

INTRODUCTION



WE ALL HAVE A STAKE IN THE FUTURE OF THE JORDAN RIVER CORRIDOR

The Jordan River corridor runs through 3 counties and 15 cities, flowing from Utah Lake, through the Salt Lake Valley, and finally into the Great Salt Lake. Streams and rivers from Wasatch and Oquirrh mountains feed directly into the Basin. Thus, the Jordan River represents a unique 50-mile-long green corridor of tremendous value—environmentally, recreationally, economically, and culturally—for both the communities through which it flows and for the entire Wasatch Front. Because of this physical and social interconnectedness, successful management and development of the river corridor will require close cooperation between government agencies, landowners, and the public who uses the river corridor.

Enhancing the river corridor will benefit the communities of the Salt Lake Valley. Eighty percent of U.S. population now lives in an urban or semi-urban setting, and many are disconnected from the natural world. A common belief is that nature and the need for environmental restoration occurs elsewhere. However, many key ecological functions such as hydrology, energy flow, and plant-animal community dynamics occur within urban limits (Pickett et al. 2001). More importantly, experiencing nature in an urban context can foster support for ecological preservation by residents within their own community and elsewhere (Miller 2005), as well as having the potential to improve quality of life and health of urban and suburban residents. Research has shown that exposure to nature and open space can relieve stress, and contact with nature in familiar settings can enhance emotional and intellectual development and value formation in children (Miller 2005). Finally, improving open space can increase our cultural heritage, provide spiritual and religious inspiration and a sense of place, and improve aesthetics and educational and recreational opportunities (Costanza et al 1997).

The Jordan River has been a life line for the development of this valley. The first pioneers harnessed the water to transport materials and for irrigation. The river has been intensively managed for the last century and in many instances confined to a very narrow engineered corridor. There are also areas along the corridor that are wide swaths of native vegetation and the river flows unencumbered in the lowland areas. The community created a vision for the future of the river through the Blue Print Jordan River.

The Blueprint Jordan River is the result of a community visioning process about the Jordan River. Through the process, the community created a vision for the protection and enhancement of the river. Through the visioning process, 57 percent of the community said they would like to see it as a green corridor and 23 percent would like to see it as a recreation corridor. Land-use policy statements within the document provide a framework to guide future efforts related to the Jordan River corridor and include:

Policy 1: All undeveloped land within the flood plain and land that has wetland or habitat restoration, creation, or preservation potential should be preserved as open space.

Policy 2: Areas that are planned for development that conflict with Policy 1 should be priority areas for land acquisition and protection.

Policy 3: Any land within the river corridor (i.e., within one-half mile of the river) that is not designated as “open Space” or recommended for preservation in Policies 1 and 2 should be subject to the application of strategies for low-impact development and sustainable landscaping.

The Jordan River corridor is a lifeline that connects our communities by providing many critical services, such as mitigating floods, recharging groundwater, filtering pollution, providing critical wildlife habitat, offering recreational opportunities, and being an economic driver. Therefore, the challenges that exist along the river corridor (e.g., water quality issues, noxious weed infestations, and flooding) also connect communities because issues that affect one are likely to reverberate downstream and impact others. Thus, both the benefits and the challenges require a collective approach that focuses on the river system as a whole, framed by long-term initiatives, and the development of Best Management Practices (BMPs) that provide solutions in assisting communities achieve their vision for preserving or enhancing the river corridor.

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BEST MANAGEMENT PRACTICES

ENVIRONMENT

LANDUSE

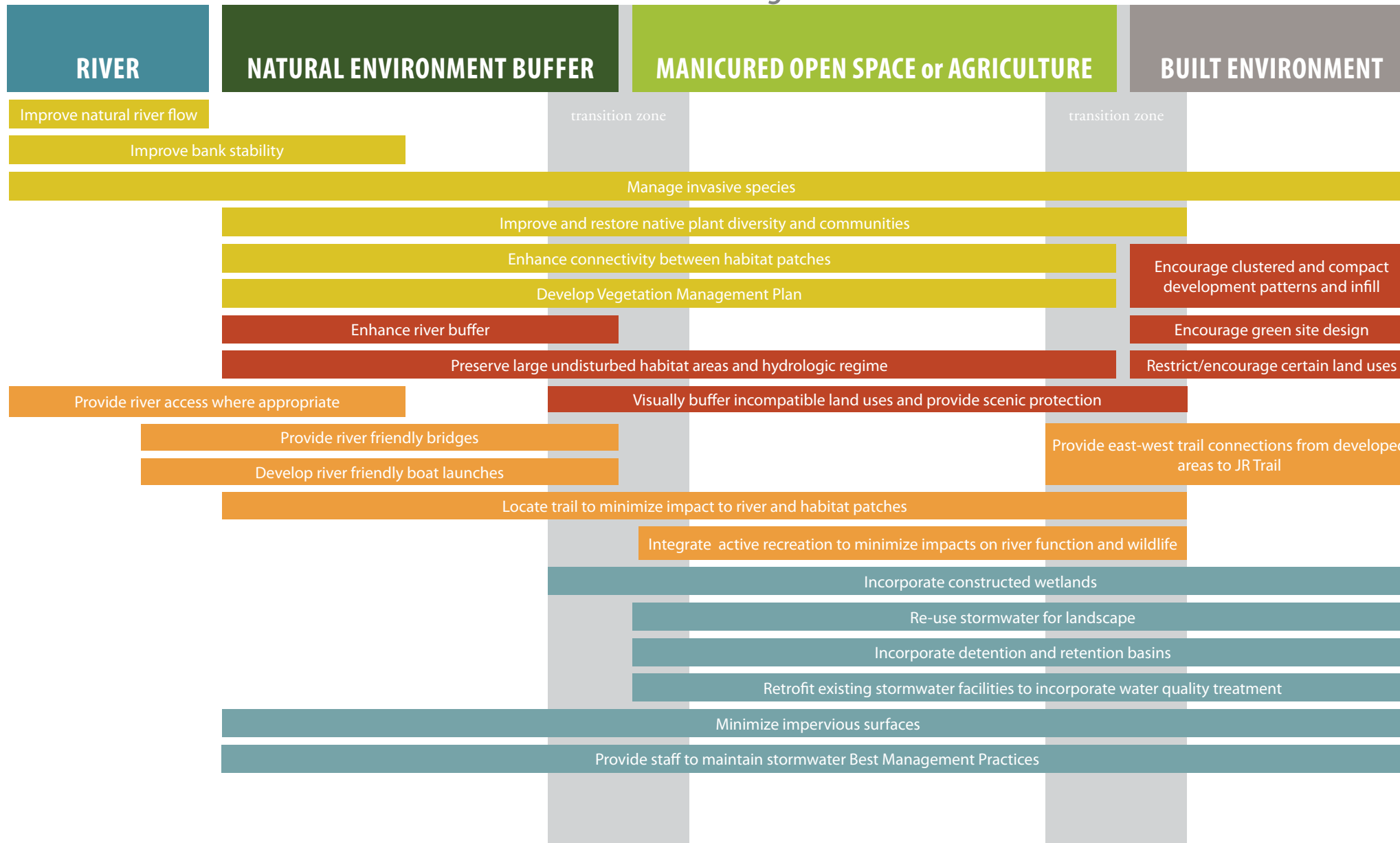
RECREATION

STORMWATER



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JORDAN RIVER CORRIDOR TRANSECT and Best Management Practices



The goal is to create an integrated system of practices that work together.

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PRESERVATION AND ENHANCEMENT OF THE JORDAN RIVER CORRIDOR

The Jordan River represents a rare and important lowland riparian habitat for many native birds, mammals, reptiles, and amphibians. The river corridor is also a major artery in a U.S. migratory path known as the Great Salt Lake flyway, and creates critical nesting, resting and foraging habitat for migratory bird species. Vegetation along the corridor is comprised of riparian shrub-steppe communities, which have undergone drastic alteration as a result of human settlement and development. Native biodiversity, habitat quality, and habitat connectivity have been considerably reduced. Furthermore, exotic and invasive flora and fauna have proliferated in the wake of human disturbance to the Jordan River Corridor and created a more homogenous, less diverse community. The result is that the river corridor's ability to function as a native habitat, and act as a natural filter or storm water retention system has been severely compromised.

THE IMPORTANCE OF FUNCTIONAL DIVERSITY

Increasing the variety of species (diversity) and the number of species (richness) in an ecological community has positive effects on the number of functional roles undertaken by an ecosystem. On a small scale, vital roles include soil formation; increasing nutrient cycling and plant biomass; and providing food, water, fuel, and biochemicals. At a larger scale, a healthy ecosystem can help regulate climate, disturbance, hydrologic flow, and nitrogen deposition effects. Species diversity and richness can also help purify air and water resources, provide erosion and biological control, and regulate disease (Costanza et al 1997). Excess nitrogen (from fertilizer, leaking sewers, animal waste, highway run-off, and atmospheric deposition) is a pollutant that can result in eutrophication of water courses with impacts to aquatic species. Nitrate nitrogen also affects drinking water and can be detrimental to children's health (particularly less than 6 months),; as well as being linked to anemia and blue-baby syndrome (Schwartz et al 2000). Fortunately for any restoration project, ecosystem functioning (e.g. nitrogen retention) begins to improve at modest species richness (20 to 30 percent of possible species richness of an area) (Schwartz et al 2000). Therefore, restoring species diversity and richness along the Jordan River corridor ultimately improves the health of the river system and provides long-term benefits for urban residents.



BEST MANAGEMENT PRACTICES

Improve natural river flow

Improve bank stability

Manage invasive species

Improve and restore native plant diversity and communities

Enhance connectivity between habitat patches

Develop Vegetation Management Plan

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RESTORATION

Long-term sustainability of the Jordan river corridor requires thinking of restoration at a species' community level, using species adapted to the area (i.e., native species). Enhanced prospects for biodiversity require coordination of conservation activities communities (Miller 2006). Improving the corridor will require restoration of three ecological communities (e.g., aquatic, riparian, and shrub steppe or upland), to increase habitat heterogeneity and encourage native species to the corridor, and simultaneously reduce the spread of invasive species. Reduction and replacement of invasive species should be undertaken gradually as native species may adapt to using them as a resource (Rodriguez 2006). Going beyond a "green" corridor using structural and successional complexity improves native species diversity and creates year-long visual interest (successional changes in vegetation).

TWO-PRONGED RESTORATION APPROACH

Increase habitat patch areas and complexity (horizontal and vertical structure)

The goal should be to create large areas of quality habitat to protect biodiversity. Larger patches have potential to support greater species diversity due to species/area relationships. However, small areas can act as focal points of restoration projects in fragmented landscapes and are suitable for taxa with smaller habitat requirements (Miller 2006). Habitat patch-size potential varies along the length of the corridor, which is why it is important not to view them in isolation but as a mosaic of fragmented patches with the potential to be linked. Patch size as well as connectivity could be designated as either Bronze (small unconnected), Silver (large unconnected), or Gold (large connected).

Within habitat patches, the goal should be to have range of age classes of dominant tree and or shrub species and increase the number and type of native species present (e.g., trees, shrubs, forbs, sedges, bunch grasses). Guidelines exist for native vegetation adapted to the intermountain west riparian/shrub-steppe areas (Johnson and Buffler 2008). The target of restoration projects along the corridor should be to improve the structural complexity of habitat (e.g., understory, mid-story, and canopy), improve the successional change in vegetation communities, and increase the size and connectivity of fragmented habitat patches should be.

Patch shape is also an important consideration. Long thin patches have a lot of "edge" compared to usable habitat. This increases predation rates and alters patch environment (i.e., drier, hotter, more arid species and species adapted to disturbance [weed potential and generalists]). Reducing patch "edge" minimizes maintenance costs. Patch shape and edge effects could be enhanced by mowing management (temporal and spatial patterns).

Increase connectivity (lateral and length) between patches

Connectivity is essential for larger and wider ranging species, increased movement, genetic diversity, and long-term sustainability. Quality of patch measured by size, structural complexity, and succession potential could be linked to the widths associated with Bronze (50 to 100 feet), Silver (100 to 200 feet), and Gold 200 to 300 feet) and would be expected to attract various bird species.

Given the difficulty of determining a functional corridor (i.e., very dependent upon species: scale and behavior), a more productive approach is to consider the natural corridor as a "buffer" between the Jordan River and adjacent development. Riparian buffer is defined as follows:

"A strip or area of vegetation adjacent to a river or stream of sufficient width as determined by the Deputy Administrator to remove nutrients, sediment, organic matter, pesticides, and other pollutants from surface runoff and subsurface flow by deposition, absorption, plant uptake, and other processes, thereby reducing pollution and protecting surface water and subsurface water quality, which are also intended to provide shade to reduce water temperature for improved habitat for aquatic organisms and supply large woody debris for aquatic organisms and habitat for wildlife." (NRCS 2003; Practice Code 391)

Recommendations exist on effective buffer widths to counteract nitrogen deposition (pollution) and maintain and improve water quality (Mayer et al 2006).



BEST MANAGEMENT PRACTICES

Improve natural river flow

Improve bank stability

Manage invasive species

Improve and restore native plant diversity and communities

Enhance connectivity between habitat patches

Develop Vegetation Management Plan

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ENHANCE CONNECTIVITY BETWEEN HABITAT PATCHES

E

ENVIRONMENT

WHY IS THIS BMP IMPORTANT?

Important for maintaining species diversity and sustainability along the Jordan River corridor. Buffers against long-term habitat degradation and loss due to increased urbanization and alterations in land use.

DESCRIPTION

Historical alteration, human settlement, and development have resulted in extensive fragmentation of wildlife habitat along the Jordan River. Long-term survival of many migratory and resident species, particularly those with limited movement capabilities, depends on connected habitat patches. Connectivity allows movement between habitat areas and buffers species against natural and man-made environmental impacts. Enhancing connectivity describes BMPs designed to create links between otherwise isolated patches of wildlife habitat and circumvent existing man-made barriers. Areas of connectivity should be given the same considerations for habitat quality as established native habitat patches. Therefore, enhancing connectivity requires initial weed removal, naturalized planting of native plant mixes designed to introduce structural complexity, or the installation of structures designed to facilitate movement along the Jordan River corridor.

BENEFIT

- Buffers native species against natural and man-made environmental impacts
- Increased potential for wildlife habitat area available along river corridor
- Provides potential to connect river corridor to adjacent open spaces
- Improves ecological function: water purification, erosion control, and nitrogen deposition
- Improves aesthetics for recreational user groups by providing a continuous 'green' corridor along river

APPLICATION

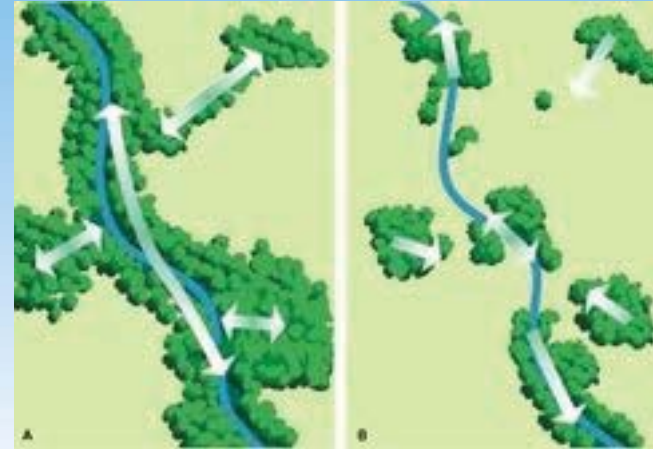
- Longitudinal connection of wildlife habitat patches along river
- Lateral connection between wildlife habitat patches and adjacent open spaces
- River zone
- Natural environment buffer zone
- Manicured open-space zone

CONSIDERATIONS

- Existing man-made or natural barriers
- Umbrella species and habitat requirements

HOW TO

- Conduct site inventory of existing fragmented habitat patches to be connected and potential barriers
- Conduct species inventory to identify umbrella species (benefits most species), including assessment of habitat requirement and life history patterns
- Site preparation; removal of invasive plant and hardscape materials
- Installation of vegetation using naturalized planting depending upon short-term and long-term functionality
- Installation of alternative movement systems (i.e., pipes under river bridges)
- Regular watering during initial growing season (2–3 day cycle)
- Noxious weed control during initial growing season



<http://www.smartgrowthvermont.org/toolbox/issues/wildlifecorridorprotection/>

IMPLEMENTATION REQUIREMENTS AND COST

- Biological survey of existing habitat areas and targeted species
- Invasive plant removal
- Initial planting or installation costs
- Plant mortality monitoring and replacement
- Noxious weed monitoring and control

LONG-TERM MANAGEMENT

- Establish a monitoring program of corridor effectiveness in facilitating movement and species establishment
- Monitor and manage exotic and invasive plant and animal species



CONTEXT:

ASSOCIATED BMPs:

- E** Restoration of native plant diversity and wildlife habitat
- E** Manage invasive species
- E** Improve bank stability
- L** Preserve large undisturbed habitat areas
- R** Provide river access where appropriate

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RESTORATION OF NATIVE PLANT DIVERSITY AND WILDLIFE HABITAT

E

ENVIRONMENT

WHY IS THIS BMP IMPORTANT?

Improve wildlife habitat features and functions, as well as environmental quality and value for recreational user groups.

DESCRIPTION

Restoration of native plant diversity and wildlife habitat describes BMPs designed to improve three habitat communities: aquatic, riparian, and shrubsteppe that naturally occur along the length of the Jordan River. Restoration of the three habitat communities can increase native wildlife habitat area and species diversity. Increasing species diversity can enhance ecological functioning; reduce the spread of invasive species, and reduce long-term vegetation management costs. Aquatic, riparian, and shrubsteppe communities describe unique plant and wildlife assemblages associated with the river, natural environment buffer, and manicured open-space zones. Restoration requires initial weed removal, and naturalized planting of native plant mixes designed to introduce the structural complexity of each specific community.

BENEFIT

- Long-term sustainability of native wildlife habitat
- Increases wildlife viewing potential (bronze, silver and gold species)
- Improves ecological function: water purification, erosion control, and nitrogen deposition
- Improves aesthetics along river corridor for recreational user groups
- Reduces long-term maintenance costs (vegetation clearing and mowing)

APPLICATION

- Lateral and longitudinal open space along river corridor
- River zone
- Natural environment buffer zone
- Manicured open-space zone

CONSIDERATIONS

- Larger areas have the potential to support more native species
- Human access to established habitat areas

HOW TO

- Conduct site inventory of existing fragmented habitat patches to be connected and potential barriers
- Conduct species inventory to identify umbrella species (benefits most species), including assessment of habitat requirement and life history patterns
- Site preparation; removal of invasive plant and hardscape materials
- Installation of vegetation using naturalized planting depending upon short-term and long-term functionality
- Installation of alternative movement systems (i.e., pipes under river bridges)
- Regular watering during initial growing season (2–3 day cycle)
- Noxious weed control during initial growing season

IMPLEMENTATION REQUIREMENTS AND COST

- Site inventory, design, and analysis
- Invasive plant removal
- Initial planting costs
- Plant mortality monitoring and replacement
- Noxious weed monitoring and control

LONG-TERM MANAGEMENT

- Monitor establishment success and failure by season
- Spot herbicide or mow during community establishment



CONTEXT:

ASSOCIATED BMPs:

- E** Connectivity between habitat patches
- E** Manage invasive species
- E** Improve bank stability
- L** Preserve large undisturbed habitat areas
- R** Provide river access where appropriate
- R** Provide river access where appropriate

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Land use and zoning tools play a critical role in shaping the character and physical development of local communities. Zoning codes, supported by the policies of a comprehensive plan, not only set the rules for the development of land but also for the protection of important local resources, such as wildlife habitat, scenic areas, and historic resources.

In the context of protecting and enhancing the Jordan River corridor, this means that communities along the river should supplement technology-based traditional BMPs, such as stormwater detention and filtering systems discussed above, with land use strategies that address river health on a broader, landscape level. For example, creating a river buffer zone that limits or prohibits certain types of development near the river can significantly improve water quality and riparian habitat by reducing impervious surface and limiting land disturbance. Similarly, the river's long-term health will be enhanced by encouraging or requiring cluster subdivisions that permanently protect open space and wildlife habitat by concentrating new homes on smaller lots on the least sensitive portions of the site. Such strategies can significantly reduce the need for expensive stormwater BMPs in the first place. They also help achieve other important goals, such as improving the aesthetic quality of the river and providing recreational opportunities. The key is to carefully coordinate the implementation of these land use tools with more site-specific traditional BMPs and green infrastructure.

Adopting new land use and zoning tools, however, involves challenges that are not typically associated with traditional BMPs. Because zoning tools can impact the value and use of a landowner's property, local residents may vocally oppose such measures and decision-makers often want to avoid controversy. Given this fact and the diverse character of the communities along the Jordan River, it is important to recognize that most zoning tools can be designed in a flexible manner to respond to local political and geographic circumstances. For example, instead of adopting a new uniform riparian setback, incentives (e.g., reduced parking or additional height) can be used to help off-set any additional financial burden or site-design constraints imposed if a landowner voluntarily provides the additional setback. Or, some communities may want to adopt performance-based standards (e.g., post development

run-off rates must not exceed pre-development rates) that allow landowners to design their own solution for compliance rather than having to meet, for instance, a uniform impervious coverage standard. Another major zoning challenge is to address existing development that will not comply with newly adopted river corridor standards (nonconformities), as well as special standards for infill and redevelopment. This final point is especially important given the extensive amount of current development within one half mile of the river.

Many communities along the Jordan River have already adopted some level of zoning measures to improve the health of the river. This BMP manual is intended to not only support these efforts but provide guidance on how each community can go even further by adding creative new zoning tools to further protect an irreplaceable natural and cultural resource.



BEST MANAGEMENT PRACTICES

Enhance river buffer

Preserve large undisturbed habitat areas and hydrologic regime

Visually buffer incompatible land uses and provide scenic protection

Encourage clustered and compact development patterns and infill

Encourage green site design

Restrict/encourage certain land uses

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RIVER BUFFER

L

LAND USE

WHY IS THIS BMP IMPORTANT?

Important for protecting water quality and maintaining native vegetation along the river that supports aquatic and terrestrial species diversity. Also supports recreational uses and limits development that may adversely impact the river.

DESCRIPTION

A river buffer is a protective zone placed along a river that limits development and other activities that may negatively impact the river. In particular, it is intended to protect sensitive natural resources, such as riparian vegetation, wildlife habitat, migration corridors, and water quality. It can also be used to protect recreational opportunities and enhance scenic beauty. The width of a buffer vary, but in most cases it range from from 50 feet to 150 feet in width, but may be smaller or larger depending on the goals of the community. Buffers may also be divided into multiple zones or tiers so that the areas closest to the river have stricter standards than areas on the outer reaches of the buffer.

BENEFIT

- Protects native riparian and upland plant species near river
- Enhances water quality and fish habitat through water filtration and reducing sedimentation
- Increases wildlife habitat and migration routes along river corridor
- Increases connections with adjacent open spaces
- Improves aesthetics for recreational user groups and others by providing a continuous 'green' corridor along river

APPLICATION

- Any river or major waterway
- Both natural and developed areas

CONSIDERATIONS

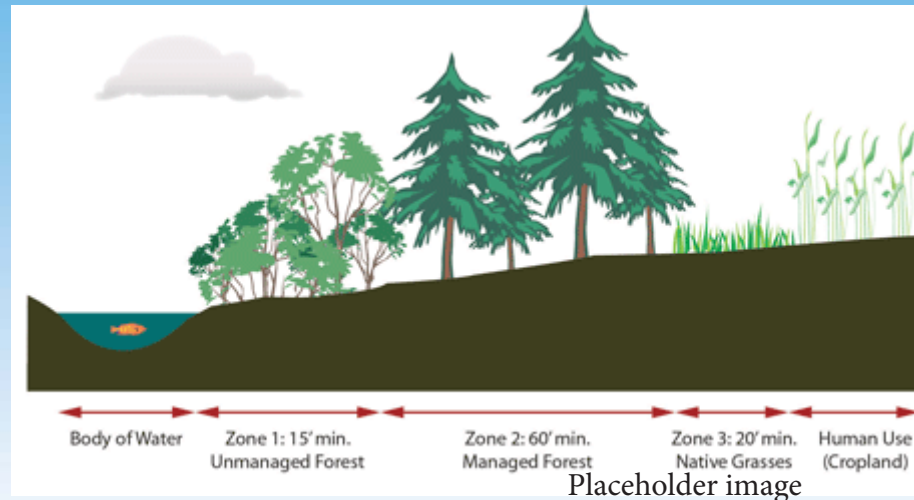
- Existing development patterns
- Coordination with other local open-space and river-protection efforts

IMPLEMENTATION REQUIREMENTS AND COST

- For jurisdiction: Minimal to modest cost for adoption of code amendment (depending on whether jurisdiction conducts biological assessments to identify buffer area).
- For landowners: Modest cost to comply with buffer requirements for new projects.

HOW TO

- Conduct vegetation and species inventory of existing river corridor
- Prioritize riparian resources for protection
- Inventory existing land uses within potential river buffer
- Establish a river buffer that balances river protection, development rights, and existing development patterns



LONG-TERM MANAGEMENT

- Minor staff time to enforce and periodically update buffer standards

INCENTIVES

- Potential density bonus

LOCAL EXAMPLE

- Riparian Corridor Overlay District - Salt Lake City

RESOURCES

- Boulder study



Can be used to protect and enhance riparian habitat

CONTEXT:

ASSOCIATED BMPs:

- E** Improve and restore native plant diversity and wildlife habitat
- E** Manage invasive species
- S** Minimize impervious surface
- L** Preserve large undisturbed habitat areas
- R** Provide river access where appropriate

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CLUSTERED DEVELOPMENT

L

LAND USE

WHY IS THIS BMP IMPORTANT?

Clustering development preserves environmentally-sensitive land and open space by concentrating new development on less sensitive parts of a property. It also reduces sprawl by minimizing land consumed by roads, infrastructure, and structures.

DESCRIPTION

Clustered development tools are usually implemented through the subdivision process. This is because the subdivision process is the community's primary opportunity to impact the location and design of new development, such as the location, number, and layout of new lots. Whether clustered development tools are optional or mandatory, the intent is to concentrate development away from protected sensitive areas (e.g., rivers, wildlife habitat, natural hazards, farmland) and locate where it will consume the least amount of land. The undeveloped part of the property is usually permanently protected with an easement and may provide public access. In addition, minimum lot sizes are often reduced or waived to facilitate the clustering of lots, while density bonuses are sometimes used to encourage clustering or offset any potential loss in property value.

BENEFIT

- Protects open space and wildlife habitat from urban sprawl
- Reduces footprint (e.g., grading, roads, infrastructure) of new development
- Is a flexible tool that can be designed to fit the needs of diverse communities

APPLICATION

- Within or adjacent to adopted river buffer
- Most effective in areas with vacant land and growth pressure

IMPLEMENTATION REQUIREMENTS ANDh COST

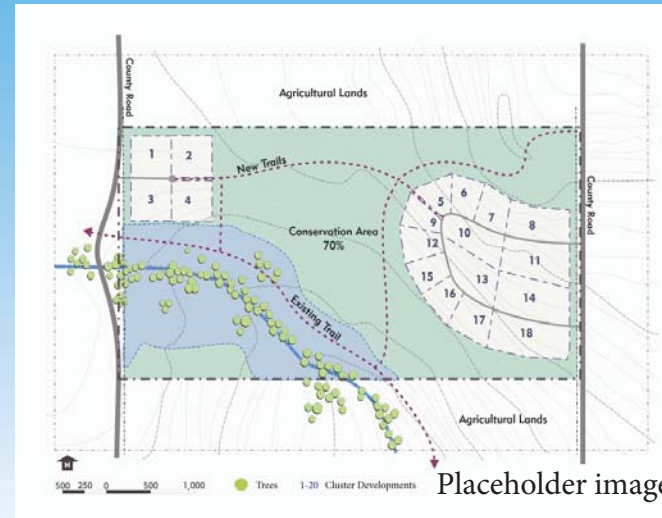
- For jurisdiction: Minimal cost for adoption of code amendment
- For landowners: Depending on details of ordinance, potential for modest loss in development value due to smaller and more concentrated lots

CONSIDERATIONS

- Prevalence of vacant and developable land
- Long-term management of protected open-space areas
- Coordination with other local open-space and river protection-efforts

HOW TO

- Identify open-space related resources that community wants to protect
- Develop clear criteria for clustering (when it's required and how it should be done)
- Consider property rights
- Amend subdivision ordinance but provide flexibility based on community needs



LONG-TERM MANAGEMENT

- Minor staff time to enforce and periodically update clustering standards

INCENTIVES

- Potential density bonus

WHERE HAS THIS BEEN DONE BEFORE?

- Riley County, Kansas

RESOURCES



CONTEXT:

ASSOCIATED BMPs:

- E** Improve and restore native plant diversity and wildlife habitat
- E** Enhance connectivity between habitat patches
- S** Minimize impervious surface
- L** Preserve large undisturbed habitat areas
- R** Provide river access where appropriate

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R

RECREATION



The Jordan River Corridor is a great recreation resource for the region. It provides the opportunity for users to experience a river environment in the midst of a heavily urbanized area. The Jordan River Trail has increased access and use for a variety of users leading to increased knowledge and engendering stewardship and a desire to protect the resource. The Blueprint Jordan River demonstrated wide public support to maintain the corridor as a natural landscape, or “green corridor” primarily, and as a recreation space second. The public’s perception of naturalness is often less discriminating than that of an expert ecologist or biologist. Recreation opportunities can be created in areas that already have human influence, therefore meeting the expectations of experiencing a natural landscape while also protecting sensitive ecosystems and critical habitats

BMPs for recreation include design of recreation features in a river-friendly manner and increased east-west access from the communities to the corridor. There is momentum and support to close the few remaining gaps in the trail from Utah Lake to the Great Salt Lake. Communities also desire more east-west connections from adjacent communities and regional transportation. Providing education and interpretive opportunities throughout the corridor are critical activities as people arrive in and spend time along the corridor. These opportunities assist in developing an understanding of the value of the Jordan River Corridor. As people use and gain greater understanding of the corridor, they can take more ownership of it to protect its resources. Providing a unified system of interpretive, regulatory, and way-finding signage throughout the corridor will be an important element in fostering appropriate use and community stewardship for all types of recreation.

The Jordan River provides valuable open space in proximity to many residents in the adjacent communities. Trail and recreation design should provide a variety of experiences from intimate small scale spaces to vast open spaces. Connectivity to adjacent communities, regional transportation, and to the canyons of the Wasatch Front will increase the overall robustness and value of the network. Creeks that feed into the Jordan River are good corridors for recreation and access, but must be sensitive to wildlife habitats that need protection and enhancement.

There is also the opportunity to develop a water trail that allows the public to view the sensitive landscape with very little impact. Identifying appropriate access points to the river that have minimal impacts to riparian habitat will be an important component of developing the blue trail.

Recreation and ecological sustainability can be mutually beneficial as well. Recreation in the manicured open spaces can be integrated with green infrastructure and stormwater BMPs. Native habitat patches could be incorporated into the manicured open space to enhance habitat connectivity and reduce overall maintenance. River-friendly maintenance standards for both natural areas and manicured open spaces can reduce negative impacts on the river. Providing education and interpretive facilities about these efforts will contribute to community sense of stewardship.

Open-space protection for recreation as well as protection for sensitive wildlife habitat becomes more important as development pressures increase. Communities need ways to balance the value of the open-space versus economic development opportunities. A well-connected open-space system that provides recreation as well as ecosystem services such as flood control, clean water, clean air, and relief from the urban environment has tremendous tangible and intangible value. The land strategies for protecting open space in perpetuity that can be facilitated by conservation easements land trusts, Transfer of Development Rights (TDRs), and overlay districts.

BEST MANAGEMENT PRACTICES

Provide river access where appropriate

Provide east-west trail connections from developed areas to JR Trail

Provide river friendly bridges

Develop river friendly boat launches

Locate trail to minimize impact to river and habitat patches

Integrate active recreation to minimize impacts on river function and wildlife

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LOCATE TRAILS TO MINIMIZE IMPACT TO RIVER AND HABITAT

R

RECREATION

WHY IS THIS BMP IMPORTANT?

The physical location of the trails in the Jordan River Corridor has important environmental impacts and implications for sustainability.

DESCRIPTION

The Jordan River Trail is a well-liked and supported regional destination trail. It provides valuable recreation opportunities in proximity to communities adjacent to the River. The multi-use Jordan River Trail accommodates pedestrians, bicyclists, in-line skaters, and wheelchair users. In some cases it also accommodates equestrian users between segments of other equestrian trails.

The Jordan River Trail is a great way to experience the natural environment of the Jordan River Corridor in our urbanized valley. The design and location of the trail has impacts on the corridor. Therefore, it is important to design trails that protect sensitive ecological areas and will be physically sustainable. The goal of sound trail design is to create a high value experience in the corridor.

New trail development should be located in areas that have already been influenced by human activity. Trails should be safe, convenient, and provide a high value experience while also contributing to a regional transportation network. The trail should be located to minimize impacts to the sensitive ecological areas and to protect large habitat patches. Any river crossings should be minimal to protect the riparian habitat.

BENEFIT

- Create trail sequences and experiences that vary between intimate spaces and vast open areas
- Identify important view sheds and management of the vegetation in the corridor to protect the riparian and other ecological values (should be included in a vegetation management plan)
- Trails in the corridor can contribute to regional transportation network
- Offer opportunities for recreation, fitness, and transportation
- Enhance knowledge, understanding, and stewardship of the corridor
- Become more valuable as a transportation and commuting corridor as more east-west connections are made from communities and regional transportation

HOW TO

- Avoid sensitive environments and critical habitats
- Develop trails in areas that already have human impacts
- Respect the river buffer (do not locate trails in the buffer zone)
- Use natural infiltration and stormwater best management practices
- Vary the distance from the river to provide variety and interest
- Avoid placing the trail close to the river on an outside bend
- Decommission poorly located trails and restore to natural state
- Avoid locating trail on ecotone but rather on the periphery with crossings at the least disruption location to natural ecosystems
- Identify important view sheds and management of the vegetation to protect (included in a vegetation management plan)

CONSIDERATIONS

- Develop a hierarchy of trails to provide a variety of experiences
- Enhance regional connectivity and transportation opportunities

IMPLEMENTATION REQUIREMENTS AND COST

- Vegetation and wildlife habitat mapping
- User analysis; what kind of activity needs to be accommodated on the trails
- Regional transportation and connectivity analysis
- Materials analysis and appropriate application
- Vegetation management

LONG-TERM MANAGEMENT

- On-going stewardship of trail and adjacent natural system.
- Management and control of the spread of invasive species along the trail corridor
- Maintenance of positive drainage and stormwater to reduce impacts to trail

RESOURCES

- Minnesota Department of Natural Resources. 2006. *Trail Planning, Design, and Development Guidelines*.



CONTEXT:

- River zone
- Natural environment buffer zone
- Manicured open-space zone
- Built environment

ASSOCIATED BMPS:

- L** Preserve large undisturbed habitat areas
- E** Improve natural river flow
- E** Enhance connectivity between habitat patches
- E** Manage invasive species
- R** Provide river access where appropriate
- R** Create east-west trail connections to communities and regional transportation
- S** Minimize impervious surfaces

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ENHANCE EAST-WEST TRAIL CONNECTIONS TO THE JORDAN RIVER TRAIL AND REGIONAL TRANSPORTATION

R

RECREATION

WHY IS THIS BMP IMPORTANT?

The Jordan River Trail is a trail destination, providing recreation and transportation opportunities for residents of the entire region. Enhancing east-west connectivity from adjacent communities creates a more accessible recreation and transportation facility.

DESCRIPTION

The Jordan River Trail is part of a larger network of recreation and transportation facilities. Establishing connectivity creates a robust system that is accessible to the community. Improving the existing network will encourage the use of alternative and active transportation, which is an integral factor in community sustainability. Communities have voiced avid appreciation of the Jordan River Trail and desire more east-west connections to enhance accessibility. East-west connections could be in the form of both on-street and off-street connections that serve a variety of user groups. Creating connections to regional transportation can reduce the need for parking in proximity to the Jordan River Corridor; these connections will enhance the accessibility of the recreation resource to an increased number of user groups. The linking of trail systems on both local and regional levels is important to create a functioning and comprehensive trail system.

BENEFIT

- Encourages active transportation
- Enhances recreation access for a wider spectrum of users in the region
- Reduces need for parking in near proximity to the natural corridor
- As more east west connections are made from communities and regional transportation the more valuable the Jordan River Trail will become as a transportation and commuting corridor.

APPLICATION

- Involve community stakeholders in the trail planning process
- Incorporate trail connections as a part of any new development or redevelopment projects
- Create connections via both on-street and off-street trails, depending on site opportunities
- Create a gateway element at the intersection of east-west community trails and the Jordan River Trail
- Incorporate regionally standardized way-finding for both regulatory and interpretive signage
- Avoid sensitive environments and critical habitats
- Develop trails in areas that already have human impacts

HOW TO

- Identify open-space related resources that community wants to protect
- Develop clear criteria for clustering (when it's required and how it should be done)
- Consider property rights
- Amend subdivision ordinance but provide flexibility based on community needs

CONSIDERATIONS

- Develop a hierarchy of trails to provide a variety of experiences
- Enhance a regional connectivity and transportation opportunities

IMPLEMENTATION REQUIREMENTS AND COST

- Community transportation assessment
- User analysis; what kind of activity needs to be accommodated on the trails?
- Regional transportation and connectivity analysis
- Way finding signage
- Vegetation management

LONG-TERM MANAGEMENT

- On-going stewardship of trail and adjacent natural system
- Maintenance of way-finding signage and maps

RESOURCES

- *Trail Planning, Design, and Development Guidelines*. Minnesota Department of Natural Resources. 2006
- Complete Streets
- Salt Lake County Bicycle Best Practices



CONTEXT:

- Manicured open-space zone
- Built environment

ASSOCIATED BMPs:

- L** Preserve large undisturbed habitat areas
- L** Clustered development
- E** Manage invasive species
- R** Develop trail to reduce impacts on river and habitat
- S** Minimize impervious surfaces

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According to the Draft Jordan River Total Maximum Daily Load Water Quality Study – Phase 1, dated July 27, 2012, the Jordan River is impaired because of temperature, total dissolved solids, and excessive loading of organic matter. The degradation of organic matter results in episodes of depleted dissolved oxygen downstream of the Surplus Canal (north of 2100 South). The primary sources of these three impairment constituents are Utah Lake and return flows from irrigation canals that convey Utah Lake water.

Nevertheless, stormwater can potentially contribute both organic material and sediment to the Jordan River. Because of the river's very low gradient and relatively low, controlled inflows from Utah Lake, sediment and organic matter is not easily transported downstream out of the Jordan River system. This increases the importance of control of stormwater discharges to the river to improve its function and health.

Capturing stormwater in storage facilities, such as detention basins and constructed wetlands, benefits the Jordan River by improving the water quality of the discharge through deposition of sediment (potentially containing organic matter) and when detained for longer periods, removal of suspended organic matter, both contributing to impairment of the river.

Reuse of stormwater for irrigation of parks and golf courses near the Jordan River has the potential for a mix of benefits and negative impacts on water quality. If irrigation is inefficient and fertilization excessive, runoff from irrigation may increase nutrient loading (nitrogen and phosphorus) to the river. It can be argued that nutrient loading is presently so large from Utah Lake and agricultural irrigation return flows that the incremental impact to the Jordan River is negligible. On the other hand, if nutrient loading from these other sources were reduced in the future, irrigation return flows from lands adjacent to the river may have more importance. Consequently, any decision to reuse detained stormwater to irrigate near the Jordan River should include consideration of high-efficiency irrigation practices to minimize irrigation runoff from discharging to the river.

Typically, stormwater BMPs are good at improving the water quality of low flow stormwater runoff, which is when concentrations of pollutants are highest. However, the nature of the Jordan River results in the river being a “trap” for sediments and other unsuspended contaminants. Consequently, high flow runoff transports large volumes of sediment that would normally pass through a faster moving river system but frequently are deposited in the Jordan River, causing increased impairment. Therefore, the best of the BMPs for stormwater would consider detention of high flow storm events to remove as much sediment and organic matter as practical before it reaches the Jordan River.



BEST MANAGEMENT PRACTICES

Incorporate constructed wetlands

Re-use stormwater for landscape

Incorporate detention and retention basins

Retrofit existing stormwater facilities to incorporate water quality treatment

Minimize impervious surfaces

Provide staff to maintain stormwater Best Management Practices

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WET AND DRY DETENTION BASIN

S

STORMWATER

WHY IS THIS BMP IMPORTANT?

This BMP reduces a primary water quality impairment of the Jordan River, sediment with organic matter. It protects the river from oil, grease, and other light contaminant spills.

DESCRIPTION

Extended detention basins are dry between storms. During a storm, the basin fills and a bottom outlet slowly releases the stormwater to provide time for sediments to settle. (Source: Guidance). Extended or dry detention provides opportunity for multiple uses as a recreational area or other uses when the basin is dry. Wet detention has water storage for other wet purposes (e.g., secondary irrigation, recreation, etc.), as well as stormwater detention. Both extended and dry detention treats for sediment. Wet detention treats for nutrients and organic material better than dry.

BENEFIT

- Removes sediments containing organic matter, such as non-soluble metals
- Removes oils and grease
- Removes trash and debris
- Reduces downstream erosion potential

APPLICATION

- Remove particulate pollutants
- Remove and/or contain oil/grease spills when snout used on outlet pipe
- Use dry detention where lack of water prevents the use of wet detention, wetlands, or bio filters
- Use dry detention where wet detention or wetlands would cause unacceptable mosquito conditions

CONSIDERATIONS

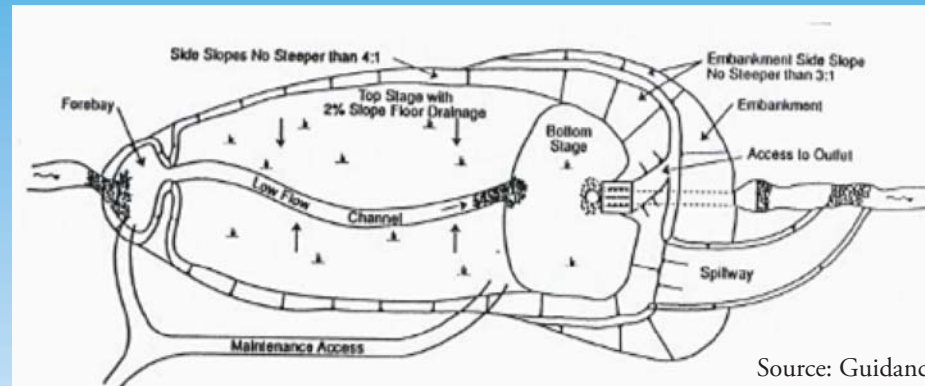
- Consider mosquito abatement, land availability, and potential for and benefits of multiple uses
- Detention basins can be sized for a range of stormwater events, but the larger the basin, the greater the detention of runoff and the more effective at removing sediment.

IMPLEMENTATION REQUIREMENTS AND COST

- Capital cost high (Source: Guidance)
- Operations and Maintenance costs medium (Source: Guidance)

HOW TO

- Evaluate potential contaminants and depth to groundwater
- Evaluate installation of subsurface components (bedding course, base reservoir, etc.)
- Include observation well to monitor drain time



Washington Fields Detention Basin, Washington, Utah (Courtesy: URS)

LONG-TERM MANAGEMENT

- Regular clearing of outlet
- Sediment removal
- Erosion repair
- Water circulation for water quality (wet detention)
- Vegetation maintenance

LOCAL EXAMPLES

- Jordan River Parkway Detention - Murray City

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CONTEXT:

All urban environments
Parks and open space

ASSOCIATED BMPs



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STORMWATER MAINTENANCE

S

STORMWATER

WHY IS THIS BMP IMPORTANT?

Because most stormwater BMPs involve removal of sediments or other contaminants from runoff, maintaining BMPs is critical to removing accumulations of sediments and contaminants.

DESCRIPTION

Several communities adjacent to the Jordan River have dedicated staff for the maintenance of stormwater BMPs throughout their communities. Staffing at this level ensures BMPs are monitored and maintained as needed to ensure their functionality. Data on stormwater BMPs are preserved in a database to ensure their maintenance continues following staffing changes. Any method that ensures maintenance of facilities would qualify as meeting this BMP.

BENEFIT

- Removes sediment and contaminants from stormwater BMPs so they continue their intended function
- Systematic method of monitoring BMPs ensures facilities are maintained and not overlooked.

APPLICATION

- Any community or county with responsibility for operating and maintaining BMPs. Once BMPs are constructed, a schedule of BMP maintenance needs to be developed that documents histories of maintenance activities.

IMPLEMENTATION REQUIREMENTS AND COST

- No capital cost
- Labor costs relatively high if staff are dedicated to BMPs
- Database establishment costs moderate
- Database maintenance costs low

CONSIDERATIONS

- Cost of long-term commitment to operations and maintenance

HOW TO



Camera inspection of a stormwater facility
Source: blog.udot.utah.gov

LONG-TERM MANAGEMENT

- The purpose is to provide long-term management of BMPs.

LOCAL EXAMPLES

- Salt Lake County, South Salt Lake City, West Valley City, and Sandy employ full- or part-time staff dedicated to stormwater facilities monitoring and maintenance.

RESOURCES



CONTEXT:

All municipal and county agencies with responsibility for operating and maintaining stormwater BMPs

ASSOCIATED BMPs:

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WETLAND RESTORATION/ENHANCEMENT

S

STORMWATER

WHY IS THIS BMP IMPORTANT?

Wetlands can be very effective in maintaining the health and wellbeing of aquatic life in the Jordan River by removing dangerous sediment and organic matter from stormwater.

DESCRIPTION

Wetlands are constructed in shallow areas of permanent ponding used by fish, insects, and other animals for habitation. There are two types of wetland BMPs: filtration and infiltration. Filtration wetlands have an outlet, and the wetland is used for filtering stormwater through vegetation and by dilution. Infiltration wetlands allow water to seep through the soil profile. Both wetland types remove sediment, nutrients, pesticides, bacteria, and organic matter. If retention of stormwater is incorporated into the wetland, the treatment can be very high. Regardless of type, wetlands are among the best BMPs to treat a wide range of pollutants.

BENEFIT

- Aesthetically pleasing, enhanced landscaping
- Can retain or detain high flood events
- Treatment efficiency high

APPLICATION

- Appropriate use adjacent to Jordan River
- Moderate to large open space required

CONSIDERATIONS

- Need for vector (mosquito) control
- Adequate storage for major flood events
- Large area requirements

IMPLEMENTATION REQUIREMENTS AND COST

- A permanent water source that is more reliable than stormwater runoff is generally needed to maintain wetland vegetation
- Capital cost high (Source: Guidance)
- Operation and maintenance costs medium (Source: Guidance)

LONG-TERM MANAGEMENT

- Occasional to infrequent maintenance
- Vegetation provided sufficient water and nutrients
- Cleaning of outlet (filtration only) and inlet

HOW TO



Jordan River Parkway, Murray

LOCAL EXAMPLES

- Jordan River Parkway - Murray City

ASSOCIATED BMPs

- All stormwater BMPs

RESOURCES

- Salt Lake County Storm Water Guidance



CONTEXT:

Proximity to Jordan River very appropriate

ASSOCIATED BMPs:

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Annotated Outline of Riparian Protection Ordinance

APPENDIX A

This is an outline of a model riparian protection ordinance. It is not designed for any particular community but provides a basic structure that can be modified by any community to meet their needs. Based on the JRC's comments provided during this project, this ordinance outline can be modified with more detail and explanation. In addition, sample language from adopted riparian ordinances can be added to show examples of how each section has been addressed in other communities.

PURPOSE

[This section describes the community's reasons and goals for protecting riparian habitats. It may contain general statements related to protecting the health, safety, and welfare of the community, as well as more specific statements regarding why riparian habitats are important for that particular community, such as habitat for important local species, flood control, water quality, etc.]

APPLICABILITY

[This section states generally where the riparian protections will apply and/or what types of development are subject to the riparian standards. More detail will be provided in the body of the ordinance but this section should provide enough detail to let readers know whether their project needs to comply with the ordinance.]

Exceptions

[This section lists all geographic areas, activities, and circumstances that do not have to comply with the riparian standards.]

MAP

Map

[If there is a map that depicts where the regulations apply, such as with an overlay district, then it should be provided to help the reader understand where the ordinance applies.]

Site-Specific Verification

[Because large-scale riparian maps are often created using remote and incomplete data it is important that a technical process exist for individual landowners to verify or challenge the inclusion of their property in the overlay (see Section 6 below).]

DEFINITIONS

[This section provides definitions for all new terms that are necessary to implement the new ordinance (they may also be located at the end of the ordinance). We highly recommend, however, that definitions be located with all other land use code definitions in a separate chapter dedicated to definitions.]



Annotated Outline of Riparian Protection Ordinance

APPENDIX A

PERMIT REQUIRED

[If the jurisdiction chooses to require landowners to obtain a specific “riparian” permit to build in protected riparian areas, then the type of permit (e.g., zoning certificate, conditional use permit, etc.) and the required review process should be provided.]

HABITAT/NATURAL RESOURCE ANALYSIS

[It is common to require applicants with proposed projects located in the riparian protection zone to submit a resource inventory and impact analysis for the property. Also, as described in more detail below, this analysis may also include a mitigation plan that proposes a strategy for avoiding, minimizing, and if required, mitigating impacts to the protected features.]

GENERAL STANDARDS

[This section provides the bulk of the substantive requirements for riparian protection. The length and detail of this section will vary significantly depending on the goals of each jurisdiction]

Buffer Zones

[A common option is to divide the riparian buffer zone into zones so that the areas closest to the river have stricter standards than the areas on the outer reaches of the zone. For example, areas within 50 feet of the river may restrict all development, areas from 51 to 100 feet may allow very limited development, and areas from 101 to 150 feet may allow most development subject to additional standards. Some codes use a uniform-sized buffer zone.]

Protected Riparian Features

[This section lists each protected riparian feature and describes clearly what special or additional standards are required to protect them from new development. Typical standards might address:

- i. Special setbacks for grading, structures, and roads;
- ii. Grading limits and conditions;
- iii. Native vegetation protection and weed control;
- iv. Impervious surface limits;
- v. Operational restrictions;
- vi. Recreational access and limits;
- vii. Site design modifications;
- viii. Fencing; and
- ix. Land use restrictions.



Alternatives Analysis

[Some ordinances require the developer to submit one or more alternative site designs to determine whether such designs might reduce impacts to protected riparian resources in comparison to the proposed design. The alternatives may be used to justify modifications to the proposed development.]

Mitigation Standards and Plan

[When impacts to protected riparian resources are unavoidable, the jurisdiction may require that those impacts be mitigated. The mitigation plan will describe how the proposed development will be designed to avoid, minimize, and if required, mitigate the impacts to the protected features]

MODIFICATION TO REQUIRED STANDARDS/ALTERNATIVE COMPLIANCE

[To provide flexibility and to allow alternative methods for compliance, the ordinance should provide a process through which landowners can modify riparian requirements (within defined limits) to respond to unforeseen circumstances on the ground or to allow innovative development techniques that meet or exceed the adopted standards.]

ENFORCEMENT

[This section includes special enforcement provisions, if any, that apply to the enforcement of the riparian ordinance. If there are no special enforcement provisions, then the regular enforcement procedures and standards apply and this section may not be necessary.]



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