2.2 PRESERVATION OF NATURAL FEATURES

Preservation of natural features includes techniques to foster the identification and protection of natural areas that can be used in the conservation of water resources. Whether a large contiguous area is set aside as a preservation zone or certain smaller areas have been identified as appropriate for preservation, protecting established vegetation (existing trees, shrubs, grasses, and other flora) can help reduce revegetation requirements, reduce long-term erosion, preserve habitat, protect water and land resources, and maintain a healthy ecosystem.

Other benefits include:

- An immediate finished "aesthetic" that does not require time to establish;
- Increased stormwater infiltration due to the ability of mature vegetation to process higher quantities of stormwater runoff than newly seeded areas;
- Reduced runoff velocity, quantity, (by intercepting rainfall, promoting infiltration, and lowering the water table through transpiration, among others);
- Provides a buffer against noise and visual disturbance during construction; and
- Usually requires less maintenance (e.g., irrigation, fertilizer), land clearing labor and costs than planting new vegetation.

SITE ASSESSMENT

In order to reach these benefits, it is important to first identify and preserve sensitive areas on the site. A site assessment is the process whereby the design team conducts an in-depth evaluation of the overall environmental conditions of the proposed development or redevelopment prior to detailed site design. Natural conservation areas are typically identified using mapping and field reconnaissance assessments. Areas proposed for protection should be delineated early in the planning stage, long before any site design, clearing or construction begins.

The goal is to broadly identify and evaluate the ecological systems influencing the area to reduce cost and time impacts from a design, construction and maintenance perspective. Achieving cost reductions is a direct result of an understanding of environmental characteristics and integrating the most appropriate construction. The initial design and planning phase is the most appropriate time to conduct the site assessment. Items to examine during a site assessment should include:

- soil types and infiltration rates;
- health and types of existing vegetation (trees, grasses, shrubs and forbs);
- riparian areas and significant waterways;
- prominent landforms;
- depression storage;
- wetlands; and
- floodplains.

Identifying these areas can help inform later development, as sites should be located to avoid sensitive resource areas such as floodplains, erodible soils, wetlands, mature forests and critical habitat areas. Buildings, roadways, and parking areas should be located to fit the terrain and in areas that will create the least impact.

WETLANDS

Generally, wetlands are areas where regular or intermittent saturation with water determines soil type, flora and fauna. Non-tidal wetlands are most common in floodplains along rivers and streams, in isolated depressions surrounded by dry land, along the margins of lakes and ponds, and in other low-lying areas. While wetland plants and soils filter stormwater before it goes into groundwater or into rivers, a significant cause of loss for tidal and non-tidal wetlands is new development.

Wetlands that are considered waters of the United States are regulated under §404 of the Federal Clean

Water Act. The U.S. Army Corps of Engineers, under provisions of the Clean Water Act and the Rivers and Harbors Act, must issue a federal permit to allow impacts to both tidal and non-tidal wetlands and shallow water habitat. It is illegal to drain or fill a wetland without a permit from the U.S. Army Corps of Engineers. The entire Texas coast is under the jurisdiction of the Corps' Galveston District Office. Before a permit can be granted, the requestor must show that the project has considered all viable alternatives and minimized impacts as much as possible. Any wetland loss must be compensated for by constructing new wetlands, restoring or enhancing existing wetlands, or purchasing credits from an approved wetland mitigation bank.

FLOODPLAINS

Development in floodplain areas can reduce the ability of the floodplain to convey stormwater, potentially causing safety problems or significant damage to the site in question, as well as to both upstream and downstream properties. Ideally, the entire 100-year floodplain should be avoided for clearing or building activities and should be preserved in a natural undisturbed state. If development has already occurred in the floodplain, it should follow FEMA guidelines and, when possible, future development should stay out of these and other local floodplains.

Once identified, preservation areas should be incorporated into site development plans and clearly marked on all construction and grading plans. This will ensure that construction activities are kept out of these areas and that native vegetation is kept in an undisturbed state. The boundaries of each preservation area should be mapped by carefully determining the limit which should not be crossed by construction activity.

SOILS

Areas of a site with permeable soils (hydrologic soil group A and B), such as sands and sandy loam soils, should be conserved as much as possible. These areas should ideally be incorporated into undisturbed natural or open space areas. Conversely, buildings and other impervious surfaces should be located on those portions of the site with the least permeable soils. Similarly, areas on a site with highly erodible or unstable soils should be avoided for land disturbing activities and buildings to prevent erosion and sedimentation problems, as well as potential future structural problems. These areas should be left in an undisturbed and vegetated condition.

CONSTRUCTION & MAINTENANCE CONSIDERATIONS

Once a site is under construction, methods to minimize disturbance should be used to limit the amount of clearing and grading that takes place on a development site. This will help in preserving the undisturbed vegetation and natural hydrology of a site. A limit of disturbance (LOD) should be established based on the maximum disturbance zone. These maximum distances should reflect reasonable construction techniques and equipment needs together with the physical situation of the development site such as slopes or soils. LOD may vary by type of development, size of lot or site, and by the specific development feature involved.

Not only should these natural conservation areas be protected during construction, but they should also be managed after occupancy by a responsible party able to maintain the areas in a natural state in perpetuity. Typically, conservation areas are protected by legally enforceable deed restrictions, conservation easements, and a maintenance agreement.

2.2.1. BUFFER ZONES

A riparian buffer is a special type of natural conservation area along a stream, wetland or shoreline where development is restricted or prohibited. The primary function of buffers is to protect and physically separate waterbodies from future disturbance or encroachment. If properly designed, a buffer can provide stormwater management functions, act as a right-of-way during floods, and sustain the integrity of water resource ecosystems and habitats. Ideally, all buffers should remain in their natural state.

Buffer zones protect waterways, coastal marshes, and wetlands from the short- and long- term impacts of development activities. Buffer zones prevent conversion of sensitive lands to developed areas, which minimizes the potential for erosion and sediment loss into tidal waters. In addition, buffer zones preserve areas that provide important water quality benefits and maintain riparian and aquatic habitats.

TIDAL BUFFERS

Buffers serve as the protective zone between upland development and the salt marsh and open water beyond. Buffers reduce erosion and capture pollutants such as nitrogen, phosphorous, pesticides, fertilizers, and sediments before they reach the water or marsh. Buffers also serve as wildlife habitat corridors and increase the aesthetic appearance of the marsh. All of these functions ultimately help to protect the adjacent marsh from the effects of development.

FOREST BUFFERS

In a forested ecosystem, existing forested riparian buffers should be maintained. Where no wooded buffer exists, reforestation should be encouraged. Proper restoration should include all layers of the forest plant community, including trees, understory, shrubs and groundcover.

CREEK AND RIVER BUFFERS

Natural buffer areas play an important role in maintaining pre-development water quality. Riparian vegetation stabilizes stream channels and floodplain areas, reducing the potential for creek erosion. Riparian buffers also provide filtration for overland flow from adjacent development projects. This filtering is beneficial during construction to retain sediment from up-gradient disturbed areas and also after construction to polish stormwater discharged from water quality measures. There are many benefits provided by buffer systems including:

- Minimizing activities that degrade, destroy, or negatively impact the value and function of coastal marshlands;
- Increasing pollutant removal including trapping sediment;
- Increasing distance of impervious areas from the drainage/creek/wetland/tidal waters;
- Moderating overland flow;
- Discouraging excessive storm drain systems;
- Increasing property values;
- May prevent severe rates of soil erosion;
- Minimizes disturbance to creek bank slopes;
- Improves water quality;
- Providing effective flood control;
- Helping protect nearby properties from the shifting and widening of the stream channel that occurs over time;
- Reducing small drainage problems and complaints by residents that are likely to experience backyard flooding;
- Enhancing the marshlands' scenic value and recreational opportunities;
- Protecting the terrestrial coastal habitat for nesting and feeding wildlife;
- Protecting important nursery areas for fisheries, which provide food and habitat to numerous species of fish, shellfish, including commercially important species; and
- Serving as the foundation for present or future greenways.

The purpose of the riparian buffer is to adequately protect waterways and aquatic resources from the short- and long-term impacts of development activities by providing a contiguous protection zone along the riparian corridor that is associated with natural drainage features. In many creeks, streams, and rivers, the floodplain is an integral part of the stream-riparian ecosystem. Due to natural topography and geomorphology, some streams are constrained to narrow valleys or ravines.

Many scientists and engineers have evaluated the effectiveness of riparian buffers and have found that riparian buffers can be an effective tool to reduce overland flow to streams, wetlands, and coastal marshes. Riparian buffer effectiveness has also been shown to be dependent on the condition of the watershed and should be used in concert with upslope watershed management.

LAND OR DEVELOPMENT RIGHTS ACQUISITION TO PROTECT SENSITIVE AREAS

An effective way to protect environmental integrity of an area is to preserve the land. The following practices can be used to protect beneficial uses:

- Fee Simple Acquisition/Conservation Easements
- Transfer of Development Rights
- Purchase of Development Rights
- Land Trusts
- Agricultural and Forest Districts

2.2.2. DEPRESSION STORAGE PRESERVATION

Depression storage occurs when a particular area of land retains water in natural depressions, effectively storing stormwater and allowing it more time to infiltrate into the soil. Generally, areas draining to depression generate no runoff until the storage has been filled, thus, making depression storage a natural, effective, and cost-free method of reducing the volume of stormwater runoff from a site. Standard design and construction practices remove these natural depressions in order to promote drainage; however minor depressions in the landscape should be treated as sensitive resource areas and should be protected from construction activities.

Due to the important role depressions play within drainage, water quality, and ecological components of the natural stormwater system, all attempts shall be made to incorporate depressions within localized stormwater management plans.

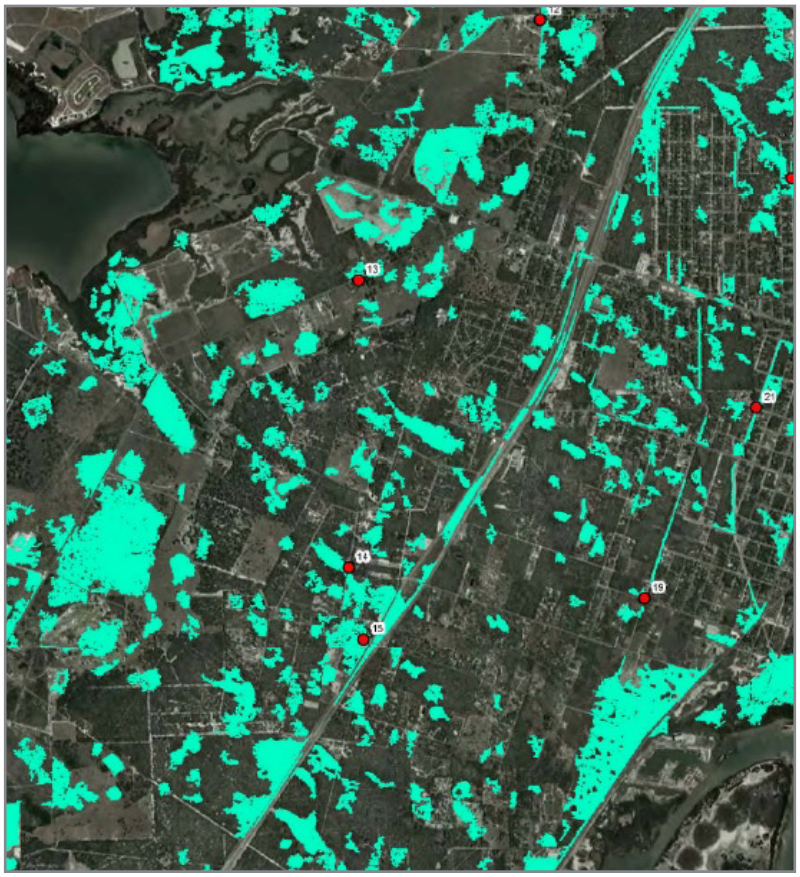

Figure 2-1: Depression storage in Aransas County, Texas (Larger than 1 acre in size and deeper than 2 feet).