Town of Sahuarita Riparian Habitat Mitigation Standards and Implementation Guidelines

A supplement to Title 18, STC 18.65 of the Town of Sahuarita Zoning Code titled "Riparian Habitat Protection and Mitigation Requirements"

Section One:
The Ordinance

What is the history of this Ordinance?

On April 24, 2006, the Town of Sahuarita Town Council adopted the Town of Sahuarita Floodplain and Erosion Hazard Management Code. Prior to the adoption, the Pima County Regional Flood Control District assumed the floodplain management responsibilities for the Town of Sahuarita. The Town of Sahuarita adopted sections of the Pima County Code by reference, Title 16 "Floodplain and Erosion Hazard Management" and Chapter 16.30 "Watercourse and Riparian Habitat Protection and Mitigation Requirements". Pima County's riparian habitat protection regulations under the Floodplain and Erosion Hazard Management Ordinance became part of the Town Code.

In addition to the adoption of the Code, the Town also adopted official Riparian Classification maps that indicate the general location of regulated riparian habitats (RRH) that meet habitat criteria and are subject to the requirements of the Ordinance. The Ordinance applies to all property in the Town of Sahuarita that contains regulated riparian habitat.

What is the purpose of this Ordinance?

The purpose of the Ordinance is to promote and/or enhance riparian vegetation and habitat along watercourses and floodplains, and;

- Promote benefits provided by riparian habitat resources, including but not limited to groundwater recharge, natural erosion control and protection of surface-water quality.
- Assist in the long-term stability of natural floodplains and survival of the full spectrum of plants and animals that are native to the Town of Sahuarita and Santa Cruz Valley by:
    1. Encouraging preservation and future survival of riparian habitat by promoting minimum disturbance of habitat during development;
    2. Supporting the continuity of riparian habitat along watercourses;
    3. Promoting land-use guidance for avoiding, minimizing and mitigating damage to riparian areas; and
    4. Providing ecological sound transition between riparian habitat and developed areas.
- Provide an economic benefit to the region by providing aesthetic, recreational opportunities and promoting wildlife values by preserving riparian habitat for the enjoyment of residents and visitors.

Importance of Riparian Habitat

Riparian habitat is the community of plants found in areas where water tends to concentrate—either temporarily or permanently—fostering the growth of plant life. A more thorough definition is that riparian habitat is the community of plants occurring in association with any spring, cienega, lake, watercourse, river, stream, creek, wash, arroyo, or other body of water,

either surface or subsurface, or channel having banks and bed through which waters flow at least periodically.

Riparian habitat is a valuable resource in the Sonoran Desert. River systems in the Sonoran Desert are important corridors for resident and migratory birds, along with providing wildlife with the resources necessary to maintain their populations. Preserving and restoring riparian habitat in the Town of Sahuarita provides multiple benefits to people as well as wildlife by protecting the natural function of the floodplain, providing shade, natural beauty, creating passive recreational opportunities, preventing erosion, protecting water quality, increasing groundwater recharge, and reducing the urban heat island effect.

Where is the Ordinance applied?

The ordinance applies to all properties within the Town that contain riparian habitat as delineated on riparian habitat maps adopted by Town Council. It shall apply to regulated hydroriparian, mesoriparian and xeroriparian classes A, B, and C habitat that will be disturbed with the following actions:

- New development
- Expansion of structures that require a town building permit, zoning clearance or floodplain permit
- Type 1 and Type 2 grading permits issued by the Town per STC 18.81
- Land development permits associated with subdivisions per STC 18.69
- Land development permits associated with commercial development plans per STC 18.71

Exceptions:

- The ordinance does not apply when regulated riparian habitat is not present or disturbed.
- Existing buildings constructed before April 24, 2006
- Final Plats, Development Plans and Rezoning approved prior to April 24, 2006
- Single-family residential lots with dwellings constructed prior to April 24, 2006

What is Regulated Riparian Habitat (RRH)?

Regulated Riparian Habitat (RRH) consists of Hydroriparian, Mesoriparian, and Xeroriparian habitats, as described below:

Hydroriparian and Mesoriparian Habitat (Class H):

Hydroriparian: Hydroriparian habitats are generally associated with perennial watercourses and/or springs. Plant communities contain obligate or preferential wetland plant species such as willow and cottonwood.

Mesoriparian: Mesoriparian habitats are generally associated with perennial or intermittent watercourses or shallow groundwater. Plants may be dominated by species that are also found

in drier habitats (e.g., mesquite) but contain some preferential riparian plant species such as ash or netleaf hackberry.

Xeroriparian Habitat (Classes A-C):
Riparian habitats classified as xeroriparian are generally associated with an ephemeral water supply. These communities typically contain plant species also found in upland habitats; however, these plants are typically larger and/or occur at higher densities than adjacent uplands. Xeroriparian habitat is divided into Classes A, B, and C, as defined in Section 2 of this document.

What is considered alteration of Regulated Riparian Habitat (RRH)?

The Ordinance considers riparian habitat to be altered on the subject property when disturbance to Regulated Riparian Habitat (Class H and Xeroriparian Classes A, B, and C) occurs and reduces vegetative volume or diminishes the value of the riparian habitat present on the site. Types of disturbances may include, but are not limited to:

- Mass grading/partial grading
- Clearing/thinning (including pruning)
- Planting of non-native (exotic) species within the RRH, outside of developed areas
- Planting of noxious and/or invasive species
- Other modifications that may reduce vegetation volume or diminish the value of the RRH (e.g., implementing turf plantings, livestock areas, fencing, paved walking paths, roads, structures, play areas).

Disturbances that prompt a Riparian Habitat Mitigation Plan

- Disturbances of class A, B, and C xeroriparian habitat are greater than 5 percent or when habitat disturbances are greater than 1/3 of an acre, determined by whichever is greater.
- Any disturbance of Hydroriparian & Mesoriparian habitat.

To prevent a property owner from affecting Regulated Riparian Habitat in a piece-meal manner, disturbance is considered cumulative. All disturbances occurring on a property or project site will be counted toward the mitigation trigger.

Disturbances that prompt a Site Plan

A site plan is required when disturbance of Regulated Riparian Habitat is less than 1/3 of an acre or less than 5 percent of onsite riparian habitat, measurement is based on whichever is greater.

Minimizing Disturbance

When Regulated Riparian Habitat (RRH) is present on a site to be developed or subdivided, the following alternatives are available for treatment of Regulated Riparian Habitat, with preference in the order shown:

1. Avoidance of habitat
2. Modification of Development Standards
3. Minimize disturbance
4. Disturbance with onsite mitigation
5. Onsite riparian habitat exchange
6. Disturbance with in-lieu fee

Avoidance of Habitat

Avoidance is highly recommended. If impacts to Regulated Riparian Habitat cannot be avoided, the applicant shall provide evidence that no reasonably practicable alternative exists to the proposed impact.

Acceptable reasons for affecting Regulated Riparian Habitat:

- Site constraints such as steep slopes, rock outcroppings, etc.
- Certain restrictions imposed by Town of Sahuarita Departments (examples: minimum road width requirements, fire and emergency access, etc.)
- Public Health and Safety considerations

Modification of Development Standards

Modifications of Development Standards found in Section 18.65.070 of the Zoning Code are also available as incentives to preserve regulated riparian habitat, they include:

- Reduction in minimum setbacks
- Reduction in minimum lot size
- Reduction in the quantity of plants required to be installed within required Bufferyards
- Reduction in number of required parking spaces
- An owner or developer may request additional development standard modifications that promote the purpose of the Ordinance.

Modified Development Standards may be allowed if:

- A mitigation plan required by the Ordinance would be unnecessary if the development standard modification is granted; or
- Development within the Regulated Riparian Habitat cannot reasonably be avoided and a modification is applied for as part of a mitigation plan submitted pursuant to the Ordinance.

More information related to Modified Development Standards can be found in Chapter 18.65 of the Town of Sahuarita Zoning Code, available online at: www.ci.sahuarita.az.us

Minimizing Disturbance

Measures that can be taken to minimize impacts to Regulated Riparian Habitat include:

- Reducing grading limits;
- Reducing building footprint;
- Reorienting the structure;
- Reducing width, length, and/or relocating driveways and parking areas;

- Utilizing modified development standards offered under Chapter 18.65 of the Zoning Code.

For Linear Projects, such as those located along a river, the following should be taken into account:

- Minimizing the number of crossings for the overall project
- Minimizing new disturbance
- Consider wildlife crossing as part of the project design
- Adopting measures to control invasive species

Disturbance with Onsite Mitigation

If it is demonstrated that avoidance is not feasible, the amount of disturbance cannot be minimized, and a mitigation plan has been prepared and approved, the Regulated Riparian Habitat may be removed per the approved Riparian Habitat Mitigation Plan. This alternative is available only after it is demonstrated the modification of development standards cannot be applied and the proposed impacts are minimized to the greatest extent possible.

An approved Riparian Habitat Mitigation Plan is required before any disturbance to regulated riparian habitat is permitted, it must also address ways to minimize, rectify or eliminate impacts over time. In some instances, the use of Modified Development Standards may be requested as part of a Mitigation Plan submitted to the Town of Sahuarita. (See Chapter 18.65.100 of the Town of Sahuarita Code.)

Onsite Riparian Habitat Exchange:

On occasion, a site proposed for development may have areas located outside of the mapped Regulated Riparian Habitat that have a similar or greater ecological value as the mapped habitat. This may be due to natural landscape features, upstream development that has redirected flow to another low-lying area or wash corridor on the property, an area of ponded water due to construction of a roadway, or other unique situation in which an ecologically equivalent riparian habitat has been left unmapped and therefore, unprotected from disturbance.

The property owner has the option to quantify these areas by surveying and delineating the area proposed for protection. The Regulated Riparian Habitat proposed for disturbance must also be surveyed to verify the riparian habitat to be preserved is of equivalent ecological value. In addition to a biological evaluation of the mapped and proposed riparian habitat, the property owner must show that the proposed riparian habitat provides an equivalent or greater function as the mapped habitat to be impacted. Mitigation will consist of an exchange, i.e., riparian habitat located on one portion of the site will be preserved in exchange for impacts to Regulated Riparian Habitat located on another portion of the site.

The red outlined areas are areas that may qualify for an onsite riparian habitat exchange.

Substitution of unmapped areas for mapped Regulated Riparian Habitat areas:
Potentially areas that may qualify as a riparian habitat substitute are shown in red. These areas are part of the overall distributary floodplain area and include stream channels and riparian vegetation. A field survey is required to determine the value of the Regulated Riparian Habitat lost to disturbance as it is compared to the area to be substituted and whether it is of equal value.

Substituted areas may use supplemental plantings to increase vegetation diversity and cover. This allows for enhancement and an increase in overall value of the substituted area, proposals using this approach require approval by the Planning Director.

Examples of potential substitute areas are shown in red where riparian vegetation is evident, but not mapped. Areas marked in blue are potential riparian/ transition zones that may also qualify based on survey and evaluation.

In Lieu Fee:

In certain circumstances, when all mitigation options have been exhausted and opportunities to mitigate onsite is proven infeasible by the property owner; the Planning Director may approve to waive the mitigation plan requirement with conditions that the owner will contribute funds to an account established and administered by the Town for offsetting damage to riparian habitat. Compensation for Regulated Riparian Habitat loss (in-lieu fee) is not meant to replace avoidance and minimization.

The In-lieu fee option is based on riparian classification, standardized costs (based on project costs) for onsite mitigation, including monitoring and long-term maintenance. The method will standardize costs for each onsite mitigation component and incorporate costs into a spreadsheet, whereby the user can input certain parameters, resulting in a base in-lieu fee. The following components will be incorporated into the spreadsheet and create a full cost estimate:

1. Plant material (quantity and size of trees, shrubs and groundcover),
2. Labor or installing plant material,
3. Hydroseed (seed, mulch, water, cost for machinery, and labor to apply seed),
4. Irrigation (materials and labor for installation),
5. Five (5) years of maintenance and monitoring (removal of noxious/invasive weed species, water, replacement plants, material, etc.), and
6. Other miscellaneous work, such as grading and/or construction of water harvesting basins.

A standard value will be assigned for each mitigation component and will be based on average cost estimates obtained from a licensed landscape architect, arborist or biological consultant; the applicant is required to provide two full cost estimates (within last 90 days).

The average cost between the two estimates will be used to determine each spreadsheet component in order to calculate the in-lieu fee for the project. The spreadsheet will allow each component of the mitigation plan to be calculated separately so that total mitigation costs can be accurately assessed for each project.

In-Lieu Fees obtained by the Town will be used toward the purchase of property with high value riparian habitat and for Town projects that may include restoration, enhancement, and/or preservation of Regulated Riparian Habitat. The overall objective of the in-lieu fee is to restore, enhance and protect riparian habitat in one area to compensate for negative impacts to Regulated Riparian Habitat that occur in the Town.

In-lieu Fee Collection

In-lieu fee collection will take place prior to issuance of a grading permit or disturbance of project site. Collecting the fees prior to disturbance ensures the property owner compensates for disturbance of regulated riparian habitat. Under special circumstances, the property owner may request that payment of the in-lieu fee be delayed until prior to final inspection. The option to delay payment of the in-lieu fee is only available to single-lot residential development and requires approval by the Planning & Building Director.

In-lieu fee collection for commercial and residential subdivision development will take place prior to approval of a Final Plat, Development Plan or disturbance of project site. If circumstances prevent payment at the time of Final Plat or Development Plan approval, the applicant may submit a request to the Planning & Building Director for Town Council approval. Under no circumstance should ground disturbance be performed prior to payment of the in-lieu fee.

Administrative Processing

When a check for the in-lieu fee is submitted, the applicant and/or property owner is issued a receipt, detailing the amount of the check, check number, and Planning Project Case number or Flood Plain Use Permit number. This information is then input into the in-lieu fee-tracking database and deposited into the in-lieu fee program account.

Modified Development Standards

To encourage the preservation of Regulated Riparian Habitat on sites proposed for subdivision or development, Section 18.65.070 of the Town of Sahuarita Zoning Code allows for the use of Modified Development Standards. The following is an overview of the types of modifications potentially available. For more information on how these modifications may be applied to any given project, please contact Town of Sahuarita Planning & Building Department.

Setback Reductions

Setback reductions may be approved by the Town of Sahuarita Planning and Building Department pursuant to procedures and standards included in Section 18.85.020 of the Zoning Code. The code can be viewed on the Town website at www.ci.sahuarita.az.us, listed under the Town Code link.

Subdivision Lot Size Reductions

A reduction in lot size may be approved when such a reduction allows for the preservation of riparian habitat. The sum of the reductions in lot size area may not exceed the area of riparian habitat preserved and the preserved area must be owned by a homeowner's association. The site must be shown in a surveyable manner on the recorded subdivision plat and protected by recorded covenants running with the land. Additionally, the number of lots allowed by the reduction cannot exceed the number of lots allowed without the reduction. When such conditions are met, the following lot size reductions may be approved:

- Minimum lot sizes for an R-1 subdivision may be reduced from 36,000 square feet to 24,000 square feet.
- Minimum lot sizes for an R-2 subdivision may be reduced from 16,000 square feet to 12,000 square feet.
- Minimum lot sizes for an R-3 subdivision may be reduced from 8,000 square feet to 7,000 square feet.

Off-Street Parking Space Reductions

Off-street parking requirements may be reduced pursuant to Chapter 18.75 of the Zoning Code if such an adjustment has been demonstrated by the applicant that it will not result in increased traffic or danger to persons or property.

Bufferyard Quantity Reductions

The number of trees to be planted in a required Bufferyard, in accordance with Chapter 18.73 may be reduced. The number of trees required in the Bufferyard may be reduced up to 50% when Regulated Riparian Habitat is preserved.

Riparian Habitat Mitigation Plan Approval

Riparian Habitat Mitigation Plan approval from the Planning Director is required for:

- Disturbances of class A, B, and C xeroriparian habitat greater than 5% of onsite riparian habitat or disturbances greater than 1/3 of an acre, whichever is greater.
- Any disturbance of hydroriparian and mesoriparian habitat

Site Plan approval from the Planning Director is required for:

- Disturbances less than the mitigation plan threshold. The plans must be prepared according to the site plan requirements in Section 3.

Appealing an Approved Decision & Compliance with the Ordinance

A. The Planning Director's decision may be appealed by the applicant within 30 days from receipt of the decision. The applicant shall submit a letter of appeal with supporting documents containing a detailed explanation of all matters in dispute to the Planning Director.

B. Within 10 working days of receipt of the written appeal, the Planning Director and Town Engineer, acting as the Town Floodplain Administrator, may meet with the property owner to discuss the appeal and request additional information deemed necessary.

C. The appeal submitted must contain a detailed explanation of all matters in dispute and all fees associated with a public hearing to the Planning Department. Notice of an appeal and scheduled public hearing shall be published in a newspaper of local circulation and notice is to be mailed to adjacent property owners within 300 feet.

D. Appeals involving Hydroriparian and Mesoriparian shall be held by the Town Council.

E. Appeals involving Xeroriparian A and Xeroriparian B shall be held by the Planning and Zoning Commission.

F. Variance. Any property owner requesting relief from provisions of this title or from this chapter and/or a change to the adopted riparian maps or requesting a waiver to mitigation standards shall request a variance through the Planning and Building Department Director in accordance to Chapter 18.93.030.

Compliance with the Ordinance

All Mitigation areas will be inspected at least once a year during the three (3) to five (5) year maintenance period to monitor compliance with the approved Riparian Habitat Mitigation Plan. Sites found that do not comply with the approved Riparian Habitat Mitigation Plan will be subject to enforcement action pursuant to Chapter 18.95 of the Compliance and Enforcement section of the Zoning Code. The Code can be viewed at www.ci.sahuarita.az.us

Section Two: Riparian Classifications, Descriptions, Mitigation and Monitoring Requirements

Characteristics of Hydroriparian Habitat

Hydroriparian habitat is generally associated with perennial watercourses, where plant species such as cottonwood and willow are present. This is the rarest type of riparian habitat in Sahuarita and the Santa Cruz Valley and is vital to wildlife species who utilize the habitat for critical life cycle stages.

Characteristics of Mesoriparian Habitat

Mesoriparian habitats are associated with areas of shallow groundwater and/or intermittent stream flow. Mesquite bosques are characteristic of this habitat type.

Characteristics of Xeroriparian Habitat

Xeroriparian habitat is typically associated with ephemeral streams (those that flow only in response to rainfall). The plant species present are similar to those found in upland areas but plant densities are greater due to the relative abundance of water.

Xeroriparian habitats have been further subdivided into four sub-classes based on the total vegetation volume present.

Xeroriparian A: The densest Xeroriparian subcategory.
Xeroriparian B: Moderately dense Xeroriparian subcategory.
Xeroriparian C: Less dense Xeroriparian subcategory.
Xeroriparian D: Less to sparsely dense Xeroriparian subcategory, that provides hydrologic connectivity to other riparian habitat areas.

Xeroriparian Densities

Habitat Type	**Total Vegetative Volume**
Xeroriparian A	Greater than 0.856 cubic meters per square meter (M^3/M^2)
Xeroriparian B	Less than or equal to 0.856 M^3 / M^2 and greater than 0.675 M^3/M^2
Xeroriparian C	Less than or equal to 0.675 M^3/M^2 and greater than 0.500 M^3/M^2
Xeroriparian D	Less than or equal to 0.500 M^3/M^2

Riparian Classification Maps

The official maps illustrating the location of Regulated Riparian Habitat are on file at the offices of:
Town of Sahuarita Planning and Building Department
375 West Sahuarita Center Way
Sahuarita, Arizona 85629 (520)822-8852

The Goal of Riparian Habitat Mitigation

The goal of riparian regulations and the mitigation standards is to promote the preservation and restoration of high quality riparian habitat and encourage the integration of riparian open space within the fabric of our urban and suburban environment.

When is Mitigation Required?

Mitigation is required when disturbances of class A, B, and C xeroriparian habitat is greater than 5% of onsite riparian habitat or when disturbances greater than 1/3 of an acre occur; determination is based on whichever is greater. Any disturbance of Regulated Hydroriparian and Mesoriparian habitat require a mitigation plan.

The Purpose of Onsite Mitigation

The purpose of onsite mitigation is to provide new habitat of similar value to Regulated Riparian Habitat that will be disturbed because of site development. The Ordinance requires that within three (3) to five (5) years of installation, the replacement/ mitigated habitat be of similar or equal value to the removed/ disturbed habitat. The habitat must at minimum equal in function and appearance of riparian habitat before disturbance.

Mitigation Requirements

- **Mitigation Area Location** – Mitigation shall be located in a manner that enhances the overall function of natural open space within a property and contributes to the overall value of riparian habitat protected within the property. The site shall be selected based upon its potential to support the required planting density without long-term supplemental irrigation (i.e., within the floodplain, drainage swales and/or low-lying areas). To the extent compatible with other public health, safety, and welfare considerations, mitigation will be integrated into flood control infrastructure and will utilize water harvesting to the maximum extent possible. Water harvesting features, such as microbasins and swales will be required if the mitigation area is proposed outside of a naturally sustaining riparian ecosystem, such as a floodplain or naturally low-lying land feature, such as a drainage swale or depression in the land, where water accumulates.
- **Planting and Seeding –** Trees, shrubs, and understory are required when re-establishing a natural riparian plant community similar to the removed habitat.
- **Irrigation –** Used to facilitate the establishment of plants and to assist in re-establishment of riparian habitat values within three (3) to five (5) years required by Ordinance.
- **Maintenance –** A period of three (3) years minimum, up to five (5) years is required to ensure re-establishment of the riparian habitat. Maintenance practices for riparian habitats will differ from maintenance practices used on traditional aesthetic landscape areas. Refer to Appendix C for maintenance requirements.
- **Monitoring –** A period of three (3) years minimum, up to five (5) full calendar years is required, to ensure that the Riparian Habitat Mitigation Plan is implemented and actively maintained.
    - Information on the periodic monitoring of mitigation features shall start with the first year beginning after installation of plants and irrigation system. The monitoring period at minimum is 3 years and can be extended to 5 years if needed. The extension of

monitoring past 3 years will be determined by the Planning Director based on the condition of the habitat.

Successful Riparian Habitat Mitigation Plan Characteristics

A successfully mitigated habitat will:

- Include all layers of site-appropriate vegetation in a naturalistic condition.
- Include sufficient diversity of plant species and structure to provide food and cover for a variety of wildlife.
- Develop and continue to function as riparian habitat and should not be modified for other activities.
- Retain leaf litter that acts as a mulch to hold soil moisture and recycle nutrients into the soil for plant use.
- Establish vegetation to help prevent erosion and increase infiltration into groundwater aquifers.

Unsuccessful Riparian Habitat Mitigation Plan Characteristics

Unsuccessful mitigated habitats include:

- Planting only trees and failing to use all the plant species identified in the Riparian Habitat Mitigation Plan. Planting shrubs, succulents, forbs (any herb that is not a grass or grass-like), and grasses are key components. All the vegetation layers need to be present in order for the habitat to function properly.
- Placement of landscaping rock, and other intensive landscaping measures within the mitigation area.
- Installing fencing or walls that hinder wildlife movement, divert natural drainage, and prevent surface water drainage from reaching existing riparian habitat
- Using the mitigated habitat for livestock grazing
- Using the mitigated habitat as recreation areas (e.g., children's play areas, paved walking paths, gazebos)

Common flaws in maintaining a mitigated area include:

- Pruning or shaping of trees and shrubs,
- Removal of ground cover vegetation, leaf litter and woody debris

Mitigation Requirements

1. Location of Mitigation Areas

Locate the mitigation area within or adjacent to Regulated Riparian Habitat or in areas where conditions are optimal for plant survival. To ensure the long-term viability of the mitigation area the plant density must be similar to habitat that naturally exists and in an area that can be supported by site conditions. Portions of the mitigation area can also be located outside of Regulated Riparian Habitat if the property owner can demonstrate that this will enhance the overall habitat value of the site. The property owner is required to provide verification that the area will support the required planting density without long-term supplemental irrigation. The mitigation area should be one continuous area that provides continuity of habitat. If one continuous area is not feasible, several areas in a density that creates habitat may be used.

The mitigation area shall not consist of scattered trees or used as amenity landscaping on the site. If the mitigation area cannot be placed adjacent to preserved habitat, an alternative location shall be chosen based on water availability, to facilitate growth/maintenance of habitat, such as areas of shallow ground water, the floodplains of ephemeral, intermittent, and perennial streams, low-lying areas, or water harvesting basins that collect and infiltrate sufficient water to support riparian plant species. Examples of an acceptable non-adjacent location could include the replanting of previously disturbed natural drainages or constructed detention basins.

Examples of unacceptable mitigation areas include planting in parking lots, in areas with high volumes of vehicle and pedestrian traffic, landscaped areas, or areas with active recreation.

If approved by the Town of Sahuarita Planning Director the mitigation area may be located within designated Natural Open Space. In order for this alternative to be chosen, the applicant must submit plans, information that supports the alternative habitat location and meet with Planning staff. If this option is chosen, additional design guidelines may be provided by the Town of Sahuarita for planting within Natural Open Space, these additional design guidelines must be followed.

2. Grading and Erosion Control Requirements

If the mitigation area is placed within a disturbed area, it is recommended the area be graded to collect and retain stormwater runoff to help reduce supplemental irrigation requirements. Grading must be done so as not to disturb additional habitat. Temporary fencing is required to surround the regulated riparian habitat identified to be preserved. If consistent with applicable town state, and federal regulations, harvesting of stormwater runoff from other areas of the site is also encouraged and acceptable. For additional information, see Appendix D for Water Harvesting Guidelines and the Pima County Grading Manual and the Pima County Stormwater Detention/ Retention Manual.

3. Irrigation System Requirements

For subdivision plats and development plans, an automatic irrigation system shall be installed within the mitigation area to provide water to all transplanted/salvaged trees, shrubs and all planted nursery stock trees and shrubs. The irrigation system must be capable of providing appropriate volumes of water to the trees and shrubs. An automatic bubbler or other irrigation system capable of efficiently providing water to the tree and shrub root zones may be proposed. If an automatic bubbler or other type of irrigation system is proposed, the property owner must demonstrated that the alternative irrigation system will provide sufficient irrigation water at the appropriate intervals and ensure establishment of mitigation plantings. Individual homeowners may not be required to install an extensive automatic irrigation system if they can be demonstrate that they will provide adequate supplemental irrigation to ensure plants are established. Subdivision plats and development plans must meet all requirements in the City of Tucson and Pima County Standard Specification for Public Improvements (2003) adopted by the Town of Sahuarita.

4. Required Maintenance

Required maintenance for the site shall be between three (3) years to five (5) years. As part of maintaining the site, the applicant shall submit an annual monitoring report, detailed in Section 3. Maintenance activities include regular operation of the irrigation system, replacement of dead trees and shrubs and removal of noxious and invasive plant species on a regular basis. Maintenance Guidelines is located in Appendix C and must be followed. A list of noxious and/or invasive plant species along with best management practices used to control these species can be found in Appendix E.

Hydroriparian, Mesoriparian (Class H) & Xeroriparian Mitigation Standards

1. Amount of Mitigation Required

- The actual size of the mitigation area provided shall be the minimum necessary to ensure the long-term viability of the mitigation plantings, accounting for topography, frequency of inundation and existing vegetation.
- In no case shall the mitigation area be less than 70% of the disturbed area acreage after the mitigation ratio is applied, unless an on-site vegetation survey has been provided that justifies sustainability of a more densely planted area.
- The 70% minimum mitigation area is based upon the maximum Total Vegetative Volume for each class of riparian habitat at maturity. It represents the smallest area within the habitat classification that the required number of plantings can be accommodated.
- Hydroriparian/ Mesoriparian habitat has a mitigation ratio of 1.5:1.0. (Example: If 1.0 acre of Class H habitat is disturbed, the equivalent of 1.5 acres of mitigation plantings must be provided.)
- Xeroriparian habitat has a mitigation ratio of 1:1.
- The mitigation area may be located outside of Regulated Riparian Habitat if the property owner can demonstrate that this will enhance the overall habitat value of the site along with providing verification that the area will support the required planting density without long-term supplemental irrigation.
    - Acceptable non-adjacent location examples include; replanting previously disturbed natural drainages or constructed detention basins.
- Examples of unacceptable planting areas include planting in parking lots, in areas with high volumes of vehicle and pedestrian traffic, areas that will be landscaped, or within active recreational areas.

2. Tree Quantity & Type required for Mitigation

Habitat Type	Tree Quantity	Tree Size
Hydroriparian	90 trees/ acre of disturbance	100% at 15 Gallons
Mesoriparian	90 trees/ acre of disturbance	100% at 15 Gallons
Xeroriparian A	75 trees/ acre of disturbance	50% at 50 Gallons 50% at 5 Gallons
Xeroriparian B	60 trees/ acre of disturbance	
Xeroriparian C	45 trees/ acre of disturbance	

Required Tree Species diversity:

- No more than 75% of the trees used in the Mitigation Area can be of a single species.
- A minimum of three (3) tree species are required.
- Use existing tree species as a guide for species selection.

Tree Planting Alternatives:

Habitat Type	Tree Quantity	Tree Size
Hydroriparian Mesoriparian	90 trees/ acre of disturbance	50% trees required at 15 Gallons and 50% of trees required at 5 Gallons + 20% increase in total trees required
Xeroriparian A	75 trees/ acre of disturbance	100% of trees required at 15 Gallons, reduction of 20% in total trees required
Xeroriparian B	60 trees/ acre of disturbance	
Xeroriparian C	45 trees/ acre of disturbance	

Additional Guidelines:

- Trees must be selected from the Approved Plant List found in Appendix B.
- Select trees appropriate for mitigation location and install using approved planting methods found in Appendix C (Installation & Maintenance Requirements).
- Native species identified within the mapped habitat found on-site, but not found on the approved plant list may be allowed pending review and approval by Town Planning staff.
- Tall pots may be substituted for standard container plants. Tall pots are nursery-planting containers that are longer than wide and allow more room for a longer tap root to develop.

  Equivalent tall pot sizes to standard nursery containers are:
  15" tall pot = 1-gallon or 5-gallon container
  30" tall pot = 15-gallon container

3. Shrub Quantity & Type required

Habitat Type	Shrub Quantity	Shrub Size
Hydroriparian Mesoriparian	100 shrubs per acre of disturbance	100% at 5 Gallons or larger
Xeroriparian A	90 shrubs per acre of disturbance	50% at 5 Gallons or larger 50% must be at minimum 1 Gallon
Xeroriparian B	80 shrubs per acre of disturbance	
Xeroriparian C	70 shrubs per acre of disturbance	

Hydroriparian, Mesoriparian & Xeroriparian Shrub Species Diversity:

- No more than 35% of the shrubs selected may be of a single species.
- A maximum of one (1) shrub species may be selected from the "cacti & succulents" section of the approved plant list.

Hydroriparian/Mesoriparian Shrub Species Diversity:

- A minimum of five (5) shrub species is required unless an onsite vegetation survey is performed that justifies less diversity.

Xeroriparian Shrub Species Diversity:

- Use any shrub species found on the approved Xeroriparian shrub list in Appendix B.
- A minimum of five (5) shrub species is required.
- Use existing shrub species as a guide for species selection.

Shrub Planting Alternatives:

Habitat Type	Shrub Quantity	Shrub Size
Hydroriparian	100 shrubs per acre of disturbance	All shrubs may be installed at 1 Gallon if an additional 20% is added to the total number of required shrubs.
Mesoriparian	100 shrubs per acre of disturbance	
Xeroriparian A	90 shrubs per acre of disturbance	If all shrubs planted are 5 Gallons in size, the required number of shrubs may be reduced by 20%.
Xeroriparian B	80 shrubs per acre of disturbance	
Xeroriparian C	70 shrubs per acre of disturbance	

Hydroriparian/ Mesoriparian Other Guidelines:

- Shrubs must be selected from the Approved Class H Plant List found in Appendix B and appropriate for the mitigation location.
- In general, existing native plants found on site are a good indicator of appropriate mitigation plants.
- Native species identified onsite but not found on the approved plant list may be allowed pending review and approval by Town Planning staff.

4. Seeding/Understory Requirements

Hydroriparian, Mesoriparian & Xeroriparian Basic Requirement:

- Class C seed mix and seeding requirements found in Appendix B is required when hydroseeding or hydro-mulching all disturbed areas within the mitigation area.
- Follow approved planting methods found in Appendix C.
- It is recommended that the applicant contact seed vendors prior to submitting the Riparian Habitat Mitigation Plan to determine plant species availability at the time of installation.

Seeding Alternatives:

The following alternative methods may be used for seeding the area:

- Drill seeding with crimped straw mulch,
- Broadcast seeding and raking into seedbed with straw or other appropriate mulch.
- Site-specific seed mixes may be proposed and approved if they reflect better existing/desired conditions.

Section Three: Components of a Mitigation Plan Submittal

Riparian Habitat Mitigation Plans are submitted to the Town of Sahuarita Planning and Building Department for review and approval. The Town requires all applicants to meet with Planning and Building Department staff prior to submittal of a Riparian Habitat Mitigation Plan to discuss site constraints and requirements. A complete submittal shall include the following information:

- Site plan
- Evidence showing impact has been minimized
- Exhibit delineating Regulated Riparian Habitat
- Mitigation Planting Plan
- Irrigation Plan
- Monitoring Details
- Copy of development plan or tentative plat and landscape plan
- If applicable, development standard modification request

Detailed Site Plan

The site plan must include the following information:

- Title Block with name and address of development (include on all sheets)
- Bar scale/ Graphic scale, north arrow, location map and a brief legal description of site location with township, range and section information.
- Town case number for the project and any related case numbers (rezoning, conditional use permit, tentative plats, development plans, etc.)
- Name, address and phone number of developer, owner and architect/landscape architect/engineer professional seal or firm preparing the plans
- Date of drawing and/or last revision
- All property lines with proposed and existing development and infrastructure
- Delineation of all riparian habitat and habitat types must be labeled.
- Acreage or square footage of regulated riparian habitat prior and after disturbance must be indicated.
- Total habitat disturbance acreage with habitat disturbance percentages provided.
- Building footprint with proposed structures including land uses, square footage, height, dimensions, finished floor elevations, and setbacks to property lines.
- Demonstration that disturbance of regulated riparian habitat cannot be avoided and attempts to minimize disturbance through the modification of development standards outlined in STC 18.65.110 has been attempted.
- Demonstration that disturbance of regulated riparian habitat does not fracture landscape linkages and biological corridors but maintains the continuity of habitat.

- All existing and proposed structures and conditions, including topography, within 100 feet of project
- Legend with all symbols and line work described
- Note all ground planes, i.e. asphalt, concrete, decomposed granite, etc.
- Property boundary with dimensions, bearings, and distance
- Location of all existing and proposed easements, indicate if public or private.
- Contour lines at two (2) foot intervals
- 100-year floodplain and erosion hazard limits
- Onsite roadways and adjacent roadways along with sidewalks and trail systems
- Location and dimensions of all sidewalks and pedestrian paths
- Bufferyard location, indicate width and type
- Location of temporary safeguard fence to protect undisturbed area
- Indicate surface water holding facilities including detention/retention areas, drainage ways, drainage easements, ditches, and swales. Label as Public or Private.
- Significant rock outcroppings or other natural features

A sheet from an existing development plan or tentative plat associated with the property may be used if sufficient information is included on the sheet.

Evidence of No Alternative

Evidence (reports, studies, drawings, pictures, etc.) that the proposed disturbance to Regulated Riparian Habitat has been minimized to the maximum extent practicable and confirmation that no reasonably practicable alternative exists.

Exhibit

The Regulated Riparian Habitat must be delineated in accordance with the Riparian Classification Maps. The Regulated Riparian Habitat delineation shall be prepared at the same scale as the plat or development plan, and shall include:

- Location of parcel boundaries and Regulated Riparian Habitat delineated on the aerial photograph
- Limits of development on the site, including existing and proposed improvements
- Grading limits
- Locations of driveways, utility lines, pools and walls or fencing

Town of Sahuarita Riparian Classification Maps are prepared at a scale that provides a general location of Regulated Riparian Habitat, when applied at a smaller scale or on a specific parcel, corrections/adjustments may be needed. The actual habitat boundaries may be shifted relative to the parcel boundaries shown on the maps due to rectification of aerial photographs with the parcel map base.

If an applicant feels the boundaries of the Regulated Riparian Habitat shown on the Riparian Classification Maps are inconsistent or do not accurately reflect the onsite conditions. The property owner may request a revision to the riparian habitat classification boundary. The

property owner must conduct a field study or survey in order to modify the boundaries or prove the boundaries are not accurate. The study must be sealed by a licensed landscape architect, qualified biologist, arborist or registered engineer. The study performed must include a field study conducted of the habitat within the existing and proposed revised regulated riparian habitat boundaries. An inventory of the individual woody plants with a caliper greater than two (2) inches, saguaro cacti, barrel cacti and ocotillos to determine the limits of a riparian habitat. The information gathered is to be included in a plant inventory list with plant identification numbers along with the common and botanical name, the height, caliper and the plant condition.

An exhibit must accompany the field study. The exhibit must include a recent aerial photograph (taken within last two years) with the following information:

- Project boundary
- Existing regulated riparian habitat delineation boundary.
- Proposed revised regulated riparian habitat delineation boundary.
- Existing topography contours.
- 100 year floodplain boundary
- Plant species and densities. (Map individual plants from the field study. Each species shall be denoted by a unique symbol or color.)

Mitigation Planting Plan

The Planting Plan shall use plant quantities required by the guidelines or plant quantities determined by an onsite vegetation survey. The plan shall be prepared at the same scale as the associated plat, development plan or site plan (at least 1:200). If a Native Plant Preservation Plan is required, the Planting Plan shall be prepared at the same scale. The Planting Plan shall include, at a minimum:

1. Bar scale
2. North arrow
3. Scaled vicinity map showing a one (1) square mile area with a brief legal description of the site location with township, range and section information.
4. A Legend with all line work indicated
5. Site-specific delineation of Regulated Riparian Habitat, current and proposed.
6. Delineation of grading limits
7. Proposed finished grades within the mitigation planting area.
    a. Finished grades shall be depicted by contours (1 or 2-foot contour interval) or by other methods that clearly depict the finished grades and slope conditions
8. A plant list that identifies plant species, plant size and seeding requirements at time of installation
9. Area and quantity calculations table:
    a. Total area (square feet or acres) of Regulated Riparian Habitat present onsite, listed by classification
    b. Total area (square feet or acres) of Regulated Riparian Habitat that will be disturbed, separated by classification (if more than one classification is present onsite)
    c. Mitigation planting area and the size of the mitigation area as proposed, by classification. (See Appendix C)
    d. Plants provided
        i. Common name and botanical name
        ii. Size (gallons)
        iii. Quantity
10. Planting placement details that include the location of trees, shrubs, groundcover and seeding
11. Irrigation details
12. Maintenance details
13. Monitoring point locations
    a. Show location, directionality and number each point on the plan

Irrigation Plan

Residential and Commercial Development - Irrigation system shall be designed and installed as required under City of Tucson and Pima County Standard Specification for Public Improvements (2003).

Single-Family Residential Homeowners with single-family lots may meet the irrigation requirement with a statement included on the mitigation plan that defines the method of irrigation and a statement of basic maintenance.

Monitoring of Mitigation Area & Responsibility of Property Owner

The property owner is responsible for implementing and maintaining the mitigation area per the Riparian Habitat Mitigation Plan and submitting an annual monitoring report for mitigated areas on their property. Although it is the property owner's responsibility, within multi-lot developments a single report may be coordinated and submitted for multiple lots. For larger developments, an assigned monitor is recommended, though not required.

The initial annual monitoring report shall be considered the "as-built" Riparian Habitat Mitigation Plan and provide information regarding any deviations from the approved Riparian Habitat Mitigation Plan based on plant species availability or problems encountered during installation. In addition to the annual monitoring requirement, a representative of the Town will visit the Mitigation Area at least once a year during the three to five year establishment period to assess compliance with the Riparian Habitat Mitigation Plan.

Monitoring Timeframe

Submittal of the annual monitoring report is required for compliance with the Riparian Habitat Mitigation Plan. The mitigated area must be maintained and monitored for a minimum of three years, if required, up to five calendar years after installation. Planting shall take place the first growing season following completion of construction. Each calendar year has multiple growing seasons typically determined by climate, location, temperature, daylight hours, and rainfall. In Southern Arizona, there are three main growing seasons:

March—May "Spring growing season"
July—September "Monsoon season" of summer rains
September—November "Fall growing season"

The Town will send out an annual courtesy reminder to property owners with an approved Riparian Habitat Mitigation Plan. Failure to submit the annual report will require an inspection of the property by Town staff. Staff will verify compliance with the approved Riparian Habitat Mitigation Plan and will take enforcement actions if the property owner has failed to implement the Riparian Habitat Mitigation Plan.

Elements of the Monitoring Report

Monitoring reports shall include the following information:

1. One (1) CD with all information and pictures and one (1) 11" x 17" copy of the approved Riparian Habitat Mitigation Plan, with photo monitoring point locations identified and numbered.
2. Photographic documentation:
   - Photographs shall be numbered to correlate with the monitoring points identified on the Riparian Habitat Mitigation Plan. Number of monitoring points will be based on site constraints, so that the entire mitigation area(s) is documented.
   - A minimum of one photograph per monitoring point is required. If the mitigation area cannot be captured by one photograph, several points shall be used.
3. Provide a plant-monitoring schedule (Microsoft Excel format) that identifies plant species, quantities, and plant size at time of installation with current plant condition noted. Deviations from the approved Riparian Habitat Mitigation Plan must be highlighted and an explanation provided. Include with the initial monitoring report submittal, copies of receipts for plant material and seed mix.

   Note: A planting plan identifying plant species, quantities, and plant size at time of installation is required as part of the original Riparian Habitat Mitigation Plan.
4. Verify replacement of dead trees and shrubs from previous year(s), if applicable. Property owners shall verify replacement through submittal of the following:
   - Nursery receipts for replacement plants
   - Photographs of replacement plants
   - Note replacement tree and shrub locations on the Riparian Habitat Mitigation Plan
5. If the site is not progressing as anticipated, a Corrective Action proposal shall be provided in the annual monitoring report. Depending upon the extent of problems encountered, a meeting with Town staff may be required.
6. Monitoring reports shall be submitted to the Town of Sahuarita at:

Town of Sahuarita
Planning and Building Department
Attention: Planning Staff
375 W. Sahuarita Center Way
Sahuarita, Arizona 85629

Place the development project number (SA12-XX-XXX) on the envelope and on documents submitted.

Success of the Riparian Habitat Mitigation Plan

The Riparian Habitat Mitigation Plan shall be considered successful if 80% of each category (trees, shrubs, etc.) plants are living and actively growing without supplemental irrigation or significant die back or loss at the end of the 3 to 5-year monitoring period. The monitoring plan will provide an assessment of success. During the monitoring period, the responsible party shall be required to provide annual reports to the Town documenting progress toward success. If the site is not progressing as anticipated, proposed corrective actions shall be provided in the monitoring report.

Development Plan or Subdivision Plat Submittal Timeframe

The Riparian Habitat Mitigation Plan shall be submitted to the Planning Department at the latest with the Tentative Plat or Development Plan submittal. As either a separate plan labeled "Riparian Habitat Mitigation Plan" or as part of the Landscape Plan. The submittal shall include two (2) 24"x36" copy and one (1) electronic copy in PDF file format.

The Riparian Habitat Mitigation Plan shall be submitted as early as possible, preferably with the first submittal of the Tentative Plat or Development Plan during the development review process. Review and approval of the final Riparian Habitat Mitigation Plan is required prior to any site disturbance.

If changes occur between the tentative plat and final plat or development plan and/or grading plan, a revised Riparian Habitat Mitigation Plan may be required prior to ground disturbance. Resubmittal of an amended Riparian Habitat Mitigation Plan will be determined by the Planning Director. Grading permits shall not be issued until the revised Riparian Habitat Mitigation Plan is approved to ensure the final Development Plan or Final Plat is reconciled.

Any revisions to the grading limits during the Improvement/Grading Plan review process that may require revision of the Riparian Habitat Mitigation Plan must be submitted to Planning staff for review and approval.

Single-Lot Development Submittal Timeframe

A single-lot development Riparian Habitat Mitigation Plan shall be submitted along with the site plan at the time of application.

Summary of Requested Development Standard Modifications

A narrative summary of requested Development Standard Modifications, if any, shall be included with the Riparian Habitat Mitigation Plan. Show locations of the Development Standard Modifications on the Development Plan or Tentative Plat. All Development Standard Modifications shall be subject to review and depending on the type of modification approval by the Planning Director or Town Council.

Section 4: Frequently Asked Questions

Q. The map does not show habitat where we are building on our property. Why are we required to mitigate?

A. The maps indicate the general location of Regulated Riparian Habitat. The actual habitat boundaries may be shifted relative to the parcel boundaries shown on the Pima County MapGuide maps (http://www.dot.pima.gov/gis/maps/mapguide/.) Habitat boundaries must be verified using current aerial photos and/or field mapping.

Q. Can I plant "non-native" species on my property?

A. Yes, although it is not encouraged, you may plant non-native species on your property, outside of designated mitigation areas. Planting noxious and/ or invasive species on the property is prohibited. See Appendix E for a listing of noxious and invasive plant species.

Q. Can I get credit towards the required plantings on the Riparian Habitat Mitigation Plan for landscaping done previously?

A. You will be required to show the date and type of plant species installed, their condition and information that indicates they are thriving and located within an area that provides good habitat value. Only plants listed on the approved plant list will count toward the mitigation requirement. Native species not included on the list may be counted toward the mitigation requirement if the species naturally occur within riparian habitat on the property. Any plant species not included on the approved plant list will require Town review and approval. The property owner can verify previous plantings in a number of ways, including but not limited to, photographic documentation, receipts or dated verification from a landscaping company.

Q. Will my mitigation plantings be inspected?

A. Yes. A representative of the Town Planning & Building Department will visit the project site/mitigation area at least once per year during the three (3) to five (5) year maintenance period to assess compliance with the Riparian Habitat Mitigation Plan and compare site conditions to the annual monitoring report submitted by the property owner.

Q. When will I need to do my Mitigation Planting?

A. Planting should occur during the first growing season following completion of construction. The best time to plant is in the spring (March through May) or in the fall (September through November). Avoid planting during the hottest, driest part of the summer or when freezing temperatures may occur. Seed application is most effective when applied prior to the rainy season, either in late July or in the fall, prior to winter rains, to ensure proper seed germination.

Q. Do I need to install a drip irrigation system?
A. Newly planted trees and shrubs require irrigation in order to establish a healthy root system. Even drought tolerant plants must be irrigated during their initial, formative years. Any type of irrigation system will work but drip is the most efficient and lessens the chance of plant loss. Subdivision and commercial sites require automatic irrigation systems.

Q. How long will it take for my Riparian Habitat Mitigation Plan to be approved?
A. On average, a Riparian Habitat Mitigation Plan review can be completed within 10 business days, although this timeframe may vary due to workload constraints, degree of disturbance and if it is processed with a Tentative Plat or Development Plan. The amount of time it takes to review and approve a Riparian Habitat Mitigation Plan is highly dependent upon the thoroughness and accuracy of the initial submittal.

Q. The area that I am developing has previously been disturbed, why am I being required to mitigate?
A. Mitigation is required in order to comply with Federal and Town regulations; it also promotes continuity of habitat and flood conveyance along watercourses. The Ordinance recognizes the value in maintaining and restoring continuous corridors of habitat so that the Towns' rich, diverse and potentially rare plants and animals continue to thrive and essential natural floodplain functions are maintained.

In addition, in arid regions like the Town of Sahuarita and Santa Cruz Valley, riparian habitat is usually associated with watercourses, and is thus associated with potential flood hazards. Continuous corridors for floodwater conveyance are extremely important for public safety. Not only that, but vegetation can actually reduce flood hazards by reducing flow velocities, attenuating floodwaters, and preventing erosion.

In some parts of Sahuarita, riparian areas may have been removed long ago, fragmenting the vital ecologic and flood hazard reduction role performed by riparian habitat. Restoring habitat in a particular area can help to reconnect fragmented habitat corridors, and in some cases restore an area that was previously disturbed and in violation of the Ordinance, mitigation in this case is being required to correct the violation.

Q. Where can I find the plants and seed mixes that I need?
A. A list of local nurseries, seed vendors, and landscaping companies who can provide the appropriate native species is included in Appendix B.

Q. Why is it important to preserve riparian habitat for wildlife?
A. According the Arizona Riparian Council (http://www.azriparian.org), approximately 60-75% of Arizona's resident wildlife species are dependant on riparian habitat to sustain their populations, by providing food, shelter, and protection from predators.

Appendix A: Riparian Habitat Mitigation Plan Submittal Checklists

SINGLE RESIDENTIAL LOT DEVELOPMENT

Applicability

Pursuant to Chapter 18.65 of the Town of Sahuarita Zoning Code, alteration or disturbances of class A, B, and C xeroriparian habitat greater than 5% of onsite riparian habitat or disturbances greater than 1/3 of an acre, whichever is greater a Riparian Habitat Mitigation Plan shall be submitted to the Town for approval. Any disturbance of Hydroriparian/Mesoriparian habitat requires submittal of a Riparian Habitat Mitigation Plan to the Town for review and approval.

Single Lot Riparian Habitat Mitigation Plan Submittal Requirements

☐	Justification for Disturbance summary • If the property contains developable areas outside of the regulated riparian habitat, but improvements are encroaching into regulated riparian habitat, an avoidance justification summary will be requested at the time of the Riparian Habitat Mitigation Plan submittal. • The justification for disturbance summary must include evidence that the impact has been minimized to the maximum extent practicable, the reason the habitat could not be avoided and include examples of site constraints (i.e. steep slopes, public health & safety requirements, traffic control requirements and fire safety zones).
☐	Aerial Photograph • Provide the most recent aerial photograph • An aerial photograph can be used as a base for the site plan • If unavailable, the most recent aerial photographs from the Pima County MapGuide website may be used: http://www.dot.pima.gov/gis/maps/
☐	Plan Scale & Size • Two (2) rolled sets (24"x36") of the Riparian Habitat Mitigation Plan at the same scale of the Development Plan, Final Plat or Tentative Plat for the site. • One (1) PDF copy of the Riparian Habitat Mitigation Plan. • If a Development Plan, Final Plat or Tentative Plat is not available, the plans are to be prepared at a 1:40 scale.

Site Plan Requirements	
☐	Locate all property lines and indicate the location of riparian habitat
☐	Include a Title block • Name and address of development (include title block on each sheet) • Title the plan "Riparian Habitat Mitigation Plan" • Date of drawing and/or last revision
☐	Include the Town Case number (SAXX-XX-XX) along with rezoning or subdivision plat case reference numbers on all sheets
☐	Include a signature block at the lower right corner with lines for the Planning & Building Director. If floodplain is affected, a signature line for the Town Engineer is required.
☐	• Include the property parcel number, • Provide the property owner name and preparers/ firm preparing the plans, • Include the name, address, phone number and professional seal
☐	Include a Legend, describing all symbols and line work used
☐	Bar scale and north arrow
☐	Indicate the riparian habitat classification type in the legend and label the line type on the plan. Use the following line type and legend descriptions: HR = Hydroriparian, MR = Mesoriparian XA, XB, XC = Xeroriparian habitat A, B & C
☐	Provide the proposed finished grades within the mitigated area, depicted by contours (1 or 2 foot interval) or by other method that clearly depicts the finished grades and slope conditions.
☐	Show grading limits for all existing and proposed improvements including utilities, driveways, and septic systems.
☐	Delineate the mitigation area of Regulated Riparian Habitat that will be disturbed and area of proposed mitigation.
☐	Include calculations and quantities for disturbance and mitigation. • Include the total area of Regulated Riparian Habitat onsite by classification • Display the disturbance and mitigation calculations in acres and round to the nearest hundredth (ex., 0.33 acres). • Indicate the plant quantity calculations that include quantity of trees and shrubs, (detailed in Section 2 of this document) multiplied by the area of proposed mitigation and separate by classification.

☐	Include a planting list that identifies plant species (provide common and botanical name), quantities and sizes at the time of installation. • The planting list shall list a minimum of three (3) tree species, no more than 75% of any one species and five (5) shrub species, no more than 35% of any one species.
☐	Seeding requirement • The mitigation area is to be seeded with a minimum of 12 species from the approved plant list (see Appendix B – Hydroriparian/Mesoriparian seed mix or Xeroriparian seed mix). • List the twelve (12) species used to seed on the Riparian Habitat Mitigation Plan. Indicate the seeding methods to that will be used for the site: hydroseeding, drill seeding with crimped straw mulch or broadcast seeding and raking into seedbed with straw or other approved mulch.
☐	Include the following notes on the Riparian Habitat Mitigation Plan:

- "No disturbance shall occur within the mitigation area(s) without Planning Director review and approval. Such disturbance includes but is not limited to secondary impacts such as the presence of livestock, fencing, intensive landscaping, outdoor play areas, etc."
- "Once plants have become established, supplemental irrigation will be decreased in accordance with standard landscaping practices."
- "The project owner, and/or the Owner's successors, agrees to preserve and protect the Mitigation Area for the duration of the project. Further, the project owner and/or their successors agree to maintain the mitigated area for a period of not less than three (3) years up to five (5) years. Maintenance activities shall include, but are not limited to, the regular operation of the irrigation system, the replacement of dead trees and shrubs, and the removal of noxious and/or invasive plant species."
- "Riparian Habitat Mitigation plan implementation shall be completed by the first growing season following completion of construction (select one season) March-May 20XX, July-September 20XX, September-November 20XX."
- "A monitoring plan, in accordance with the Guidelines, will be submitted annually for a period of three (3) years minimum up to five (5) years following implementation of the Riparian Habitat Mitigation Plan. Any changes from the approved Riparian Habitat Mitigation Plan shall be noted on the monitoring plan submittal."
- "Mitigated area will be (*insert method of seed placement*) with a minimum of twelve (12) species from the approved (Class H or Xeroriparian) plant list found in Appendix B. If plant species listed on the mitigation plan are not available, replacement species from the approved plant list may be selected. Of the twelve (12) species, four (4) shall be shrubs, four (4) shall be annuals/perennials/vines, and four (4) shall be grasses."

☐	Indicate the method of irrigation that will be used for the project.

Helpful Hints and Useful Instructions

- Use planting densities determined by the survey, if an onsite vegetation survey has been performed. If existing riparian habitat will be enhanced, space the trees and shrubs within the undisturbed area, according to the individual plant species mature canopy width.
- The property owner is encouraged to consult with the seed vendor regarding seed mix requirements.
- If plant species and/or seeding rates change after Riparian Habitat Mitigation Plan approval due to plant species availability, the property owner/applicant shall provide information regarding changes to the original Riparian Habitat Mitigation Plan to the Town Planning staff as soon as possible.
- Irrigation methods may include an automatic system such as drip or a manual method such as hand watering (single residential lot only). Irrigation method must demonstrate that adequate irrigation will be provided to the new plants during the three (3) to five (5) year establishment period.
- Use of onsite water harvesting methods is encouraged.
- The mitigation area shall be shown as a general location on the Riparian Habitat Mitigation Plan or shown as a detailed planting plan that indicates locations of individual trees and shrubs.
- If the mitigation area is shown as a general location, provide a table with the number of trees and shrubs per area, or depict the number of trees and shrubs per area directly on the Riparian Habitat Mitigation Plan.
- Locate mitigation area where there is a potential for enhancement to existing habitat or create habitat with value equal to that removed from the site.
- The mitigation area shall be one continuous area in a density that creates habitat, as the site allows.
- Mitigation areas are to be located away from improved areas, to prevent the desire to maintain the natural area as part of the landscaping adjacent to improvements.
- Mitigation plantings shall be installed per the approved planting methods outlined in this manual.
- Show the site-specific limits of the Regulated Riparian Habitat
- Plants must be established prior to decreasing the supplemental irrigation.
- Native plants are well adapted to annual rainfall amounts in the Tucson Basin. To create a successful mitigation area, initial plant establishment is essential.

- Once a healthy root system is established (usually one to three years, depending upon plant species), plants shall be "weaned" from supplemental irrigation. The intent is to adjust the irrigation schedule until plants can survive on natural rainfall alone. This can be accomplished by decreasing the frequency of irrigation each year. It is important to monitor plant health while decreasing supplemental irrigation.
- During times of drought, the plants may require additional irrigation.

Riparian Habitat Mitigation Plan Annual Monitoring Report

- Annual monitoring is required for a period of three (3) to five (5) full years following Riparian Habitat Mitigation Plan implementation. Extension of the monitoring period will be determined by Planning staff based on the condition of the habitat.
- The applicant will be required to ensure the Riparian Habitat Mitigation Plan is implemented and the mitigation area is maintained.
- Photo monitoring points should remain consistent year after year and are required to cover the entire mitigation planting area(s) to ensure the site is well documented.
- A minimum of one photograph per monitoring point is required. If the mitigation planting area cannot be captured by one photograph, several points shall be used

Send the report to the following address:

Planning & Building Department
Case # SA12-_____
Attention: Planning Staff
375 West Sahuarita Center Way
Sahuarita, Arizona 85629

Plan Review Timeframes

On average, a Riparian Habitat Mitigation Plan first review can be completed within 10 business days. The amount of time it takes to review and approve a Riparian Habitat Mitigation Plan is highly dependent upon the thoroughness and accuracy of the initial submittal.

Compliance

It is the responsibility of the applicant to ensure the trees and shrubs received from the nursery are the correct plant species as noted on the Riparian Habitat Mitigation Plan (i.e., native plants). The most common problem encountered is the substitution of non-native and/or hybrid mesquites for native species. Arizona has only three (3) native species of mesquite. Those species include Velvet mesquite (*Prosopis velutina*), Screwbean mesquite (*Prosopis pubenscens*) and Western Honey mesquite (*Prosopis glandulosa Torr*. Var. *torreyana*). The Western Honey mesquite has not been included on the approved plant list, since it is typically found outside of the region. The predominant species within Pima County is Velvet Mesquite.

It is important that the installer verify with the nursery, both prior to purchase and prior to installation that the species conform to the list on the Riparian Habitat Mitigation Plan. If plants installed are found to be non-native (exotic) species during inspection, the applicant shall be required to replant adequate native species to satisfy the requirements of the Riparian Habitat Mitigation Plan at their expense. A statement requiring verification of plant species nativity prior to installation may be a condition of final approval.

A mitigation plan application provides the Town with the authority to enter the subject property to inspect the mitigation area to ensure continued compliance with the permit during the three (3) to five (5) year maintenance period.

Riparian Habitat Mitigation Plan Submittal Checklists

SUBDIVISION AND COMMERCIAL PROJECTS

Applicability

Pursuant to Chapter 18.65 of the Town Zoning Code, if an applicant demonstrates to the satisfaction of the Town that alteration or disturbances of to riparian habitat cannot be reasonably avoided a Riparian Habitat Mitigation Plan shall be submitted to the Town Planning Director for review and approval.

Subdivision and Commercial Project Riparian Habitat Mitigation Plan

Submittal Requirements	
☐	Justification for Disturbance summary ○ A justification for disturbance summary will be requested at the time of the Riparian Habitat Mitigation Plan submittal if the property contains developable areas outside of the regulated riparian habitat. ○ The justification for disturbance summary must include evidence that the impact has been minimized to the maximum extent practicable. The applicant shall indicate the reason the riparian habitat will be disturbed and include examples of site constraints that may contribute to the disturbance (i.e. steep slopes, public health & safety requirements, traffic control requirements and fire safety zones). ○ If the property contains developable areas outside of the regulated riparian habitat but has improvements encroaching into regulated riparian habitat; the applicant is required to include information that exhibits the impact has been minimized to the maximum extent practicable. ○ During the planning phases of the project, the location and extent of Regulated Riparian Habitat on the project site shall be evaluated for the proposed use. Site improvements shall be designed to void and minimize disturbance to riparian areas.
☐	Aerial photograph ○ Provide the most recent aerial photograph for the site ○ An aerial photograph can be used as a base for the site plan to meet this requirement ○ If approved by Town Planning staff, the most recent aerial photographs from the Pima County MapGuide website may be used: http://www.dot.pima.gov/gis/maps/

☐	Plan Scale & Size o Two (2) rolled sets of the Riparian Habitat Mitigation Plan at the same scale and size of the Development Plan, Final or Tentative Plat for the site, preferably 24”x36” o If a Development Plan, Final or Tentative Plat is not available, the plans shall be prepared at a 1:40 scale.
Mitigation Plan Requirements	
☐	Indicate all property lines and location of riparian habitat
☐	Include a Title block o Provide the name and address of development (include a title block on each sheet) o Title the plan “Riparian Habitat Mitigation Plan” o Date the drawing and/or last revision
☐	Include in bold and larger font the Town Case number (SAXX-XX-XX) with rezoning or case reference numbers for all subdivision plat provide on all sheets.
☐	Include a signature block with signature lines for the Planning & Zoning Director and Town Engineer (if needed for floodplain).
☐	Include the property parcel number, property owner name and preparers/ firm preparing the plans. (Name, address, phone number and professional seal).
☐	Describe all symbols and line work used in the Legend.
☐	Provide a plan bar scale and north arrow
☐	Include the riparian habitat classification type in the legend and label the line type on the plan. Use the following line type and legend descriptions: Line Type Description — Legend Description HR — Hydroriparian habitat MR — Mesoriparian habitat XA, XB, XC — Xeroriparian A,B,C habitat
☐	Show site-specific limits of the Regulated Riparian Habitat.
☐	Label proposed finished grades within the mitigated area, use a dark, thick line weight. o Finished grades shall be depicted by contours (1 or 2 foot contour interval) or by other methods that clearly depict the finished grades and slope conditions.
☐	Indicate existing site topography at 1 or 2 foot contour interval, use a lighter line weight
☐	Indicate the limits of disturbance/grading limits on the plan include building envelopes, septic systems, utilities, drainage infrastructure, off-site improvements, fire safety setbacks, etc. Include locations that will have temporary disturbance (ex: equipment storage areas, construction trailers, etc.)
☐	Include calculations and quantities for disturbance and mitigation
☐	Indicate the total acreage of Regulated Riparian Habitat onsite by classification

☐	Delineate the area of proposed mitigation on the plan
☐	Indicate the size of the mitigation area as proposed and indicate classification (mitigation area must be a minimum of 70% of the size of the area disturbed, unless technical data is provided that justifies an alternative planting density, Planning staff approval is required).
☐	Display the disturbance and mitigation calculations in acres and round to the nearest hundredth (ex., 0.33 acres).
☐	Indicate the plant quantity calculations that include number of trees and shrubs, (detailed in Section 2 of this document) multiplied by the area of proposed mitigation, separate by riparian habitat classification if more than one type of habitat exists onsite.
☐	Describe any special site conditions, such as presence of noxious and/or invasive species, previous disturbance, etc.
☐	Identify methods that will be used to protect regulated riparian habitat during construction, especially for the areas that are to be left unaltered.
☐	Include a detailed planting plan

- Provide a table with the number of trees and shrubs per area, or depict the number of trees and shrubs per area, directly on the Riparian Habitat Mitigation Plan, if the mitigation area is shown as a general location.
- Include a Plant List that identifies plant species, quantities and sizes (gallons) along with their common and botanical name.
- The planting plan shall list a minimum of three (3) tree species, no more than 75% of any one species. *This requirement may be modified upon submittal of an onsite plant survey performed by a qualified professional (Appendices F and G).*
- The planting plan shall list a minimum of five (5) shrub species, no more than 35% of any one species. *This requirement may be modified upon submittal of an onsite plant survey performed by a qualified professional (Appendices F and G).*
- A list of approved plant species can be viewed in Appendix B of the Guidelines.

☐	Identify the irrigation method for mitigation plantings and the irrigation water source

- Irrigation method shall include an automatic system such as drip, sprinklers, or other automatic irrigation system.
- The method of irrigation must demonstrate that adequate water will be provided to the new plants during plant establishment.
- Use of water harvesting methods is encouraged as a supplement to irrigation in addition to providing long-term benefits to the plants.

☐	Identify the seeding methods used for the site

- Indicate the seeding methods used for the site: hydroseeding, drill seeding with crimped straw mulch or broadcast seeding and raking into seedbed with straw or other approved mulch.
- The mitigation area shall be seeded with a minimum of twelve (12) species from the approved plant list (see Appendix B)
- Provide a list of the twelve (12) species on the Riparian Habitat Mitigation Plan. If plant species listed on the mitigation plan are unavailable, replacements species from the approved plant list may be selected (requires Town Planning staff approval).
- The property owner is encouraged to consult with the seed vendor regarding seed mix requirements.
- If plant species and/or seeding rates change after Riparian Habitat Mitigation Plan approval due to plant species availability, the property owner/applicant shall provide information regarding changes to the original Riparian Habitat Mitigation Plan to the Town Planning staff as soon as possible.
- Any changes to the seed mix shall be noted on the first monitoring plan submittal.
- Of the twelve (12) species, four (4) shall be shrubs, four (4) shall be annuals/ perennials/ vines, and four (4) shall be grasses.

☐	Include the following required notes on the Riparian Habitat Mitigation Plan

- "No disturbance shall occur within the mitigation area(s) without Planning Director review and approval. Such disturbance includes but is not limited to secondary impacts such as the presence of livestock, fencing, intensive landscaping, outdoor play areas, etc."
- "Mitigated area will be (*insert method of seed placement*) with a minimum of twelve (12) species from the approved (Class H or Xeroriparian) plant list found in Appendix B of the Regulated Riparian Habitat Mitigation Standards and Implementation Guidelines. Of the twelve (12) species, four (4) shall be shrubs, four (4) shall be annuals/perennials/vines, and four (4) shall be grasses."
- "The project owner, and/or the Owner's successors, agrees to preserve and protect the Mitigation Area in perpetuity. Further, the project owner and/or their successors agree to maintain the mitigated area for a period of not less than three (3) calendar years and no greater than five (5) calendar years. Maintenance activities shall include, but not be limited to, the regular operation of the irrigation system, the replacement of dead trees and shrubs within four (4) months of damage or demise, and the removal of noxious and/or invasive plant species."
- "Riparian Habitat Mitigation plan implementation shall be completed by the first growing season following completion of construction, (select one season) March-May 20XX, July-September 20XX, September-November 20XX."
- "A monitoring plan, in accordance with the Guidelines, will be submitted annually for a period of three (3) to five (5) years following implementation of the Riparian Habitat Mitigation Plan."
- "Once plants have established, supplemental irrigation will be decreased in accordance with Appendix C: Installation & Maintenance Requirements of the Guidelines."

Implementation & Monitoring Instructions
• An annual monitoring plan submittal for a period of three (3) to five (5) full years following Riparian Habitat Mitigation Plan implementation will be required to ensure the plan is implemented and maintained. • The periodic monitoring of mitigation features begin after installation of plants and irrigation. The monitoring period begins with a minimum of three (3) years with the option of extending to five (5) years decided by the town Planning Director. The extension of the monitoring and maintenance period will be determined based on the condition of the habitat at three (3) years. • Identify the group or person responsible for implementation of the Riparian Habitat Mitigation Plan, monitoring of the mitigation area and the entity or individual responsible for long-term ownership and management of the mitigated area(s). The mitigation area shall be documented by establishing multiple photo monitoring points, so that the entire mitigation area(s) is documented. • A minimum of one photograph per monitoring point is required. If the mitigation area cannot be captured by one photograph, several points shall be used. • Annual monitoring – required for a period of three (3) to five (5) full years following Riparian Habitat Mitigation Plan implementation. The applicant will be required to ensure the Riparian Habitat Mitigation Plan is implemented and the mitigation area is maintained. • Photo monitoring points should remain consistent year after year and are required to cover the entire mitigation planting area(s) to ensure the site is well documented. A minimum of one photograph per monitoring point is required. If the mitigation planting area cannot be captured by one photograph, several points shall be used • Monitoring Report submittals shall be labeled “Annual Riparian Habitat Monitoring Report for SA12XX-XX” and sent to the following address: Town of Sahuarita Planning and Building Department, 375 West Sahuarita Center Way, Sahuarita, Arizona 85629. • The individual or entity responsible for implementation and monitoring of the mitigation area shall provide an “as-built” Riparian Habitat Mitigation Plan with the first monitoring plan submittal. Any changes to the plant species composition shown on the Riparian Habitat Mitigation Plan due to availability shall be noted on the “as-built” Riparian Habitat Mitigation Plan. If the mitigation area is not progressing as anticipated, proposed corrective actions shall be provided in the annual monitoring report.

Helpful Planting Notes:
• If an onsite vegetation survey has been performed, use planting densities determined by the survey. • If mitigation cannot be located adjacent to or enhance habitat due to site constraints, the mitigation area may be placed in locations that receive sufficient water to facilitate growth and maintain healthy habitat (i.e., drainage swales, low-lying areas, detention basins, water harvesting basins, etc.) Approval by the Planning Director is required, prior to planting. Wildlife must have access to the site if this option is used. • Locate mitigation area where there is a potential for enhancement to existing habitat or create habitat with value equal to that removed from the site. • The mitigation area shall be one continuous area in a density that creates habitat • Mitigation areas are to be located away from improved areas, to prevent the desire to maintain in a manner similar to adjoining landscaped areas. • For residential developments, placement of mitigation areas and protected riparian habitat within common areas maintained by the Home Owners Association (HOA) is required. • Common Areas containing mitigation plantings shall be delineated and labeled separately from "landscaped" common areas on the tentative and final plats. • Mitigation plantings shall be installed per the approved planting methods found in this manual. • Space the trees and shrubs within the undisturbed area, according to the individual plant species mature canopy width, especially if existing riparian habitat will be enhanced.

Plan Review Timeframes

The Riparian Habitat Mitigation Plan shall be submitted as early as possible during the development review process, with a final Riparian Habitat Mitigation Plan approved prior to Regulated Riparian Habitat impacts. Review times are determined by the Planning and Building Department. On average, a Riparian Habitat Mitigation Plan review can be completed within 10 business days, although this timeframe may vary due to workload constraints.

Appendix B - Approved Plant List

Plant Selection

Successful riparian habitat mitigation requires sufficient diversity of plant species and structure to provide food and cover for a variety of wildlife. A mix of annual and perennial plant species will provide structural diversity required for a naturalistic habitat. Use plants native to the location when selecting plant species for the Mitigation Plan.

Approved Hydroriparian Tree Species

Botanical Name	***Common Name***
Celtis laevigata, Celtis reticulata	*Netleaf/ Canyon Hackberry*
Fraxinus velutina	*Arizona Ash, Velvet Ash*
Juglans major	*Arizona Black Walnut*
Platanus wrightii	*Arizona Sycamore*
Populus fremontii	*Fremont Cottonwood*
Salix gooddingii	*Gooding Willow*

Approved Mesoriparian Tree Species

Botanical Name	***Common Name***
Acacia constricta	*Whitethorn Acacia*
Acacia greggii	*Catclaw Acacia*
Celtis laevigata, Celtis reticulata	*Netleaf/ Canyon Hackberry*
Chilopsis linearis	*Desert Willow*
Fraxinus velutina	*Arizona Ash, Velvet Ash*
Juglans major	*Arizona Black Walnut*
Parkinsonia florida, Cercidium floridum	*Blue Palo Verde*
Platanus wrightii	*Arizona Sycamore*
Populus fremontii ssp. fremontii	*Fremont Cottonwood*
Prosopis pubescens	*Screwbean Mesquite*
Prosopis velutin	*Velvet Mesquite*
Quercus emoryi	*Emory Oak*
Salix gooddingii	*Gooding Willow*
Sambucus nigra ssp. serulea, sambucus mexicana	*Mexican Elderberry, Blue Elderberry*
Sapindus saponaria var. drummondii	*Western Soapberry*

Approved Xeroriparian Tree Species

Botanical Name	***Common Name***
Acacia constricta	*Whitethorn Acacia*
Acacia greggii	*Catclaw Acacia*
Olneya tesota	*Ironwood*

Parkinsonia florida, Cercidium floridum	*Blue Palo Verde*
Parkinsonia microphylla, Cercidium floridum	*Foothills Palo Verde*
Prosopis pubescens	*Screwbean Mesquite*
Prosopis velutina	*Velvet Mesquite*
Quercus emoryi	*Emory Oak*
Sapindus saponaria var. drummondii	*Western Soapberry*

Approved Hydroriparian Shrub Species

Botanical Name	***Common Name***
Acacia constricta	*Whitethorn Acacia*
Acacia greggii	*Catclaw Acacia*
Anisacanthus thurberi	*Desert Honeysuckle*
Asclepias tuberosa	*Butterfly Flower*
Baccharis salicifolia	*Seep Willow*
Berberis haematocarpa	*Red Mahonia*
Celtis pallida	*Hackberry*
Garrya wrightii	*Silktassel*
Hymenoclea monogyra	*Burrobrush*
Lobelia cardinalis HW	*Monkey Flower*
Lycium Spp.	*Wolfberry*
Muhlenbergia rigens	*Deergrass*
Quercus emoryi	*Emory Oak*
Rhus glabra	*Smooth Sumac*
Rhus ovata	*Sugar Bush*
Rhus trilobata	*Squawbush*
Ribes aureum	*Wax Currant*
Salix exigua HW	*Coyote Willow*
Sambucus mexicana	*Mexican Elderberry*
Senecio salignus	*Senecio*
Sporobolus wrightii	*Sacaton (grass)*

Approved Mesoriparian Shrub Species

Botanical Name	***Common Name***
Anisacanthus thurberi, Drejera thurberi	*Desert Honeysuckle*
Asclepias tuberosa	*Butterfly Milkweed*
Baccharis salicifolia	*Seep Willow*
Barkleyanthus salicifolius	*Senecio, Willow Ragwort*
Celtis ehrenbergiana ,Celtis pallida	*Desert Hackberry, Spiny Hackberry*
Condalia warnockii	*Warnock Condalia, Warnock's Snakeweed*
Garrya wrightii	*Silktassel*

Gossypium thurberi, Thurberia thespesioides	*Native Cotton, Thurber's Cotton*
Justicia candicans	*Red Justicia, Arizona Water-Willow*
Lycium andersonii var. andersonii	*Anderson Wolfberry, Water Jacket*
Lycium fremontii	*Fremont Wolfberry, Fremont's Desert-thorn*
Mahonia haematocarpa, Berberis haematocarpa	*Red Mahonia, Red Barberry*
Rhus glabra	*Smooth Sumac*
Rhus microphylla	*Littleleaf Sumac*
Rhus ovata	*Sugar Bush, Sugar Sumac*
Rhus trilobata	*Three-leafed Sumac, Skunkbush Sumac*

Approved Xeroriparian Shrub Species

Botanical Name	***Common Name***
Abrosia deltoidea	*Triangle-Leaf Bursage*
Atriplex canescens	*Four-wing Saltbush*
Atriplex lentiformis	*Quail Bush*
Calliandra eriophylla	*Fairy Duster*
Celtis ehrenbergiana, Celtis pallida	*Desert Hackberry, Spiny Hackberry*
Condalia warnockii	*Warnock Condalia, Warnock's Snakeweed*
Dodonaea viscosa	*Hopbush*
Encelia farinosa	*Brittlebush Bush*
Ericameria laricifolia, Haplopappus laricifolius	*Turpentine Bush*
Eriogonum fasciculatum var. foliosum/ polifolium	*Flat-Top Buckwheat, Eastern Mohave, Buckwheat*
Gossypium thurberi, Thurberia thespesioides	*Native Cotton, Thurber's Cotton*
Hymenoclea monogyra, Ambrosia monogyra	*Burrobrush, Single Whorl Burrobrush*
Hyptis emoryi	*Desert Lavender*
Justicia candicans	*Red Justicia, Arizona Water-Willow*
Larrea tridentata var. tridentata	*Creosote Bush*
Lycium andersonii var. andersonii	*Anderson Wolfberry, Water Jacket*
Lycium fremontii	*Fremont Wolfberry, Fremont's Desert-thorn*
Parthenium incanum	*Mariola*
Rhus microphylla	*Littleleaf Sumac*
Simmondsia chinensis	*Jojoba*
Tecoma stans	*Yellow Bells, Yellow Trumpetbush*
Trixis californica	*Trixis, American Threefold*
Vauquelinia californica ssp. californica/ sonorensis	*Arizona Rosewood*
Zizyphus obtusifolia var. canescens	*Greythorn, Lotebush*

Approved Vine Species

Botanical Name	***Common Name***	***Hydro-riparian***	***Meso-riparian***	***Xero-riparian***
Clematis drummondii	*Old Man's Beard, Virgin's Bower, Drummond's Clematis*			
Curcurbita digitata	*Fingerleaf Gourd*			
Curcurbita palmata, Curcurbita californica	*Coyote Melon, Coyote Gourd*			
Ipomoea hederifolia, Ipomoea coccinea var. hederifolia	*Scarlet Creeper*			
Maurandya antirrhiniflora	*Snapdragon Vine, Roving Sailor*			
Vitis arizonaica	*Arizona Wild Grape, Canyon Grape*			

Approved Cacti & Succulent Species

Botanical Name	***Common Name***	***Hydro-riparian***	***Meso-riparian***	***Xero-riparian***
Cylindropuntia arbuscula, Opuntia arbuscula	*Arizona Pencil Cholla*			
Cylindropuntia leptocaulis, Opuntia leptocaulis	*Christmas Cholla, Desert Christmas Cholla*			
Ferocactus wislizeni, Echinocactus wislizeni	*Candy Barrel Cactus*			
Nolia microcarpa	*Beargrass, Sacahuista*			
Opuntia phaeacantha	*Prickly Pear*			
Yucca elata	*Soaptree Yucca*			

Approved Perennial Forbs/ Sub-Shrubs

Botanical Name	***Common Name***	***Hydro-riparian***	***Meso-riparian***	***Xero-riparian***
Allionia incarnata	*Trailing Windmills, Trailing Four-o'clock*			
Ambrosia ambrosioides	*Canyon Ragweed*			
Anemopsis californica	*Yerba Mansa*			
Aquilegia chrysantha	*Columbine, Yellow*			
Baileya multiradiata	*Desert Marigold*			
Brickellia coulteri	*Brickelbush, Coulter's Brickelbush*			
Dichelostemma capitatum,	*Bluedicks*			

Dichelostemma pulchellum				
Dicliptera resupinata	*Arizona Foldwing*			
Epilobrium canum ssp. latifolium, zauschneria californica	*Hummingbird Trumpet*			
Glandularia gooddingii, Verbena gooddingii	*Goodding's Verbena, Southwest Mock Vervain*			
Lobelia cardinalis	*Cardinalflower*			
Machaeranthera tanacetifolia, Aster tanacetifolius	*Tanseyleaf Tansyaster, Purple Aster*			
Penstemon parryi	*Pestemon, Parry, Beardtongue*			
Penstemon pseudospectabilis	*Desert Penstemon*			
Ruellia nudiflora var. nudiflora	*Violet Wild Petunia*			
Rumex hymenosepalus	*Canaigre Dock*			
Senna hirsuta var. glaberima, cassia leptocarpa var. glaberrima	*Slimpod Senna, Woolly Senna*			
Sphaeralcea ambigua ssp. ambigua	*Desert Globemallow, Apricot Globemallow*			
Zinnia acerosa, Zinnia pumila	*Desert Zinnia*			

Approved Wildflowers

Botanical Name	***Common Name***	***Hydro-riparian***	***Meso-riparian***	***Xero-riparian***
Bowlesia incana	*Bowlesia, Hoary Bowlesia*			
Datura wrightii	*Datura, Sacred, Jimsonweed, Sacred Thorn-apple*			
Eriastrum diffusum	*Miniature Woollystar*			
Eschscholzia californica ssp. mexicana, eschscholtzia mexicana	*Mexican Gold Poppy, California Poppy*			
Kallstroemia grandiflora	*Arizona Poppy*			
Lesquerella gordonii var. gordonii	*Gordon's Bladderpod*			
Lupinus sparsiflorus ssp. mohavensis	*Coulter's Lupine*			
Nama demissum var. demissum	*Purplemat*			

Phacelia distans	*Blue-eyed Scorpionweed, Distant Phacelia*			
Platystemon californicus	*Creamcups*			
Polansia dodecandra	*Western Clammyweed*			
Salvia columbariae var. columbariae	*Chia*			

Approved Grasses

Botanical Name	***Common Name***	***Hydro-riparian***	***Meso-riparian***	***Xero-riparian***
Aristida ternipes	*Spidergrass*			
Bothriochloa barbinodis, Andropogon barbinoides	*Cane Beardgrass*			
Bouteloua aristidoides	*Needle Grama*			
Bouteloua curtipendula	*Sideoats Grama*			
Bouteloua rothrockii	*Rothrock Grama*			
Distichlis stricta	*Desert Saltgrass*			
Dasyochloa pulchella, Erioneuron pulchellus, Tridens pulchellus	*Fluffgrass, Low Woolly Grass*			
Hilaria belangeri var. belangeri, anthephora belangeri	*Curly-mequite*			
Leptochloa dubia	*Green Sprangletop*			
Muhlenbergia porteri	*Bush Muhly*			
Muhlenbergia rigens	*Deergrass*			
Panicum obtusum	*Vine Mesquite*			
Setaria macrostachya	*Plains Bristlegrass, Large Spike Bristlegrass*			
Sporobolus airoides	*Alkali Sacaton*			
Sporobolus cryptandrus	*Sand Dropseed, Spike Dropseed*			
Sporobolus wrightii	*Giant Sacaton, Big Sacaton*			
Vulpia octoflora, Festuca ocotflora	*Sixweeks Fescue*			

Use of Native Top Soil

Salvaging topsoil can provide an abundant source of native seed, organic matter and beneficial soil organisms. If the property owner decides to salvage topsoil for redistribution on the site, the following procedure is recommended:

- Only use topsoil from undisturbed, native plant communities. If noxious and/or invasive plant species are present, it is not recommended the topsoil be salvaged.
- Topsoil should be salvaged to a depth of 4 to 6 inches and stockpiled no higher than 3 feet in height.
- Topsoil shall be stored for as short duration as possible to ensure survival of seeds and soil organisms.

Approved Hydroriparian & Mesoriparian (Class H) Seed Mix

Approved Class H seed mixes shall be selected from the Approved Plant List and contain at least 12 plant species appropriate for the site elevation, soil type and watershed location. Of the 12 species, four (4) shall be shrubs, four (4) shall be annuals/perennials/vines, and four (4) shall be grasses. These quantities are to serve as guidance in developing seed mixes appropriate for individual sites. Applicants may also contact local seed vendors for additional seed mixes. To help prevent the spread of noxious and/or invasive plant species, ask vendors if the seed mix is certified "weed-free." Listed below is an example seed mix for a property located in the Sabino Creek Watershed.

Baccharis salicifolia
Seep Willow
Anisacanthus thurberi
Desert Honeysuckle
Aristida ternipes
Spidergrass
Brickellia coulteri
Brickelbush
Epilobium canum ssp. latifolium
Hummingbird Trumpet
Garryea wrightii
Wright's Silktassel
Hilaria belangeri var. belangeri
Curly-mesquite
Ipomoea coccinea var. hederifolia
Scarlet creeper
Leptochloa dubia
Green Sprangletop
Muhlenbergia rigens
Deergrass
Penstemon pseudospectabilis
Desert Penstemon
Rhus trilobata
Skunkbush sumac

Note: Onsite seed collection is encouraged. Seeds collected onsite may be used within the approved seed mix, given appropriate seed application rates are verified through a seed vendor and noted on the Riparian Habitat Mitigation Plan.

Approved Xeroriparian Seed Mix

Approved Xeroriparian seed mixes shall be selected from the Approved Plant List and contain at least 12 plant species appropriate for the site elevation, soil type, and watershed location. Of the 12 species, four (4) shall be shrub species, four (4) shall be annual/perennial/ vine species, and four (4) shall be grasses. These quantities are to serve as guidance in developing seed mixes appropriate for individual sites. Applicants may also contact local seed vendors additional seed mixes. To help prevent the spread of noxious and/or invasive plant species, ask vendors if the seed mix is certified "weed –free". Below is an example seed mix for a property located in the Black/Brawley Wash Watershed.

Ambrosia ambrosioides
Canyon Ragweed
Aristida ternipes
Spidergrass
Atriplex canescens
Four-Winged Saltbush
Atriplex lentiformis
Quailbush
Cucurbita digitata
Fingerleaf Gourd
Hilaria belangeri var. belangeri
Curly-mesquite
Hymenoclea monogyra
Burrobrush
Larrea tridentata var. tridentate
Creosote Bush
Lesquerella gordonii var. gordonii
Gordon's Bladderpod
Machaeranthera tanacetifolia
Purple Aster
Muhlenbergia rigens
Deergrass
Vulpia octoflora
Sixweeks Fescue

Note: Onsite seed collection is encouraged. Seeds collected onsite may be used within the approved seed mix, given appropriate seed application rates are verified through a seed vendor and noted on the Riparian Habitat Mitigation Plan. Plant species selected for the Riparian Habitat Mitigation Plan shall be native to Pima County and the Santa Cruz Valley.

Purchasing Native Plants

Plants selected for the Riparian Habitat Mitigation Plan shall be native to Pima County and the Santa Cruz Valley. The following is a partial list of local nurseries that sell native plants. This list is for information only and is in no way exhaustive. It is not required that plants be purchased from these vendors. The Arizona Native Plant Society website has an extensive list of native plant and seed sources in addition to the ones listed on pages. This list is available online at:

http://www.aznps.com/sources.html

When purchasing plants from the nursery, verify plant species nativity by checking the botanical name to ensure the plant species noted matches plant species on the Riparian Habitat Mitigation Plan. Many of the non-native plants look similar to native species. Hybrid mesquites look similar when young, but have a very different growth habit and do not provide the same value for wildlife as native mesquites. In addition, native mesquites are one of the most difficult species to identify correctly. Note: Onsite seed collection and propagation is encouraged including the establishment of an onsite plant nursery. The onsite nursery will act as a supplement to required mitigation and will not act as a replacement for onsite plant requirements.

EXAMPLES OF LOCAL PLANT NURSERIES:

Civano Nursery Inc.
5301 S. Houghton Rd.
(520) 546-9200 Tucson, Arizona 85747

Coronado Heights Nursery
2944 N. Castro Lane, Tucson, Arizona 85705
(520) 882-0969

Desert Survivors Nursery
1020 W. Star Pass Blvd., Tucson, Arizona 85731 (520) 791-9309

Harlow Gardens
5620 E. Pima Road, Tucson, Arizona 85712
(520) 298-3303

Mesquite Valley Growers
8005 E. Speedway Blvd., Tucson, Arizona 85710 (520) 721-8600

Mountain States Nursery
10020 W. Glendale Ave., Glendale, Arizona 85307 1-800-840-8509

Plants for the Southwest
50 E. Blacklidge Drive, Tucson, Arizona 85705 (520) 628-8773

Silverbell Nursery
2730 N. Silverbell Rd., Tucson, Arizona 85745 (520) 622-3894

Sonoran Desert Nursery
901 E. 12th Street, Tucson, Arizona 85719
(520) 791-2334

SPECIALTY NURSERY
B & B Cactus Farm
11550 E. Speedway Blvd., Tucson, Arizona 85748 (520) 721-4687

More Information on Plants

For more information on these and other native plants, the following resources may be helpful.

Native Plants for the Southwestern Landscapes
Judy Milke, 1993, University of Texas Press.

Landscape Plants for Dry Regions
Warren Jones & Charles Sacamano. 2000 Fischer Books.

A Field Guide to the Plants of Arizona
Anne O. Epple & Lewis E. Epple. 1995. LewAnne Publishing Company

Pruning, Planting and Care: Johnson's Guide to Gardening Plants for the Arid West.
Eric A. Johnson, et.al. 1997. Ironwood Press.

The Arizona Native Plant Society
The Arizona Native Plant Society has an extensive list of native plant and seed sources.
http://www.aznps.com

Characteristics between native mesquite species:

	Velvet Mesquite	Screwbean Mesquite	Honey Mesquite
Number of Minor Leaflets	15-20 pairs	6-9 pairs	10-16 pairs
Hairy Leaflets	Yes	Yes	No
Leaflet Spacing	Close	Intermediate	Wide
Pods	Straight or Slightly Curved	Tightly Coiled	Flattened, Straight or Curved

Native mesquites are easily confused with non-native South American mesquites and hybrids. Indicators of non-native mesquites:

- Thornless or extremely long thorns
- More upright form
- Bright green, more widely-spaced leaflets that are not fuzzy

Characteristics of Velvet Mesquite (Prosopis velutina)

Range: Central and southern Arizona, extreme southwestern New Mexico, and adjacent northern Mexico below 5,000 feet.

Form: Large shrub or small tree with spreading crown. May be single-stemmed and up to 50 feet tall or grow as an erect, multi-stemmed shrub.

Leaves: Alternative and bipinnately compound, usually about 6 inches long. Each leaflet has 15-20 pairs of minor leaflets, less than one half inch long. Finely fuzzy surface; dull green above and paler below. Deciduous in the winter.

Flowers: 2-3 inch catkins of pale yellow flowers; late spring to early summer.

Fruit: Straight or slightly curved tan pods 3-7 inches long ; solitary or clustered, ripen mid to late summer and drop in the fall.

Twigs: Light brown and velvety, slightly zigzagged with paired slender spines at the base of each leaf. Bark on young stems can be greenish.

Bark: Dark brown, rough and shredded, sometimes gnarled and twisted. Newer bark can be reddish brown.

Characteristics of Screwbean Mesquite (Prosopis pubescens)

Range: Riparian areas of the Sonoran and Chihuahuan deserts

Form: Single or multi-stemmed small tree or shrub; sometimes forms thickets. Several crooked and arching stems form a broad round crown.

Leaves: Deciduous, alternate, and bipinnately compound, 1 to 2 inches long, usually with only two major leaflets. Each leaflet with 6 – 9 pairs of narrow minor leaflets approximately ½ to 1 inch long. Entire margins and fuzzy surface, green to gray-green above, paler below.

Flowers: Pale yellow pendulous yellow spikes in groups of 2 to 6, appearing late spring to early summer

Fruit: A unique, tightly coiled pod, 1 -2 inches long, light brown, ripening in mid to late summer.

Twig: Paired whitish spines (up to 1 inch long) at the base of each leave; knobby spur branches may also be present.

Characteristics of Honey Mesquite (Prosopis glandulosa)

Range: Kansas and Oklahoma, much of Texas, eastern New Mexico, southeastern Arizona, Coahuila, Nueva Leon, and Tamaulipas, Mexico, comprise the native distribution of Honey Mesquite, growing on desert plains and along washes.

Form: Large spreading tree with weeping form. May be multi-trunked, growing 25 feet high and 30 feet wide. Under stressful conditions, remains a shrub.

Leaves: Bright green fernlike leaves are 4 inches long, with 10 to 16 leaflet pairs, 1/8 inch wide by 1 inch long. Among the foliage are thorns, which vary from ¼ inch to 1 inch long. Deciduous in winter.

Flowers: Sweet-smelling, pale yellow, which are crowded together into fuzzy 2 to 3 inch long spikes; blooming predominantly in April and May. Attractive to bees.

Fruit: Straw-colored leathery pods are about 5 inches long, (up to 10 inches long) and ½ inch wide.

Twig: Thicket of branches.

Bark: Dark brown, rough and shredded.

Very good desert shade tree whose spreading canopy casts a moderately dense shade in summer, yet allows the sun's warmth to penetrate during winter months. By planting an informal line of three to seven plants and allowing their lower branches to remain, an effective security hedge and windbreak can be achieved. Very attractive to wildlife, with seeds to feed a variety of desert birds and mammals, with thorny foliage to provide cover.

Appendix C: Installation & Maintenance Requirements

The use of proper planting techniques for installing plant material in mitigation areas is important for initial plant establishment. Inadequate plant installation may have detrimental effects on the long-term health of plant material and could cause plant mortality prior to reaching maturity.

Standard Plant Installation Methods

All plant material shall be installed in accordance with planting details referenced in the City of Tucson and Pima County Standard Specifications for Public Improvements (2003) and City of Tucson and Pima County Standard Details for Public Improvements (2003), available online at:

Http: //www.dot.pima.gov/transeng/stdspecsdet/standardspecs2003.pdf
Http: //www.dot.pima.gov/transeng/stdspecsdet/standarddetails2003_vector.pdf

The following recommendations use landscaping industry accepted planting methods to ensure survival and long-term health of installed plant material. For additional information on standard planting methods, consult with a local nursery, a Landscape Architect or reputable landscape contractor.

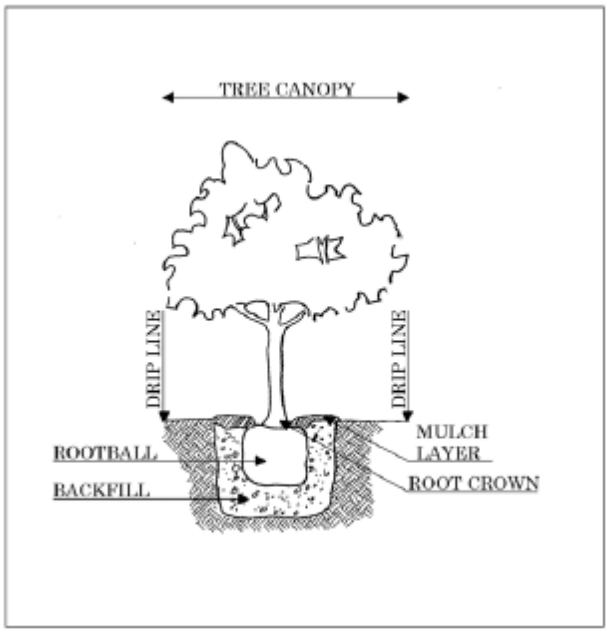
Recommendations:

- Inspect all plant material upon arrival to the site.
  - Check for any signs of mechanical damage, such as wounds in the bark or stems or broken branches.
  - Check for any signs of serious insect or disease problems.
  - Examine foliage, color, and density as signs of general health.
  - Check sales invoice and plant label to ensure correct native plant species were delivered Check container plants to ensure they are not root-bound.

    ** If the plants are root-bound, they should be rejected.*

    **A plant is considered root-bound when kept in a container too long, resulting in the root growth becoming restricted, tangled and matted. This condition typically results in stunted plant growth.*

- The planting hole should be wider and deeper than the root ball.
  See planting detail no. 408-410 from City of Tucson and Pima County Standard Details for Public Improvements (2003)
- Make sure the root crown will be above grade level when the hole is filled.



Typical planting detail and terms.

Standard Plant Installation Methods:

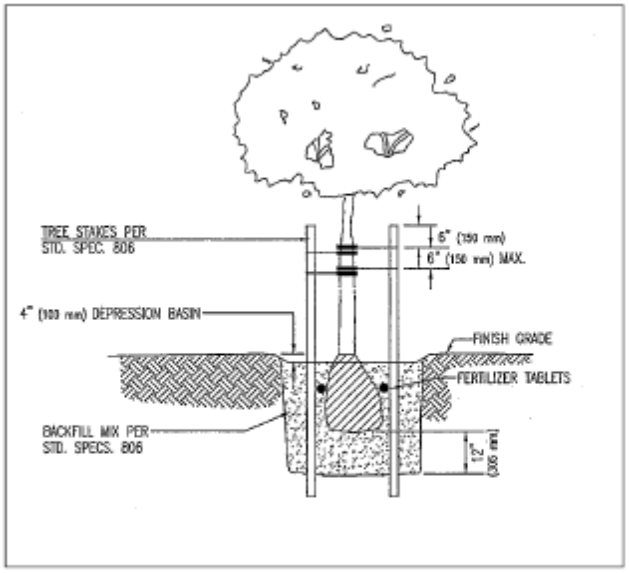
- Remove all non-biodegradable nursery wrappings (i.e. plastic containers, wires, and tags).

- Place the plant in the center of the hole, and make sure the plant is straight, as it is difficult to reposition the plant once the hole is backfilled.

- Backfill half of the hole with soil (preferably with the same soil that was removed). Saturate the soil to fill all holes and cavities around the roots. Finish backfilling the hole and water. Make sure the root crown remains exposed.

- Three (3) to four (4) inches of organic mulch material should be spread five (5) to seven (7) feet around trees, and three (3) feet around other plantings. Two (2) to three (3) inches of bare soil should be left around the base of the plant to avoid trunk suffocation or rot.

- Plants generally do not require staking. Staking is usually required when a plant cannot support itself with its existing root system, for example, in a strong wind situation, loose soils, wet conditions, or very large specimen size. The critical issue with staking is attaching the plant to the stake. It is recommended that wide, flexible cloth or elastic trapping be used as it causes less injury to the plant and can expand as the plant grows. A section of old hose works well for this purpose. The ties should be tight enough to support the tree but not so tight as to prevent swaying. Stakes should be removed after one year, once the plant's root system has established.



Tree Staking Detail no. 410 from *City of Tucson and Pima County Standard Details for Public Improvements (2003)*

Standard Plant Installation Methods:

- Proper spacing of plant material is determined by the mature canopy width of each plant species. In order to maintain proper plant spacing within the landscape, plants should be spaced no closer than their maximum width at maturity, using the larger mature canopy width to determine spacing. For example, if shrub "A" has a mature width of three (3) feet and shrub "B" has a mature width of two (2) feet, then both shrubs should be planted no closer than three (3) feet apart. All distances should be measured from the center of plant "A" to the center of plant "B".

- Applicants should review the mature canopy width table at the end of this appendix to assist in establishing proper plant spacing within the mitigation area. If the mitigation area is located within existing habitat, the applicant must account for existing vegetation when placing new plantings.

- Based on average planting densities for each riparian habitat classification, and accounting for an average mature canopy width, the actual size of the mitigation area provided shall be no less than 70 % of the disturbed area, unless an onsite vegetation survey has been provided that justifies sustainability of a more densely planted area (see Section 2 and Appendix G). Additionally, a higher planting density may be allowed if the applicant can demonstrate the new planting density is sustainable (i.e., plants will receive enough water once established to survive, without supplemental irrigation). This may be accomplished by placing plants within an artificially constructed basin, such as a detention basin or water-harvesting basin and by providing a water balance calculation based on plant water needs, average annual rainfall amounts for the Tucson basin, and retention volumes for the constructed basins.

Seed Application

Seed shall be applied by one of three methods: hydroseeding, drill seeding with crimped straw mulch, or broadcast seeding and raking into seedbed with straw or other appropriate mulch. For previously disturbed areas that will be hydroseeded, imprinting or pitting of the soil surface prior to seed application is recommended. This process creates niches for water, seed, and mulch to accumulate, increasing chances for seed germination. Seed shall be applied in accordance with standard specifications detailed in Sections 805-2.03 thru 3.01, 805-3.02 (B), and 805-3.03 thru 805-4 of the City of Tucson and Pima County Standard Specifications for Public Improvements.

To ensure proper seed germination, seeding shall occur prior to the summer or winter rains, which may or may not coincide with planting of containerized plants. If this occurs, please note when the seeding will occur on the Riparian Habitat Mitigation Plan and initial monitoring report submittal.

Standard Irrigation Installation Methods

During the initial establishment period, the irrigation of trees and shrubs is essential. As part of the Riparian Habitat Mitigation Plan, irrigation must be provided to trees and shrubs in order to establish all transplanted plant material. A properly designed and installed automatic drip irrigation system is required for subdivision and commercial development, but is also recommended for single-lot development, and should be designed and installed as required by City of Tucson and Pima County Standard Specifications for Public Improvements (2003) and City of Tucson and Pima County Standard Details for Public Improvements (2003). The specifications and standard details are available online at:

http://www.dot.pima.gov/transeng/stdspecsdet/standardspecs2003.pdf
http://www.dot.pima.gov/transeng/stdspecsdet/standarddetails2003_vector.pdf

An applicant may submit a proposal for an alternative system, such as an automatic bubbler or a soaker hose on a timer. To obtain approval, the applicant must demonstrate that an alternative irrigation system will provide sufficient irrigation water at appropriate intervals to ensure establishment and long-term survival of mitigation plantings.

Watering Requirements for Installation

Once the irrigation system is installed, establish an irrigation schedule. An irrigation schedule should take into account soil type, plant water requirements, plant size and time of year. The schedule also needs to be adjusted seasonally to accommodate variations in localized temperatures, rainfall, day length, growing season, plant age, drought tolerance of the plant, and other factors.

Sample publications that can assist in determining irrigation schedule:

- An interactive version of the *Landscape Watering by the Numbers* booklet from Water Use It Wisely can be found online at: http://www.wateruseitwisely.com/region/arizona/100-waysto-conserve/outdoor-tips/water-guides/Landscape-Watering-Guide.pdf

- The *Guidelines For Landscape Drip Irrigation Systems (2001)* booklet from the Arizona Landscape Irrigation Guidelines Committee (Appendix M - "A Simplified Approach for Determining Landscape Watering Schedules" and Appendix J - "Estimated Water Requirements for Tucson, Arizona—Desert Adapted Plants, Native) is available for download online at: http://www.amwua.org/pdfs/drip_irrigation_guide.pdf

For additional information on irrigation systems and irrigation water schedules, consult with a local irrigation professional or contact a Landscape Architect or reputable landscape contractor.

Standard Irrigation Installation Methods

Table 1 contains a general outline of an irrigation schedule. This schedule represents irrigation requirements during the initial establishment period of 1 to 2 years. Temperature and rainfall can vary significantly even within normally hot and cold seasons, and normally wet or dry times of the year, therefore, months are shown to overlap, representing a range of conditions. The two primary rainfall seasons in the Sonoran desert are the summer monsoon season, which typically extends from July to September, and the winter rainfall season from December to March.

TABLE 1. Example Irrigation Schedule for Establishing New Plants

Daytime Temperature	Precipitation	Approximate Months	Tree Watering*	Shrub Watering*
Hot to warm	Dry	September, October, November	Once every 2 weeks	Once every week
Cool to cold	Occasional rain	November, December, January, February	Once a month	Once every 2 weeks
Cool to warm	Occasional rain	February, March, April	Once every 2 weeks	Once a week
Hot	Dry	April, May, June	Once every 5 days	Once every 3 days
Hot	Monsoon rains	July, August, September	Once every 2 weeks	Once a week

*To determine an irrigation schedule specifically for the site, review the publications noted on above and consult with a local irrigation professional, Landscape Architect, or reputable landscape contractor.

Maintaining Mitigation Plantings

The mitigation area shall be maintained for a period of three (3) to five (5) calendar years following installation, to ensure establishment of a new riparian plant community. The intent of mitigation is to establish vegetation that replicates the natural conditions within a riparian habitat, regular pruning and shaping of trees is prohibited. Understory plants should also be allowed to grow to their natural form. Mowing and/or chemical control of understory plant growth should be avoided, unless it is selectively used on noxious and/or invasive plant species. The ultimate goal is to ensure plants develop a deep and stable root system to survive in arid conditions. The monitoring, repair, and proper operation of the irrigation system will be an essential part of the maintenance program.

The following is an outline of the minimum requirements for mitigation planting maintenance. Site-specific conditions may make additional maintenance necessary and appropriate for projects.

What To Do	How Often
Check plants/ Replace Dead Trees and Shrubs	Four (4) times per year until plants have established (typically through the second year).
Remove Noxious and/ or Invasive Plat Species/ Weeds	Two (2) times per year or as needed (see Appendix E).
Reseed & Stabilize Eroded Areas	As-Needed
Check & Repair Damaged Tree Stakes and Browser Cages	Once a month for first growing season. Tree stakes can typically be removed after one year.
Fencing used to Exclude Livestock from Mitigation Area	As Needed

Watering Requirements for Maintenance

Once healthy root systems are established (approximately two (2) years but varies with site conditions and plant species), the plants should be “weaned” from supplemental irrigation. Adjust the irrigation schedule until plants can survive on natural rainfall. This can be accomplished by decreasing the frequency of irrigation each year. For example, if plants are watered once each week during the establishment period, the frequency would be adjusted to once every two weeks during the first year of weaning, once every three weeks during the second year of weaning, once every four weeks during the third year of weaning, and no watering would occur in subsequent years. Even after establishment, during extreme drought, certain plants may require supplemental irrigation.

Criteria for Success

Native plants are well adapted to annual rainfall amounts in the Tucson Basin and most will survive on natural rainfall alone, once established. To create a successful mitigation area, initial plant establishment is important. Proper "weaning" of the plant from supplemental irrigation in order to establish a healthy root system, as mentioned above, is essential. Once

supplemental irrigation has been reduced or eliminated, it is the applicant's or their successor's responsibility to continue monitoring plant health for the remainder of the three (3) to five (5) year maintenance period. Establishment of the mitigation area will be considered successful when 80% of the plants are living and actively growing (without significant die back or loss) after one (1) year without supplemental irrigation.

Average Mature Canopy Width Table

Botanical Name	Common Name	Average Mature Canopy Width (feet)
Trees		
Acacia constricta	Whitethorn Acacia	16
Acacia greggi	Catclaw Acacia	18
Celtis reticulata	Netleaf/ Canyon Hackberry	28
Chilopsis linearis	Desert Willow	23
Fraxinum velutina	Arizona Ash, Velvet Ash	28
Juglans major	Arizona Black Walnut	50
Olneya tesota	Ironwood	24
Parkinsonia florida	Blue Palo Verde	28
Parkinsonia microphylla	Foothills Palo Verde	17
Platanus wrightii	Arizona Sycamore	35
Populus fremontii	Fremont Cottonwood	40
Prosopis pubenscens	Screwbean Mesquite	20
Prosopis velutina	Velvet Mesquite	28
Quercus emoryi	Emory Oak	40
Salix gooddingii	Goodding's Willow	25
Sambucus nigra (mexicana)	Mexican Elderberry	18
Sapindus saponaria var. drummondii	Western Soapberry	30

Botanical Name	Common Name	Average Mature Canopy Width (feet)
Shrubs		
Ambrosia ambrosioides	Canyon Ragweed	4
Ambrosia deltoidea	Triangle-Leaf Bursage	2
Anisacanthus thurberi	Desert Honey-Suckle	4
Asclepias tuberosa ssp. Interior	Butterfly Milk-Weed	2
Atriplex canescens	Four-winged Salt-Bush	9
Atriplex lentiformis	Quailbush	11
Baccharis salicifolia	Seep Willow	9
Berberis haematocarpa	Red Mahonia	12

Average Mature Canopy Width Table

Botanical Name	Common Name	Average Mature Canopy Width (feet)
Shrubs, cont.		
Calliandara eriophylla	Fairy Duster	4
Celtis pallida	Desert Hackberry	10
Cephalanthus occidentalis	Buttonbush	9
Condalia warnockii	Warnock Condalia	7
Dodonaea viscosa	Hopbush	10
Encelia farinosa	Brittlebush	4
Ericameria laricifolia	Turpentine Bush	3
Eriogonum fasciculatum	Flat-top Buckwheat	3
Garrya wrightii	Silktassel	6
Gossypium thurberi	Native Cotton	3
Hymenoclea monogyra	Burrobush	5
Hyptis emoryi	Desert Lavender	7
Justicia candicans	Red Justicia	3
Larrea tridentata	Creosote Bush	6
Lycium andersonii	Anderson Wolfberry	6
Lycium fremontii	Fremont Wolfberry	7
Parthenium incanum	Mariola	3
Rhus glabra	Smooth Sumac	10
Rhus microphylla	Little-Leaf Sumac	9
Rhus ovata	Sugar Bush	10
Rhus trilobata	Three-Leafed Sumac	9
Ribes aureum	Wax Current	3
Senecio salignus	Senecio	7
Simmondsia chinensis	Jojoba	8
Tecoma stans v. angustata	Yellow Bells	6
Trixis californica	Trixis	3
Vauquelinia californica	Arizona Rosewood	11
Ziziphus obtusifolia	Graythorn	8

Appendix D: Water Harvesting Guidelines

Water Harvesting

Water harvesting is the process of capturing, diverting, and storing rainwater and stormwater runoff for plant irrigation and other uses. Runoff may be collected from roofs, parking/paved areas, patios, and other land surfaces. Collected runoff can be retained and allowed to infiltrate into the ground or routed through landscaped areas using water-harvesting structures, such as microbasins or swales.

Benefits of Water Harvesting

Urban development tends to have a high ratio of impervious areas (roofs, driveways) to pervious areas (undeveloped, vegetated areas). There are numerous benefits to harvesting and using stormwater onsite, such as:

- A reduction in potable water use for landscape irrigation;
- Groundwater recharge;
- Reduce water bills and groundwater pumping;
- Reduce offsite flooding and erosion by retaining and infiltrating rainwater onsite;
- Increase water availability for onsite vegetation;
- Extend the life of landscaping by reducing salt accumulation in the soil that can be harmful to root growth.

Water Harvesting Techniques

Water harvesting techniques range from simple to complex systems. A simple water harvesting system may include extending downspouts from a roof to reach planted areas, or creating onsite depressions designed specifically to harvest rainwater and planting in and around these depressions. A more complex water harvesting system utilizes some type of collection and storage (cisterns, rain barrels, etc.), conveyance and distribution systems to retain and control where water goes. Many methods are available to harvest rainwater for landscape use. Some of these include, but are not limited to:

Microbasins	Localized basins served by small drainage areas that collect stormwater
Swales On-Contour	Swales and associated berms constructed parallel to contour lines that intercept small to moderate volumes of shallow, slow-moving stormwater (sheet flow).
Swales Off-Contour	Swales constructed at a slight angle to the contour line that convey stormwater slowly down the slope in a controlled manner to maximize infiltration, support vegetation, control erosion, and reduce stormwater flow velocity.

French Drains	Rock-filled trenches that are designed to encourage rapid stormwater infiltration through the sides, ends and bottom of the trench where soil and water meet.
Water Tank/Cisterns	Collection devices and storage devices that capture and store rooftop runoff for use later.

Important Notes

- All rainwater harvesting structures should be designed to infiltrate rainwater into the soil within 12 hours of the rainfall event in order to avoid creation of an environment that will encourage mosquito breeding.
- Rainwater harvesting depressions should be placed at least 10 feet from the foundations of buildings or walls to prevent saturated soil conditions that could cause settling of foundations.

Additional Information

- Information on how to design and construct water-harvesting features is available in the City of Tucson Water Harvesting Guidance Manual. The manual is available from the Stormwater Division of the City of Tucson Department of Transportation and from the Arizona Department of Water Resources, Tucson Active Management Area. The manual can also be downloaded online at:

http://dot.tucsonaz.gov/stormwater/downloads/2006WaterHarvesting.pdf

Websites
http://ag.arizona.edu/pubs/water/az1052
http://www.sahra.arizona.edu/

Appendix E: List of Noxious & Invasive Plant Species & Best Management Practices

Noxious and Invasive Species Plant List

Maintenance of riparian mitigation area(s) includes removal of "noxious and/or invasive plant species" from the mitigation area over the five (5) year maintenance period. The following lists and definitions are provided to assist property owners with these requirements.

Noxious Weed Species

Noxious weeds included on Federal and State noxious weed species lists are non-native plant species that are regulated by legislative action or statue controlling the management and/or movement of these species throughout the U.S. (Federal Noxious Weed Act of 1974). This list includes plant species most commonly deemed a threat to agriculture, mainly from an economic and/or environmental aspect.

Invasive Species

In 2007, Governor Napolitano signed Executive Order 2007-07, that provides guidance in establishing a coordinated and comprehensive plan for invasive species management, including a definition and listing of invasive species. EO 2007-07 defines an invasive species as, "A species that is (1) non-native to the ecosystem under consideration and, (2) whose introduction causes or is likely to cause economic or environmental harm or harm to human health." The Final Arizona Invasive Species Management Plan was published on June 30, 2008 and can be viewed at: http://www.governor.state.az.us/AIS/

The Federal and State noxious weed lists have not been included in this appendix but can be viewed at the following websites:

Federal Noxious Weed Species List
http://plants.usda.gov/java/noxious?rptType=Federal
State Noxious Weed Species List
http://www.azda.gov/PSD/quarantine5.htm
http://plants.usda.gov/java/noxious?rptType=State&statefips=04

Arizona Wildlands Invasive Plant Working Group: Invasive Plant List

The following list was developed by the Arizona Wildlands Invasive Plant Working Group and adopted by the Arizona Invasive Species Advisory Council under EO 2007-07. The list was created to address invasive, non-native plant species that pose an ecological threat to wild lands in Arizona, and is divided into three categories, indicating the severity of ecological impacts on plant communities by invasive species. Plant species listed shall be controlled within disturbed and mitigated area(s) to prevent the spread into surrounding areas.
The entire document can be viewed at:
http://www.swvma.org/InvasiveNon-NativePlantsThatThreatenWildlandsInArizona.pdf

Native Plant Species with Weedy Growth Habits

In certain areas, in particular, floodplains, specific native plant species can become invasive. While native species that are invasive in nature tend to be few, they can still affect the success of a mitigation area. For example, Palmer's Amaranth, an annual that germinates during the summer months, tends to form monotypic stands, competing with other native species for water and nutrients. Weed species should be monitored and thinned as necessary to ensure success of the mitigation area.

Arizona Wildlands Invasive Plant Working Group: Invasive Species Plant List

Scientific Name	Common Name
High	
Acroptilon repens	Russian Knapweed
Arundo donax	Giant Reed
Bromus rubens	Red Brome
Bromus tectorum	Cheatgrass
Centaurea solstitialis	Yellow Starthistle
Eichhornia crassipes	Water Hyacinth
Elaeagnus angustifolia	Russian Olive
Eragrostis lehmanniana	Lehmann Lovegrass
Euphorbia esula	Leafy Spurge
Euryops multifidus	Sweet Resinbush
Lepidum latifolium	Perennial Pepperweed
Myriophyllum aquaticum	Parrot's Feather
Myriophyllum spicatum	Eurasian Watermilfoil
Pennisetum ciliare	Buffelgrass
Pennisetum setaceum	Fountain Grass
Salvina molesta	Giant Salvinia
Tamarix chinensis	Fivestamen Tamarisk
Tamarix parviflora	Smallflower Tamarisk
Tamarix ramonsissima	Saltcedar

Medium	
Alhagi maurorum	Camelthorn
Avena fatua	Wild Oat
Brassica tournefortii	Sahara Mustard
Bromus diandrus	Ripgut Brome
Bromus inermis	Smooth Brome
Cardaria chalapensis	Lenspod Whitetop
Cardaria draba	Whitetop
Cardaria pubescens	Hairy Whitetop
Carduus nutans	Musk Thistle
Centaurea biebersteinii	Spotted Knapweed
Centaurea diffusa	Diffuse Knapweed
Centaurea melitensis	Malta Starthistle
Chondrilla juncea	Rush Skeletonweed
Cirsium arvense	Canada Thistle
Conium maculatum	Poison Hemlock
Convolvulus arvensis	Field Bindweed

Arizona Wildlands Invasive Plant Working Group: Invasive Species Plant List

Scientific Name	Common Name
Medium	
Cortaderia selloana	Pampas Grass
Cynodon dactylon	Bermuda Grass
Erodium cicutarium	Redstem Filaree
Hordeum murinum	Mouse Barley
Linaria dalmatica	Dalmation Toadflax
Linaria vulgaris	Yellow Toadflax
Lolium perenne	Perennial Ryegrass
Melilotus alba	White Sweetclover
Melilotus officinalis	Yellow Sweetclover
Mesembryanthemum nodiflorum	Slenderleaf Iceplant
Rhus lancea	African Sumac
Rubus armeniacus	Himalayan Blackberry
Rubus discolor	Himalayan Blackberry
Saccharum ravennae	Ravennagrass
Salsola collina	Slender Russian Thistle
Salsola paulsenii	Barbwires Russian Thistle
Schismus arabicus	Arabian Schismus
Schismus barbatus	Common Mediterranean Grass
Sonchus asper	Spiny Sowthistle
Sonchus oleraceus	Annual Sowthistle
Sorghum halepense	Johnsongrass
Ulmus pumila	Siberian Elm
Vinca major	Bigleaf Periwinkle

Low	
Aegilops cylindrica	Jointed Goatgrass
Asphodelus fistulosus	Onionweed
Cirsium volgare	Bull Thistle
Cynoglossum officinale	Houndstongue
Echinochloa crus-galli	Barnyardgrass
Elymus repens	Quackgrass
Eragrostis curvula	Weeping Lovegrass
Leucanthemum vulgare	Oxeye Daisy
Mesembryanthemum crystallinum	Common Iceplant
Onoprodum acanthium	Scotch Thistle
Panicum antidotale	Blue Panicum
Tamarix aphylla	Athel Tamarisk

Noxious and Invasive Weed Control

The method(s) used to control noxious and invasive weeds is species specific and may depend on the site conditions (i.e., the presence of desirable plants, sensitive areas, or terrain conditions). For the successful removal of noxious/invasive species, one must consider the plant's characteristics and context in which it is growing. What may be a successful solution in one situation does not mean it will be effective or appropriate in another. Weed control may require a combination of different methods (i.e., mechanical, chemical, etc.), and some follow-up work will nearly always be required in order to achieve success.

Noxious and Invasive Weeds Best Management Practices

Best Management Practices (BMPs) are practices and/or procedures that can be used to mitigate and/or prevent the adverse effects of noxious and invasive weeds. The following is a list of BMPs for noxious and invasive weeds:

- Use native plants for landscaping or plants that are not known to be invasive. Work with local nurseries that specialize in native plants if help is needed with plant identification and selection.
- Identification of invasive and noxious plants in area is important. If an invasive or noxious weed is identified, research the best method for control of the plant.
- Mechanical control (pulling, mowing, or cutting) is common for plants that do not reproduce (roots, stolons) and can be successful if implemented annually, prior to seed setting (i.e., when seeds are ready for distribution).
    - Mechanical control should be timed with the life cycle of the plant species targeted to prevent seed distribution.
    - Pulling may be effective earlier in the life cycle when tap roots and plant size are smaller.
    - Cutting or mowing may be successful after flowering or significant growth but prior to seed set.
    - The removal of plant material will reduce root reserves to prevent flowering and seeding for the year.
- Chemical control is typically used on plants with a prolific root system to prevent sprouting. This type of control may need repeating on an annual basis, typically before the plant flowers or sets seed. Trees such as Russian olive or salt cedar may be injected with herbicide rather than spraying. Different control methods provided may be necessary for large populations or in areas where mechanical removal and disposal are not practicable.
    - There are a number of chemical controls available at local stores that are sufficient for removal/control of most noxious and invasive weeds (Ex: Round Up, Rodeo, and Surflan).
    - If using chemicals, take adequate safety precautions and always read the instructions on the labels.
- It is important to inform neighbors about existing weed populations and how to prevent their spread, especially since weeds are not stopped by fences or property lines. A cooperative effort from surrounding neighbors may be necessary to prevent and protect

the landscape from invasive weeds. There may be state weed programs in the area that can offer assistance or guidance for cooperative control.

- To prevent the spread or possible invasion of new weeds, avoid disturbance to natural areas or clearing of native vegetation and clean off equipment, vehicles, and/or domestic animals that may have been exposed to weeds.

Buffelgrass

Buffelgrass is spreading rapidly across Arizona's deserts. It poses an immediate threat to the integrity of the Sonoran desert. Buffelgrass (*Pennisetum ciliare*) is a fire-prone grass introduced from the African savannah that grows in dense stands, crowds out native plants and can fuel frequent and devastating fires in what has been generally a fireproof desert. Competition for water can weaken and kill desert plants, even larger trees and cacti, while dense roots and ground shading prevent germination of native seeds. Buffelgrass can kill or exclude most native plants by these means alone; wildfires will only hasten the process. Buffelgrass will produce new leaves and flower spikes very quickly after a light rain, almost anytime of the year, making it an extremely prolific seed producer. For more information, view the Buffelgrass Action Center website: **http://www.buffelgrass.org/**

Website Resources for Noxious and Invasive Weeds

- USGS Southwest Exotic Plant Information Clearinghouse
  http://sbsc.wr.usgs.gov/research/projects/swepic/swepic.asp
- National Invasive Species Information Center (NISIC)
  http://www.invasivespeciesinfo.gov/
- Natural Resources Conservation Service Plants Database
  http://plants.usda.gov
- The Bureau of Land Management Weeds Website
  http://www.blm.gov/weeds
- TNC Global Invasive Species Team
  http://tncinvasives.ucdavis.edu/
- Center for Invasive Plant Management
  http://www.weedcenter.org/index.html
- U.S. Fish and Wildlife Service Invasive Species Program
  http://www.fws.gov/invasives/
- Plant Conservation Alliance Alien Plant Working Group
  http://www.nps.gov/plants/alien/index.htm
- Weed Science Society of America (WSSA)
  http://www.wssa.net
- University of California Cooperative Extension Weed Research and Information Center (WRIC) http://wric.ucdavis.edu/index.html
- Information on Buffelgrass
  http://Buffelgrass.org
  http://www.desertmuseum.org/invaders/
  http://www.pima.gov/nrpr/eeduc/outreach/outabout.htm

Books:

- *Weeds of the West*. 2001. Tom D. Whitson
- *Biology and Management of Noxious Rangeland Weeds*. 1999. Roger L. Sheley and Janet K. Petroff.
- *Aquatic and Riparian Weeds of the West*. 2003. Joseph M. DiTomaso and Evelyn A. Healy.

Appendix F: Field Mapping & Onsite Vegetation Survey

The regional scale mapping of riparian habitat provides a starting point for the delineation of riparian habitat regulated under the Ordinance and requiring mitigation. An applicant has the option of accepting the maps adopted by the Town Council or completing site specific field verification and mapping to understand the vegetative characteristics of riparian habitat on the property.

Field Verification & Mapping of Riparian Habitat

Site specific field assessment and verification of the adopted Riparian Classification Maps, based upon current aerial photographs, rectified to the proposed project's engineering and planning base maps, is the preferred means of establishing a baseline for impact assessment and mitigation planning. The following criteria apply to the field verification of Regulated Riparian Habitat (RRH) within a property or project area.

Applicability

Requests for adjusting Regulated Riparian Habitat boundaries will be considered for all classifications.

Professional Qualifications

Field mapping of Regulated Riparian Habitat for adjusting habitat boundaries or an onsite vegetation survey to document total vegetative volume, species composition, and quantities for purposes of mitigation calculations shall be completed by a qualified professional with one or more of the following qualifications:

1. An arborist with International Society of Arboriculture certification;
2. A landscape architect with Arizona state technical registration as a landscape architect;
3. A biologist, horticulturist, or botanist with a minimum B.A. or B.S. in a plant oriented natural resource field.

Quantitative Methods for Field Mapping Regulated Riparian Habitat

The Ordinance allows for delineation of mapped riparian boundaries and characterization of mapped riparian habitat to reflect site conditions for purposes of mitigation. Technical data may be submitted by a qualified professional to determine onsite conditions, for review and approval by the Town of Sahuarita.

Modification of Regulated Riparian Habitat Boundaries

A qualified professional will identify and delineate homogenous vegetation units along a watercourse using a combination of aerial photographs, topographic maps, on-the-ground photographs, field observation, and field survey.

Onsite Vegetation Survey - Determining Plant Community Characteristics within a Mapped Regulated Riparian Habitat Boundary

For purposes of calculating mitigation requirements for disturbance to Regulated Riparian Habitat or when the applicant believes site conditions vary from the mapped Regulated Riparian Habitat, (major boundary modifications and/or total vegetation volume estimates) the following two methods of sampling may be used, 1) Total Vegetation Volume (TVV) and Belt Transects, or 2) Plot sampling.

TVV and Belt Transects – The TVV and belt transect sampling method can be used to determine or classify Regulated Riparian Habitat and its boundaries by providing a detailed analysis of plant community structure and composition. The TVV and belt transect sampling method approved for use by the Town is a vertical line-intercept technique.

Plot Sampling – Plot sampling (also called quadrat sampling) is used to define plant community characteristics, including cover type, frequency, and density. More information on this type of method can be found in Appendix H: Standard Operating Procedure: Quantitative Methods for Regulated Riparian Habitat Boundary Modification and Onsite Vegetation Surveys.

Appendix G: Glossary of Terms

GLOSSARY OF TERMS

Approval: Written notice by the Town approving Riparian Habitat Mitigation Plans.

Approved plan: The most current Riparian Habitat Mitigation Plan that has been given approval by the Town Planning and Building Director or Town of Sahuarita Town Council.

Disturbed: The condition of existing habitat after it has been damaged, demolished or eliminated.

Development: Any permitted or non-permitted human alteration to land and its vegetation, soil, geology, drainage, hydrology and surface features; changing the appearance and character of land; and including but not limited to the acts of grubbing, clearing, and grading of land, and placing improvements on the land such as buildings, structures, signs, paving, vegetation, and outdoor use areas.

Drip line: For cacti, an area around the plant that overlays the mature root system. For trees and shrubs, an area under the undisturbed canopy of the tree or shrub.

Ephemeral: Streams that flow only during and immediately after rain.

Erosion: The wearing away of the ground surface as a result of the movement of wind, water or ice.

Floodplain: Any area within a watercourse that has been or may be covered partially or entirely by flood water from the 100-year flood. This can include lands that have been, or may be, subject to flooding from stormwater runoff, overflow of flood waters from a watercourse, alluvial fans, sheet flood zones, or other property subject to flooding. The floodplain includes the stream channel, the floodway, and the floodway fringe area.

Grade: The vertical location of the ground surface.

Grading: The clearing, brushing, grubbing, excavating, or filling of a site.

Hydroriparian Habitat: Riparian plant communities generally associated with perennial watercourses where plant species such as cottonwood and willow are present.

Hydroseed/Hydromulch: A mixture of seed, mulch and soil ameliorants that are sprayed by machine onto large or otherwise inaccessible areas.

Intermittent: Streams that flow for only certain times of the year either from springs, groundwater, or runoff.

In-Lieu Fee: Fees collected by the Town from the property owner or developer when disturbance to regulated riparian habitat occurs.

Mesoriparian Habitat: Riparian habitats generally associated with perennial or intermittent watercourses or shallow ground water. Plant communities may be dominated by species that are also found in drier habitats.

Mitigation: Providing a new riparian habitat of similar quality to to an area that had plant life removed as a result of physical improvements or development. The property is typically located within the floodplain, erosion hazard area, or riparian habitat.

Mitigation Plan: A document submitted by the applicant to the Town that clearly delineates Regulated Riparian Habitat and the limits of development on a site. The mitigation plan indicates mitigation area(s) and includes a plant list (species/quantities), and irrigation methods.

Native Plant: Plants growing in the Arizona portion of the Sonoran Desert, without cultivation and were not introduced after 1920. A plant that occurs in Mexico but still in the range of Sonoran Desert plants, is not native.

Obligate: Plant species occurring almost always (estimated probability 99%) under natural conditions in wetlands.

Perennial: Streams that flow continuously year round.

Plant Community: A biologic grouping of vegetation frequently found under natural conditions due to their common soils, moisture, climate and orientation requirements; also means a plant association.

Regulated Riparian Habitat: Riparian habitat areas identified on the Riparian Classification Maps as established by Section 18.65 of the Town of Sahuarita Zoning Code

Restoration: The process of repairing a previously disturbed, damaged, or degraded site area or site feature and replicating its previously undisturbed, undamaged, or un-graded condition of vegetation, plant communities, geologic structures, grade, drainages, and riparian habitat that historically existed onsite or in the neighborhood.

Riparian Habitat: Plant communities that occur in association with any spring, cienega, lake, watercourse, river, stream, creek, wash, arroyo, or other body of water, either surface or subsurface, or channel having banks and bed through which waters flow at least periodically.

Site: A single lot or a combination of contiguous lots (or parcels), or a leased area on a lot that meets the minimum zoning standards of the applicable zone.

Subdivision: Improved or unimproved land or lands divided for the purpose of financing, sale, or lease, whether immediate or future, into four or more lots, tracts, or parcels of land, or, if a new street is involved, any such property which is divided into two or more lots, tracts or parcels of land, or any such property, the boundaries of which have been fixed by a recorded plat, which is divided into more than two parts.

Understory: the shrubs and plants growing beneath the main canopy of a forest.

Watercourse: Any lake, river, stream, creek, wash, arroyo or other body of water or channel having banks and bed through which waters flow at least periodically.

Wildlands: Public and private lands (and waters) that support native ecosystems, including national, state, and local parks and forests, ecological reserves, wildlife areas, Bureau of Land

Management Lands, and so on. Working landscapes—such as grazed rangeland and active timber lands—that support native ecosystems are included in the definition.

Xeroriparian Habitat: Riparian habitat generally associated with an ephemeral water supply. These communities typically contain plant species also found in upland habitats, however, these plants are typically larger and/or occur at higher densities than adjacent uplands.

Appendix H: Standard Operating Procedure (RECON)