futures Analysis project funded by a grant from USEPA to IDNR and Kane County. Under this project, two “visions” for the watershed have been developed and evaluated. One vision is composed of “Conservation” urban and agricultural template land uses that conserve a high level of watershed integrity and allow preservation of the characteristics depicted under the Conservation version of the stream corridor template. The other vision is composed of “Conventional” template land uses that generally will have a negative impact on watershed hydrology and biology and tend to lead to conditions described under the Conventional (degraded) version of this template.

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Stream Corridor Guidelines and Conceptual Images

Conventional Template Description

Stream quality depends on the quality of its water source (groundwater and surface water), hydrodynamics, stream morphology, and stream corridor treatment.

Under the Conventional Template, the stream corridor is limited to a buffer width of 15 to 50 feet on each side of the waterway.

In the Conventional Template, the corridor is often either turf grass or agricultural field. Within newly developing areas, the stream is buffered by 15 to 50 feet of native vegetation, depending upon the size and quality of the stream, according to local standards set within the Countywide stormwater ordinance. These buffer requirements only apply when land uses change to urban uses, and do not apply to areas developed prior to the ordinance effective date (January, 2002).

Conventional, or degraded stream corridors are fed primarily by surface runoff and drain tile discharge during storm events. Baseflows tend to decrease as the watershed develops due to decreased groundwater recharge. As a result, streams tend to become intermittent at larger and larger drainage areas.

Many streams have been channelized, removing natural meanders, pools and riffles to facilitate drainage, and confining the stream to its channel through dredging and its resulting side-cast levees. As a result, streams tend to be isolated from their floodplains and therefore are more subject to erosive forces during high flows. Modification of flood fringe areas continues to be allowed by ordinance provided that floodplain storage is preserved.

Access to the stream in agricultural areas is often uncontrolled and subject to damage from livestock. In urban areas, stormwater is allowed to discharge directly into the stream.

As a result of the modified hydrology, reduced water quality, and physical disturbances, habitat conditions tend to be degraded and biodiversity substantially reduced. Index of Biotic Integrity scores are typically in the 30s or lower.



Conventional channelized stream corridor with 8'-10' side cast pile on left side of creek.



Conventional channelized stream corridor with agricultural development up to the stream edge.



Conventional stream corridor in urban area with significant streambank erosion. (Note exposed storm sewer tiles on left due to bank recession.)

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Stream Corridor Guidelines and Conceptual Images

Conservation Template Description

The corridor of high quality streams typically includes the entire floodplain area. In addition to a natural corridor, high quality streams generally only occur in watersheds where hydrologic modification has not been significant.

Conservation stream corridors have continuous shorelines and buffers consisting of native plants and wetlands and a corridor that generally coincides with the floodplain. Streams are buffered to a fixed distance from the edge of the meander belt width, rather than from the edge of the bank, and are protected through conservation easements. The buffer should be standard for all land uses.

Healthy stream corridors are fed primarily by groundwater, with little direct surface water runoff except during snowmelt conditions. Water level fluctuations are gradual, changing with season according to rainfall, snowmelt and evaporation rates, and are much less sensitive to individual rainfall events.

Adjacent natural features, riparian wetlands, meandering, and riffle-pool sections of the stream are either preserved or restored. Intermittent streams, hydric soils and other stream-related features are protected as "conservation connectors" adding to a conservation network across the watershed.

Channelization has not occurred, nor has dredging, levee creation, or filling in of the floodplain. Overbank flow occurs only for runoff events with frequencies of one to two years. Direct stormwater and wastewater discharges generally do not occur. Instead, discharges are to buffer areas using level spreaders, swales, created wetlands and other methods of dissipating discharge energy.

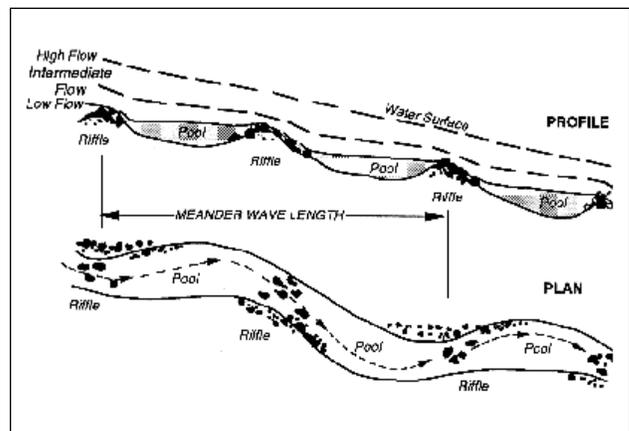
Modification of flood fringe areas does not occur. Access is not restricted and is encouraged, where appropriate. Index of Biotic Integrity scores are typically in the 40s and 50s.



Natural creeks meander through the landscape with pool-riffle sequences determined by hydrologic, soil, and geologic conditions. Connection between the stream and floodplain reduces erosion pressure and provides unique habitat.

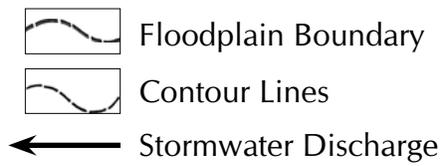
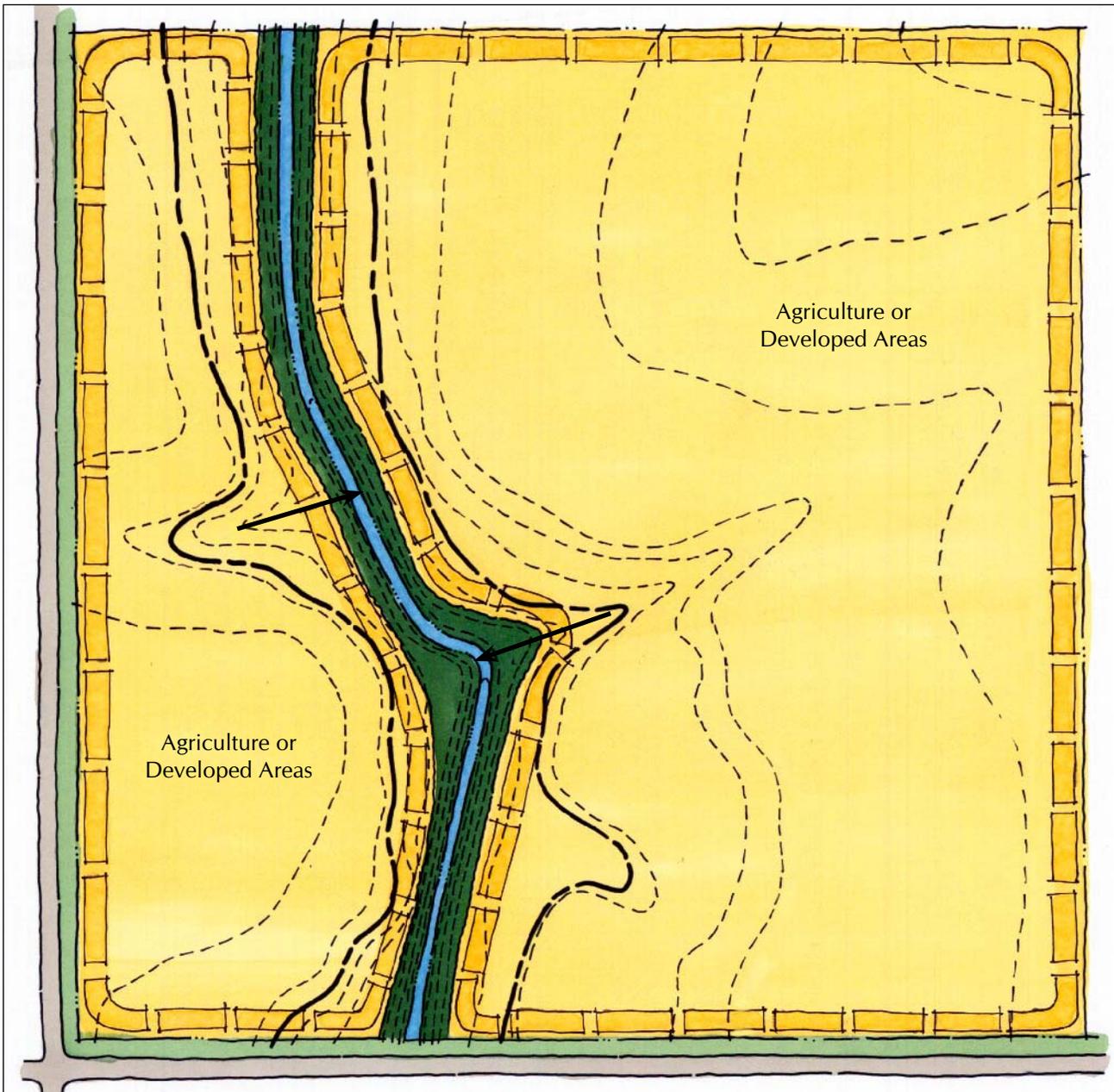


Restoration of a creek meander with adjacent native landscape and public access.



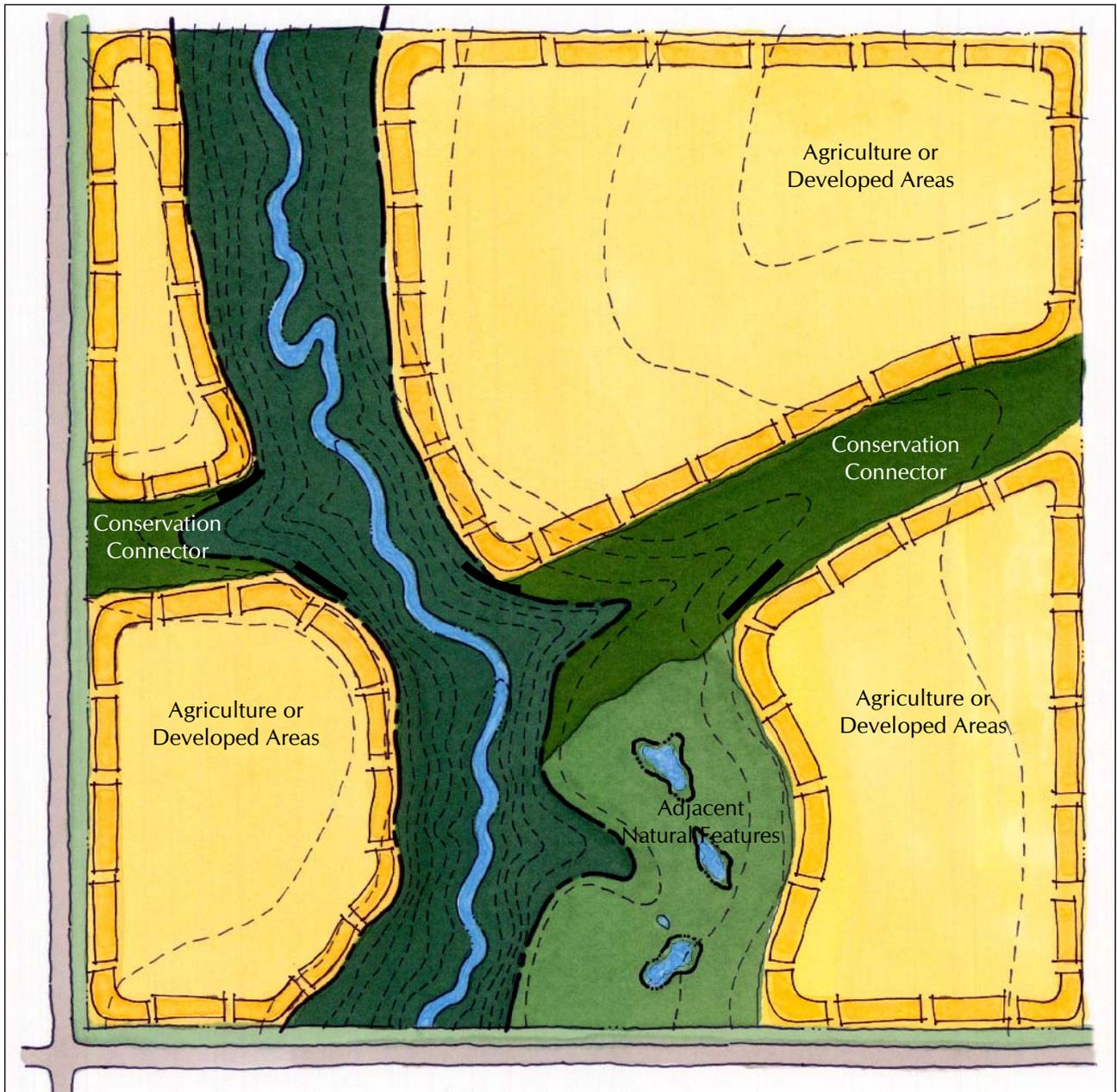
Credit: Newbury & Gaboury, "Stream Analysis and Fish Habitat Design, A Field Manual", showing naturally occurring stream riffles and pools.

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Stream Corridor Template



- | | | | |
|---|-------------------|---|---------------------------|
|  | Stream |  | Floodplain Boundary |
|  | Stream Buffer |  | Contour Lines |
|  | Restored Wetlands |  | Stormwater Level Spreader |

Stream Corridor Template Characteristics

	<i>Conventional</i>	<i>Conservation</i>
<i>Water Source</i>	<i>Primary source of runoff during storm events is surface runoff and drain tile discharge. Groundwater discharge sustains baseflows but at reduced rate.</i>	<i>Source of water is predominantly groundwater with little direct surface water runoff entering the stream except during snowmelt conditions.</i>
<i>Hydrodynamics</i>	<i>Due to decreasing groundwater recharge, streams are increasingly intermittent at larger drainage areas. Variability in streamflow rate is much more related to rainfall events than to season and "flashy" conditions predominate.</i>	<i>Water level fluctuations are generally seasonal with higher flows occurring during spring time snowmelt conditions. Flow rates are generally low during the growing season when evaporation rates are high. Flow rates are much less affected by routine rainfall events.</i>
<i>Morphology</i>	<i>Relatively incised stream channel due to both intentional channelization and downcutting resulting from erosive streamflows. Where channelization has occurred, meanders will only be marginally present. However, pool-riffle sequences may be present depending on elapsed time since channelization and present hydrologic conditions. Erosion is typically active. Stream not well connected to the floodplain due to incision and/or channelization. Channel flow cuts into banks, naturally occurring stabilizing meanders are severely diminished.</i>	<i>Streams are characterized by meandering planform and pool-riffle bedform. The channel itself is quite stable but the position of channel may migrate modestly over time. The stream bottoms will generally be silty within meanders and gravely in riffle areas. The stream channel is well connected to the floodplain with the channel having 1- to 2-year capacity to contain stream flow before over flowing into the floodplain. No dams present to obstruct migration of fish and macro-invertebrate populations.</i>
<i>Sediment Transport</i>	<i>Degraded streams often have areas of both excessive deposition and excessive erosion as the streams' sediment transport characteristics are "out of synch" with load due to disturbed hydrology, channel modifications, and flow obstructions.</i>	<i>Depending upon the watershed's geology, streams will generally have a continuous bed load of somewhat coarse sediment. Stream morphology reflects stable sediment delivery.</i>
<i>Vegetation</i>	<i>Waterway corridor tends to be either densely wooded with non-native, invasive shrubs and trees such as buckthorn, multiflora rose, honeysuckle, weeping and black willow and box elders, or else dominated by reed canary grass and purple loosestrife. Within developed areas, turf grass is often planted right up to the edge. Within the channel, there are either no plants due to active erosion or they are dominated by cattails, reed canary grass and purple loosestrife.</i>	<i>Intermittent headwater streams may have plants through the bottom of the channel. Permanently wet streams will generally not have vegetation in the bottom of the channel. Shoreline plants will typically be wetland, wet prairie or open woodland with some shrubs.</i>
<i>Aquatic life</i>	<i>Carp and other tolerant fish species adapted to disturbed and murky waters predominate. Worms and arthropods are dominant macro-invertebrates, depending on water quality.</i>	<i>A balanced mix of fish and macro-invertebrates. Fish include both game and non-game species. The stream has IBI values greater than 40.</i>

DEPRESSIONAL WETLAND TEMPLATES



Nelson Lake, Illinois

Depressional Wetlands: Depressional landscape features that are distinct from flowing streams and have vegetation, hydrology and soils characteristics of wet conditions. Historically, depressional wetlands were located where the ground dropped below the water table and therefore served as discharge zones or flow-through zones. Where the hydrology has been manipulated through agricultural or urban development, many of these wetlands now receive a much greater percentage of surface runoff as compared to groundwater discharge.

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Depressional Wetland Guidelines and Conceptual Images

Conventional Template Description

Conventional depressional wetlands are generally isolated, and not linked into a network of wetland complexes. In newly developing areas, a native buffer of 15 to 50 feet is required by ordinance around wetlands. The buffer width is dependent on the size and quality of the wetland. These buffer requirements only apply when land uses change to urban uses and do not apply to areas developed prior to the ordinance (effective in January, 2002). Buffers in other areas often consist of turf grass or agricultural field typically up to the wetland edge. Many wetlands have been dredged to create "lakes" or detention basins.

Conventional wetlands are fed primarily by surface water runoff and drain tile discharge. Some wetlands (and former wetlands) have been drained to reduce their area and make more land available for agricultural or urban land uses. These factors lead to increased magnitude and frequency of water level fluctuation, elevated water temperatures, and altered water chemistry.

The value of wetlands is often described in two broad categories. The first is their inherent floristic and habitat value that contributes to the overall health and functioning of the watershed. The second is their watershed protection functional values for downstream areas. These functions include sediment, toxicant, and floodwater retention. Typically, wetlands used to retain sediments, toxicants, or floodwaters will not exhibit high biodiversity values.

No management is typically provided of conventional wetlands, and as a result, their diversity is relatively low. Conventional depressional wetlands do not have controlled access, except where private property restricts access or a public agency has done so. Direct stormwater discharge into and out of conventional wetlands is typical, and in the past many wetlands have been incorporated into stormwater detention basins. The US Army Corps of Engineers and many local jurisdictions no longer allow detention within wetlands.



Many wetlands have been excavated to create lakes with a resulting loss in habitat diversity as well as bank erosion.



Direct discharge into conventional wetlands is typical. Heated and untreated stormwater can disrupt the natural ecology of a wetland.



Farmed wetlands seldomly produce crops, and thus function neither as wetlands nor as productive crop land.

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Depressional Wetland Guidelines and Conceptual Images

Conservation Template Description

Conservation depressional wetlands are generally linked as part of a system or network of wetland complexes of various sizes and qualities, rather than being isolated from other wetlands. Conservation wetlands have a range of buffer types and sizes depending upon such things as adjacent land uses, quality of wetland, size of wetland, topography and soils. Conservation connectors, or extended buffer areas connect isolated and critical recharge areas to the wetland system. Buffer areas are naturalized and consist of native plants. Beyond the buffer areas, adjacent natural features (hydric soils, isolated wetlands, etc.) are also protected as part of the system.

Although groundwater recharge is often listed as a wetland function, high quality wetlands are typically discharge or flow-through zones fed primarily by groundwater with little direct surface runoff except during snowmelt conditions.

Conservation wetlands have high floristic and habitat value and could also provide watershed protection functions. However, if high quality wetlands receive direct stormwater discharges and therefore are called upon to provide significant flow attenuation or pollutant retention, their floristic and habitat values are unlikely to persist.

Conservation wetlands and their buffers are managed through annual burning. Buffers increase habitat diversity, discourage intrusions by cultural activities and provide a zone for management of stormwater. Direct stormwater discharge into conservation wetlands does not occur. Instead, stormwater can be dispersed at the edge of the buffer utilizing level spreaders and other systems to disperse the runoff and more closely mimic historical groundwater hydrology. Conservation easements and/or overlay zoning are employed to protect high quality wetlands. Trails can target access to appropriate locations.



Restored depressional wetland.



Restored wetlands in residential developments can enhance aesthetics and quality of life, while at the same time improving wildlife habitat.



A fen wetland that is particularly sensitive to groundwater hydrology and chemistry.

~ CONVENTIONAL ~ Depressional Wetland Template



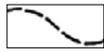
Protected Depressional Wetlands



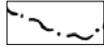
Wetland Buffer



Drainage Ditch



Contour Lines



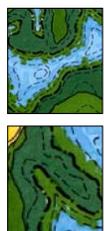
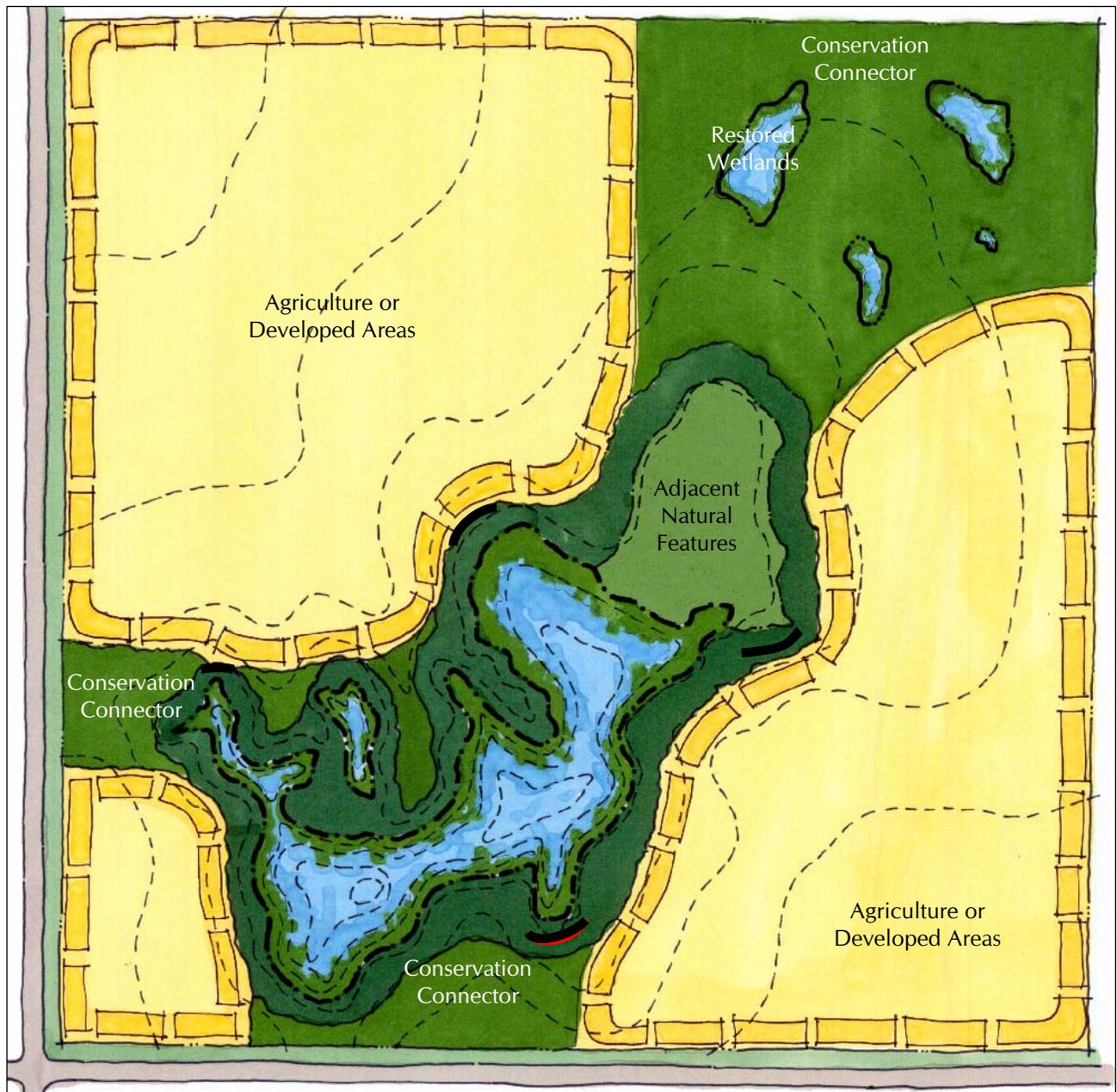
Wetland Boundary



Stormwater Discharge

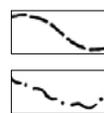
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Depressional Wetland Template



Protected Depressional Wetlands

Wetland Buffer



Contour Lines

Wetland Boundary



Stormwater Level Spreader

Depressional Wetland Template Characteristics

	<i>Conventional</i>	<i>Conservation</i>
<i>Water Source</i>	<i>Surface runoff and drain tile discharge are a significant percentage of the water source.</i>	<i>Typically groundwater based hydrology with very little surface discharge. Wetlands are located within a zone of groundwater discharge. In some cases, wetlands may be flow-through wetlands where groundwater enters on one side and leaves on the other. Certain wetlands such as seeps and fens are groundwater fed but release as surface water.</i>
<i>Hydrodynamics</i>	<i>Water level fluctuations are generally more erratic and responsive to recent rainfall events in comparison to natural depressional wetlands. Some wetlands may be drained by a surface ditch or drain tiles.</i>	<i>Water level fluctuations are moderate and related to season much more than recent rainfall. Water levels will typically be higher in spring during snowmelt conditions and when evaporation rates are low. Surface water may not be present during the growing season when evaporation rates are high.</i>
<i>Vegetation</i>	<i>Simple and tolerant vegetation communities are usually present. Conventional wetlands often have an Floristic Quality Index (FQI) less than approximately 15.</i>	<i>A diverse vegetation community will be present. The wetland will have an FQI greater than approximately 25.</i>
<i>Area</i>	<i>Wetland typically isolated from other wetlands.</i>	<i>Wetland area often includes complexes of several wetlands and intervening uplands.</i>
<i>Buffer</i>	<i>Buffer often nonexistent except where recent regulatory activity has required establishment of a buffer. Where no buffer exists, vegetation within buffer width is often turf grass or agricultural field.</i>	<i>Buffer width is greater than in the conventional template and determined by topography, soils, and quality of adjacent uplands.</i>

^a FQI is a statistic derived by multiplying Mean Coefficient of conservatism by the square root of the number of native species inventoried on a site. Coefficient of conservatism (C) is ranging from 0 to 10, implying weedy to conservative. In general, sites with FQI values less than 20 are degraded or derelict plant communities, or are very small habitat remnants.