

APPENDIX I
VEGETATION PLANTING PLAN



Spring Lake Vegetation Restoration

The area within the project site currently known as the Aqua Arena encompasses Spring Lake, which was created by damming of Sink Creek. The site has been modified since the late 1800s and serves as a recreational tourist attraction. Ownership of the property has shifted to South Western Texas University and will be managed by the Texas Parks and Wildlife Department; the project site is surrounded by the remaining portions of the SWT campus and SWT University Golf Course. Due in part to high maintenance of the existing old structures and change in ownership, plans for the site include demolition of most structures and reclamation of the site to create a landscape with a higher degree of natural ecosystem processes, while permitting passive recreation and educational use of the site.

The site supports several endangered species and it has documented evidence of cultural artifacts, which limit activities and reclamation aspects. Most of the site will be demolished to a depth of 6 inches of existing ground surfaces due to cultural limitations. Compaction will be the main factor affecting the revegetation of the site to the proposed native grass prairie/savannah landscape. Because of the presence of fragile endangered aquatic species, additional tree plantings will be limited to native small tree and shrub species to reduce avian predation.

Removal of exotic trees and shrubs. The site has numerous, complex problems with exotic plant species ranging from aquatic to ornamental shrubs and trees. Recommendations by the Natural Resources Conservation Service (NRCS) will be used to control exotic tree species. Exotics on the site include tallow, chinaberry, ligustrum, palms, and several plants identified as unknown species in the survey. Exotic species are color coded in the Existing Vegetation Map. Others not identified in the survey will also be removed. Some removal has already been initiated by SWT. (Dr. Francis Rose) with the Biology Department of SWT and Pat Fogarty will be recruited to assist in identifying and marking exotic tree and shrub removal. Individual tree cutting and chemical stump treatments will be used to remove all exotic trees and shrubs within the project area. The site will be monitored to address new seedlings or sprouts invading the site. All debris will be shredded and removed from the site for proper disposal.

Removal of Structures and Vegetative Reclamation. Structures identified for demolition are color coded on the Existing Structures Map. Upon demolition of structures the soil will be ripped to a maximum depth of 6 inches in all areas not limited by cultural resources considerations. Because of the likelihood of encountering cultural resources during demolition operations, an archeologist must be present during all excavation and soil compaction (ripping) activities.

Areas with Bermuda grass and existing exotic turf will be scalped to the 6" maximum level and new topsoil will be applied as indicated below. Existing native trees within the demolition area will be adequately protected during the entire construction and reclamation stage. Temporary fencing will be used to protect desirable trees and will encompass the entire width of the existing canopies. Where necessary, hand labor techniques will be used to remove areas of asphalt, replace removed material with topsoil, and seed within these protected tree

zones with shade tolerant native species. (Topsoil mixture will not exceed depth of removed material plus 10% in these areas.)

Once the demolished area is ripped (including existing exotic grass areas) a 50/50 mixture of compost (Dillo Dirt) and topsoil will be applied over the surface. This mixture should be applied at a minimum rate of 1 foot in depth and disked into the ripped surface. Once topsoil/compost mixture is spread over the site the entire area will be rolled to provide moderate soil compaction and to reduce air pockets. Native grass/cover crop mixtures will be drilled into the rolled soil as indicated on the planting plan. Seeding rates recommended are based upon NRCS irrigated rates (however, site will not be irrigated). Certified-Weed-Free wheat, millet or oat straw will be used as mulch material and will be crimped (anchored) into the soil at the rate of 5 tons per acre as specified.

Following seeding and mulching, the site will be rolled again to increase seed to soil contact. All treated areas will be temporarily fenced to restrict access until vegetation is established. Mowing will be used to control annual forbs and to prevent cover crop seed production; mowing height will be restricted to a height of 6 inches minimum. Grasses will be drilled during the early spring season. Wildflowers will be drilled onto the site during the early fall period of the first year. Mowing operations following wildflower seeding will be performed in late June – early July following seed maturation. Only areas to be used for festivals will be mowed to a height less than 6 inches after grass establishment. Tall-grass riparian areas will be clipped as needed to reduce wildfire hazards.

Irrigation and chemical fertilization will not be used to reclaim the site. These management features tend to promote undesirable weed competition and shift ecological processes toward exotic plant species such as Bermuda grass. Chemical herbicides will not be used because of endangered plant and animal species concerns. Undesirable vegetation will be controlled by hand removal or mowing.

Seeding Recommendations. The Town Lake(Spring Lake) project site contains two Texas Ecological Regions – Blackland Prairies and the Edwards Plateau. The Edwards Plateau region describes the surrounding landscape. The Blackland Prairie region is more applicable to the area confined within the actual project limits.

According to the report, Texas Rivers Center at San Marcos Springs, published by the Texas Parks and Wildlife Department and Southwest Texas State University, there were historically two main soil series present on the site. These were the Oakalla Soils, Frequently Flooded and the Tinn Clay, Frequently Flooded series. As documented in the 1984 Soil Survey of Comal and Hays Counties Texas, published by the U. S. Department of Agriculture Soil Conservation Service (Natural Resources Conservation Service), the area encompassing the Tinn Series supports the Clayey Bottomland plant communities. The Oakalla area supports the Loamy Bottomland plant communities. The design concept attempts to mimic these plant communities as much as possible, without removal of native Texas' tree and shrub species existing on the site and within design constraints produced by use of imported topsoil, cultural resources limitations, past use of fill material, permanent subsoil compaction and the sponsor's desired functionality of the site.

Both plant communities are described below as provided in the Soil Survey; however, this description is incomplete in relation to species frequency of occurrence and in composition of forbs and woody vegetation. Soil Survey descriptions favored agricultural use of the land, predominantly grasses and used percent of annual air-dried production to classify the systems as opposed to percent occurrence. This methodology typically under-represents forbs, shrubs and trees found within the landscape. Therefore wildflower seed mixtures were based upon regional presence and expected adaptability to the modified site. The National Wildflower Center in Austin will be contacted prior to seed purchasing to verify suitability of wildflower mixtures and seeding recommendations.

The Texas Wildscapes Gardening for Wildlife by Damude and Bender and published by Texas Parks and Wildlife Press was utilized to create a regional plant list for plant species suitability. This list is attached below. The Texas Parks and Wildlife Department and SWT Biology and Plant Maintenance Departments must approve all seeding mixtures prior to establishment.

Recommended Seeding Mix – Oakalla soils, Loamy Bottomland Plant Community. (Mesic Site). This potential vegetative community would be found adjacent to the creeks and lake – i.e. areas with high water table. According to the Soil Survey this plant community (range site) potential is a savannah with oak, pecan hackberry, elm, cottonwood, sycamore and other woody plants shading approximately 30% of the ground. This description assumes grazing and fire are and will be ecological inputs. This is not expected to be the case with this very urban site.

Twenty-five percent of the plant community would contain Virginia wildrye and sedges, predominantly at the edge of the water body. Rustyseed paspalum and beaked panicum comprised 15%; swithgrass, indiagrass, big bluestem and little bluestem made up 15%; white tridens and knotroot bristlegrass 10%, eastern gamagrass 5%; uniola (Inland sea oats) 5%; woody plants such as pecan, oak, hackberry, elm, cottonwood and sycamore, greenbrier, Alabama supplejack and legumes comprised 25 percent of the plant community's annual production.

Without grazing, the site would be expected to consist predominantly of big bluestem, little bluestem, eastern gamagrass in sunny areas. However in the absence of both fire and grazing, forbs and grasses decrease as trees, shrubs and woody vines increase. Brush species common on ungrazed and unburned sites include agarita, persimmon, Ashe juniper, elm and shin oak. These often form unpenetrable thickets. Because trees currently exist on the site and are shading some areas, the recommended mixture for this mesic area contains a larger percentage of shade tolerant species. The recommended seeding rate is based on an irrigated seeding rate as recommended by NRCS. Wildflower seeding rates are based upon NRCS non-irrigated rates.

Mesic Grass Mixture (100% seeding)

<u>Common Name</u>	<u>Scientific Name</u>	<u>% of Seed Mix</u>
Little Bluestem	Schizocyrium scoparium	5%
Big Bluestem	Andropogon gerardi	10%
Indiangrass	Sorghastrum nutans	5%
Switchgrass	Panicum virgatum	10%
Eastern Gamagrass	Tripsacum dactyloides	5%
Virginia Wildrye	Elymus virginiana	30%
Tall Dropseed	Sporobolus asper	7%
White Tridens	Tridens albescens	5%
Knotroot bristlegrass	Setaria geniculata	8%
Uniola (Inland Seoats)	Chasmanthium latifolium	15%

Cover crop of legume, oats, and/or millet seeded with mix above 25# to the acre.

Mesic Wildflower Mixture Fall Interseeding, NRCS Non-irrigated Seeding Rate (50% seeding rate)

<u>Common Name</u>	<u>Scientific Name</u>	<u>% of Seed Mix</u>
Butterfly Weed	Asclepias tuberosa	5
Winecup	Callirhoe involucrate	2
Wild Hyacinth	Camassia scilloides	2
Standing Cypress	Ipomopsis rubra	3
Cardinal Flower	Lobelia cardinalis	5
Blue Curls	Phacelia patuliflora	3
Drummond Phlox	Phlox drummondii	3
Brown-eyed Susan	Rudbeckia hirta	5
Scarlet Sage	Salvia coccinea	3
Heath Aster	Aster ericoides	1
Partridge Pea	Chamaecrista fasciculata	5
Golden Wave	Coreopsis tinctoria	4
Texas Bluebells	Eustoma grandiflora	1
Purple phacelia	Phacelia patuliflora	3
Giant goldenrod	Solidago Canadensis	5

Recommended Seeding Mix – Tinn Clay, Frequently Flooded - Clayey Bottomland Plant Community (Xeric-Mesic Site). This site is predominantly the upland portion of the site that is to be demolished. Because of cultural resource constraints the base courses and possibly some foundations will not be removed and their corresponding compaction and root barriers will affect the vegetation of the site. This area is also expected to support the festival activities along with picnicking traffic. These activities will increase the compaction of topsoil over time, again

limiting vegetative communities. Considering these factors, short grass and mid-grass species with wildflowers will comprise the bulk of the seed mix. Compost was added to the topsoil mixture to decrease adverse affects of compaction, and to increase soil fertility and water retention.

The historic plant community for this soil series was a savannah with grazing and fire being the major controlling forces. Switchgrass, yellow indiagrass, big bluestem and little bluestem comprised 30% of the plant community’s annual production. Meadow dropseed, sideoats grama, vine-mesquite and silver bluestem accounted for 20%; wildrye, sedges and Texas wintergrass, 20%; buffalograss, white tridens, Scribner panicum and eastern gamagrass, 10%; woody plants such as live oak, elm, hackberry, pecan, willows, and western soapberry 15%; forbs such as Maximilian sunflower, bundleflower, snoutbean, tickclover and wild bean, 5%. Shade tolerant species including wildrye, sedges and low panicum increase as shade increases. In a deteriorated state, buffalograss, common bermudagrass, Texas grama, ragweed, sumpweeds, annual sunflower, cocklebur, broomweed, beebalm, iceweed and croton dominate the site.

As stated above the grass and forb mixture must consider trampling, access, maintenance, functionality and subsoil limitations. Therefore short and mid grasses were selected.

Xeric-Mesic Grass Mixture, Spring Seeding (100% seeding), ¼ inch depth
(NRCS Irrigated Planting Rate)

<u>Common Name</u>	<u>Scientific Name</u>	<u>% in Mixture</u>
Buffalo Grass	Buchloe dactyloides	40%
Curly Mesquite	Hilaria belangeri	15%
Sideoats Grama	Bouteloua curtipendula	10%
Silver Bluestem	Bothriochloa sacchroides	5%
White Tridens	Tridens albescens	5%
Scribner panicum	Panicum scribneri	5%
Virginia Wildrye	Elymus virginiana	10%
Vine Mesquite	Panicum obtusum	5%
Texas Grama	Bouteloua rigidiseta	3%
Texas Wintergrass	Stipa texanum	1%
Blue Grama	Bouteloua gracilis	2%
Or Hairy Grama	Bouteloua hirsuta	
Uniola, Inland Seoats	Chasmanthium latifolia	10%

Cover crop of legume, oats, and/or millet seeded with mix above
25# to the acre.

Xeric-Mesic Wildflower Mixture (20% of full seeding rate); Fall Interseeding, 1/8 inch depth
(NRCS Non Irrigated Planting Rate)

<u>Common Name</u>	<u>Scientific Name</u>	<u>% in Mixture</u>
Evening Primrose	<i>Calylophus drummondianus</i>	1%
Indian Paintbrush	<i>Castilleja indivisa</i>	1%
Prairie Coneflower	<i>Ratibida columnaris</i>	1%
Mealy Sage	<i>Salvia farinacea</i>	1%
Greenthread	<i>Thelesperma filifolium</i>	1%
Texas Blue Bonnet	<i>Lupinus texensis</i>	3%
Prairie Verbena	<i>Verbena bipinnatifida</i>	3%
Red Gaillardia	<i>Gaillardia amblyodon</i>	2%
Indian Blanket	<i>Gaillardia pulchella</i>	2%
Horsemint	<i>Mondarda citriodora</i>	2%
Englemann daisy	<i>Englemannia pinnatifida</i>	3%