TECHNICAL MEMORANDUM

To: Dan Meyers, URS, DART GPC V - Task Order 4 Project Manager

From: Andrea Weckmueller-Behringer, ATG, Senior Transportation Planner

Date: December 31, 2012

RE: Task 4.10 – Regional Rail Vehicle Storage and Maintenance Facility – Preliminary Inventory
General Planning Consultant (GPC) Services - Dallas Area Rapid Transit (DART)
Contract ID C-1017751-10
Task Order #4: Cotton Belt PE/EIS
URS Project Number: 25338804

Overview

The purpose of this technical memorandum is to provide a preliminary inventory of sites, which were determined to be viable locations for a Vehicle Storage and Maintenance Facility (VSMF) to serve the proposed Cotton Belt rail line. The described effort builds on information gathered in two previous reports written by GPC team members. To create a more comprehensive inventory of sites, five additional locations were identified and more detailed data was gathered for particular sites. However, due to a change in the implementation plan for the project and per client request, a detailed site assessment was not carried out as prescribed in the original scope of the project.

The Cotton Belt corridor traverses both the DART and the Fort Worth Transportation Authority (The T) service areas and would provide a key, east-west regional connection. The T is currently managing the preparation of Preliminary Engineering/Environmental Impact Statement (PE/EIS) documentation for regional rail on the western portion of the Cotton Belt corridor under its TEX Rail program. The eastern portion of the corridor, which lies within the DART Service Area, was identified for development many years ago; the 26-mile segment, between Dallas-Fort Worth International Airport (DFW Airport) and the Red Line in Plano, would link growing employment and activity centers.

DART currently operates two light rail operations and maintenance facilities. The Central Rail Operating Facility is located at the Central Rail Operations division immediately southeast of the Dallas CBD, approximately 17 miles from the Cotton Belt. The Northwest Rail Operating Facility is located at Lombardy Lane and Denton Drive, approximately 6.5 miles south of the Cotton Belt. However, the shared use of these operations and maintenance (O&M) facilities is not possible since a different type of rail vehicle is envisioned for regional rail, and therefore, a facility to service the regional rail vehicles of the proposed Cotton Belt is needed.

Based on a literature review of several rail operations and maintenance yards around the nation, the following basic site requirements for the VSMF site were considered for the Cotton Belt rail corridor:

- Distance to the Cotton Belt corridor
- Site geometry, size, and topography
- Compatibility with surrounding land uses
- Accessibility of the site
- Potential environmental impacts
- Anticipated cost, ease of implementation

1 An unfinished technical memorandum with an initial assessment of VSMF sites, dated June 7, 2011, prepared by URS; and Field Investigation(s) of Potential O&M Facilities Sites, DART/Cotton Belt Regional Rail, dated May 15, 2012, prepared by Stantec.
**Distance from the Cotton Belt Corridor**

An important factor in the location of the VSMF site is the proximity to the main line to promote operational efficiency and minimize non-revenue, deadhead travel for the rail vehicles. In addition, it is preferable that no stations be located between the VSMF site and the terminus of the Cotton Belt rail line for safety reasons and to minimize patron confusion.

**Site Geometry, Size, and Topography**

Ideally, a stub-ended facility should be avoided, as it adds time to the train transfers to or from the main line tracks and increases the chance of a single-point failure. The site should be shaped in such a way that it affords a minimum main line frontage of 1,200 feet and allows for the placement of several parallel straight track sections for switching, coupling, and storage purposes.

Based on the anticipated fleet size, it was estimated that the site should encompass no less than 30 acres to allow for the placement of all functions and operations associated with the VSMF, such as the repair, maintenance, cleaning, and storage of regional rail vehicles, as well as the running and heavy maintenance shops, dispatch center, employee offices, and parking. Maintenance-of-way facilities should be considered as well.

Additionally, level topography is preferred, since it affects the initial site construction cost and has the potential to later impact train access during operation and possibly overall safety; ideally, the VSMF site and the main line track should be within just a few feet of elevation of one another to allow for sufficient line-of-sight distance when entering and leaving the main line.

**Compatibility with Surrounding Land Uses**

The goal is to find a location for the VSMF that is compatible with the current local and nearby land uses and fits well into the surrounding environmental context.

**Accessibility of the Site**

Access to and from the VSMF site should not involve an at-grade crossing of freight tracks, as regional trains’ access to and from the main line could otherwise experience delays.

Location access should also not involve an at-grade crossing of a public roadway to avoid any delays to drivers as well as to eliminate potential safety conflicts.

**Potential Environmental Issues**

As much as possible, environmental impacts should be minimized. It is therefore important to assess if prohibitive environmental issues and challenges are associated with any of the identified sites.

**Anticipated Cost, Ease of Implementation**

It is desirable to keep the number of private property acquisitions necessary for the assembly of the site to a minimum whenever possible. Real estate property assessed values should be considered as well.

**Initial Site Identification**

Based on general size and proximity criteria, the following potential VSMF locations were identified, as shown in Figure 1 and listed in Table 1:
Note: The full extent of all property parcels is shown, although in some cases, acquisition of only a certain portion of the parcel might be needed for the VSMF site.

Figure 1
Cotton Belt Regional Rail - Proposed Vehicle Storage and Maintenance Facility
Potential VSMF Locations

Cotton Belt PE/EIS
Task 4.10 Regional Rail Vehicle Storage and Maintenance Facility (VSMF) – Preliminary Site Inventory
These eleven sites were examined to determine their suitability as the location of a Vehicle Storage and Maintenance Facility for DART’s Cotton Belt regional rail service. The findings are documented in the following sections.

**Initial Site Assessment**

The initial VSMF site assessment reviewed each potential location as to its distance from the Cotton Belt rail corridor, required minimum size, as well as obvious implementation concerns, and overall compatibility with nearby land uses. This analysis was based on a desktop review of compiled Geographic Information Systems (GIS) data, a review of available aerial photography, and a limited-scope field visit. The results are captured in Table 2.
<table>
<thead>
<tr>
<th>Potential Site</th>
<th>Distance to Cotton Belt</th>
<th>Overall Size of affected Parcels&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Acreage available&lt;sup&gt;2&lt;/sup&gt; for a VSMF</th>
<th>Implementation Concerns and Compatibility with surrounding Land Uses</th>
<th>Advanced to Preliminary Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>A – Airport 1</td>
<td>0 miles (Direct Access)</td>
<td>279 acres</td>
<td>71 acres</td>
<td>According to FEMA’s DFIRM&lt;sup&gt;2&lt;/sup&gt;, the easternmost parcel is significantly impacted by floodplain.</td>
<td>Yes</td>
</tr>
<tr>
<td>B – Airport 2</td>
<td>0 miles (Direct Access)</td>
<td>236 acres</td>
<td>118 acres</td>
<td>According to the FEMA’s new DFIRM, 33 acres of the reviewed parcels are within the floodplain.</td>
<td>Yes</td>
</tr>
<tr>
<td>C – Lattimore</td>
<td>0 miles (Direct Access)</td>
<td>30 acres</td>
<td>30 acres</td>
<td>Partially within the floodplain (pending approval of the new DFIRM). Several businesses are currently located on the site.</td>
<td>Yes</td>
</tr>
<tr>
<td>D – Luna Road</td>
<td>0 miles (Direct Access)</td>
<td>56 acres</td>
<td>41 acres</td>
<td>Partially within the floodplain (pending approval of the new DFIRM).</td>
<td>Yes</td>
</tr>
<tr>
<td>E – Mercer Crossing</td>
<td>2.5 miles (Via BNSF)</td>
<td>46 acres</td>
<td>40 acres</td>
<td>Only approachable via BNSF tracks and separated from the main acreage by extensive drainage improvement structures, which would have to be crossed. Located in a proposed business park; anticipated nearby land uses would not be compatible.</td>
<td>No</td>
</tr>
<tr>
<td>F – Existing DCTA ROMF</td>
<td>6.7 miles (Via DCTA/ DGNO)</td>
<td>77 acres</td>
<td>46 acres</td>
<td>Approximately 9 acres of the desired parcel are within the floodplain.</td>
<td>Yes</td>
</tr>
<tr>
<td>G – “Old” Mercer Yard</td>
<td>0 miles (Direct Access)</td>
<td>8 acres</td>
<td>8 acres</td>
<td>Site is too small and bisected by tracks.</td>
<td>No</td>
</tr>
<tr>
<td>H – Near Glidden Building</td>
<td>0 miles (Direct Access)</td>
<td>46 acres</td>
<td>25 acres</td>
<td>Approximately 9 acres of the desired parcel are within the floodplain. The site has no direct street access.</td>
<td>No</td>
</tr>
<tr>
<td>I – Near “New” Mercer Yard</td>
<td>0.1 miles (Via an access spur)</td>
<td>42 acres</td>
<td>42 acres</td>
<td>The location would only offer the placement of a stub-ended site. It is currently occupied by multiple businesses, which has the potential to make acquisition more cumbersome and costly.</td>
<td>No</td>
</tr>
<tr>
<td>J – Zacha Junction</td>
<td>10.9 miles (Via KCS)</td>
<td>80 acres</td>
<td>80 acres</td>
<td>Only approachable via BNSF tracks, this site is also located farthest from the Cotton Belt corridor.</td>
<td>No</td>
</tr>
<tr>
<td>K – Plano</td>
<td>0.25 miles (Direct Access)</td>
<td>32 acres</td>
<td>32 acres</td>
<td>Located directly adjacent to a church.</td>
<td>Yes</td>
</tr>
</tbody>
</table>

<sup>1</sup> The appropriate county appraisal district supplied the listed parcel acreage. GIS measurements supplied the potential site acreages, which in some cases did not take into account the entire parcel depending on the environmental context.

<sup>2</sup> FEMA – Federal Emergency Management Agency; DFIRM – Digital Flood Insurance Rate Map
Based on the initial assessment, five sites were eliminated from further consideration:

- **Site E** – The site would face the following challenges:
  - The site would be located within the Mercer Crossing Business Park development, which is planned to encompass single- and multi-tenant office buildings, upscale retail, urban residential, and hotels. The use of this site as Vehicle Storage and Maintenance Facility for regional rail would therefore not be compatible.
  - Furthermore, the proposed site would require the bridging of several large drainage improvements that reside on parcels belonging to the Valwood Improvement Authority and to the Farmers Branch-Carrollton Flood Control District, thereby increasing construction cost.
  - The site could only be reached via BNSF-owned tracks, which would impact overall accessibility.
  - Acquisition could be more costly, according to the Dallas County Appraisal District’s most recent property valuation.

- **Site G** – The “old” Mercer Yard would not fulfill the minimum size requirement. An expansion of the site beyond the current boundaries would be prohibited by the fact that the site is bordered by a residential area to the south as well as a creek and floodplain to the north; furthermore, it is separated from an undeveloped parcel to the west by a public roadway, and the site would also be bisected by the anticipated relocation of BNSF tracks, required to accommodate the proposed Cotton Belt rail alignment.

- **Site H** – The parcel under consideration is partially occupied by a Glidden building, which would impact acquisition cost. If only the portion of the parcel that does not currently contain any structures would be acquired, it would not fulfill the minimum size requirement. Furthermore, nine acres along the northern boundary of the undeveloped portion of the parcel are within the flood plain.

- **Site I** – The parcels near the “new” Mercer Yard have experienced substantial, new commercial development since the site’s initial evaluation, which could severely impact the cost of acquisition. In addition, the geometry of the proposed site would only allow for the construction of a stub-ended facility, which would affect overall operational efficiency.

- **Site J** – A proposed VSMF site located at the Zacha Junction, would face the following challenges:
  - The Zacha Junction is located 10 miles southeast of the Cotton Belt Corridor, which would add considerably to the cost of operations as well as impact operational efficiency.
  - In addition, the site could only be reached via KCS tracks, which would affect overall accessibility.

**Preliminary Site Inventory**

Per client request, a detailed site assessment was not carried out to the extent prescribed in the scope. However, the six remaining potential VSMF locations underwent a preliminary site analysis, which included an in-depth review of aerial photography, additional GIS analysis, and on-site field investigations to better understand their suitability to accommodate the desired VSMF operations.

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2 Maps showing the location and nearby land use of the eliminated VSMF locations are contained in Appendix A.
Reviewed Site Characteristics

The preliminary findings associated with the proposed sites focused on several important characteristics. For the preliminary site inventory, various data sets were reviewed from a variety of sources and, whenever possible, GIS information was assembled:

- Bing – Aerial Photography
- ESRI – Aerial Photography, County Boundaries, Airport Runways, detailed Hydrology, Rail, and Roadways
- Collin/Dallas/Denton/Tarrant County Appraisal Districts – Parcel Boundaries, Property Ownership, and Parcel Valuation
- Environmental Protection Agency (EPA) – Eco Regions
- Fish and Wildlife Service (FWS) – Ecological Services (see Appendix B)
- Google Earth – Aerial Photography
- North Central Texas Council of Governments (NCTCOG) – City Boundaries, Land Use, Parks, Proposed Cotton Belt Rail Stations, Roadways, Rail, and Trails
- Texas Commission on Environmental Quality (TCEQ) – Superfund Sites
- Texas Historical Commission (THC) – Texas Historic Sites Atlas
- Texas Natural Resources Information System (TNRIS) – Elevation and Flood Insurance Rate Map (FIRM)
- Texas Parks and Wildlife Department (TPWD) – Texas Natural Diversity Database (TXNDD) (also see Appendix C)

The process of the preliminary evaluation is described in the following subsections.

Size

Using aerial photography and the appropriate county appraisal data, the acreage of the considered parcels was calculated and confirmed.

Please note: All sites included in this preliminary site inventory fulfilled the minimum size requirement of 30 acres.

Geometry/site configuration

Potential site layout challenges were evaluated through field investigation, preceded by an in-depth review of aerial photography as well as GIS information regarding limitation due to elevation and floodplain location. The approximate acreage available for each proposed VSMF location was based on GIS measurements.

Current use

A review of aerial photography, analysis of land use and real estate parcel GIS layers, as well as field investigations confirmed current land use and location of existing businesses for the site inventory.

Nearby use

Similar to the sites’ current use determination, aerial photography, land use and parcel data, as well as field investigations were employed to confirm the land use on nearby properties.
Potential for future expansion
A review of parcel and land use layers, as well as elevation and flood plain information was used to determine whether a site could be expanded if need arose in the future.

Proximity to Cotton Belt corridor
Site proximity to the Cotton Belt corridor was based on measurement of the appropriate GIS layers.

Proximity to TEX Rail
It is possible that The T’s future VSMF operations would share a site with DART’s Cotton Belt rail service. As such, a discussion of the proximity of each site to the point, where DART’s and The T’s anticipated TEX Rail service would meet, is included in the site inventory. The distance shown was based on the anticipated station location and GIS measurements.

Site accessibility
Aerial photography and field observations were used to determine if public roadways and/or freight rail tracks would have to be crossed in order to access the proposed VSMF sites.

Track Condition
Track conditions were not assessed as part of the conducted field investigation. Therefore, a detailed evaluation prior to the final selection of a VSMF site is recommended to determine the extent of needed track improvements.

Preliminary Environmental Concerns
Please note: This document is not sufficient to make a final determination for a VSMF location for DART’s Cotton Belt rail service. This initial, limited-scope, desk-top environmental review must be expanded to include detailed investigations, before the final site is determined.

GIS data was used to determine the proposed locations’ proximity to superfund sites.

County-specific data on rare, threatened, or endangered plant or animal species was obtained, along with information regarding parkland, in order to proactively avoid or at least minimize potential environmental impacts.

Bicycle and recreational trail information was compiled and included in the GIS analysis of the sites.

Historical and archeological resources were also reviewed; and while no formal review of historic properties was conducted, a review of THC Atlas’ public database information found nothing that would indicate that any of the sites have a historic designation.

Anticipated ease of implementation
For each site, the number of parcels and their current owner as well as the most recent property valuation was identified based on the appropriate appraisal district’s records. This effort was undertaken to gauge the degree of difficulty and number of stakeholders that would be involved in the acquisition process, as well as the anticipated cost associated with the purchase of the needed parcels.

Table 3 summarizes the results of the preliminary VSMF site inventory and the pages thereafter give additional details concerning each proposed site.
<table>
<thead>
<tr>
<th></th>
<th>A – Airport 1</th>
<th>B – Airport 2</th>
<th>C – Lattimore</th>
<th>D – Luna Road</th>
<th>F – DCTA ROMF</th>
<th>K – Plano</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General Location Information</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>City County</td>
<td>Grapevine, Tarrant County</td>
<td>Grapevine, Tarrant County</td>
<td>Coppell, Dallas County</td>
<td>Carrollton, Dallas County</td>
<td>Lewisville, Denton County</td>
<td>Plano, Collin County</td>
</tr>
<tr>
<td>Major intersection and approximate location</td>
<td>E Wall Street and Texan Trail; 1150 E Wall Street, Grapevine</td>
<td>E Dallas Road and Texan Trail; 1 DFW Airport, Grapevine</td>
<td>Belt Line Road and Fairway Drive; 1523 E Belt Line Road, Coppell</td>
<td>Belt Line Road and Luna Road; 1650 W Belt Line Road, Carrollton</td>
<td>SH 121 Business and S Railroad Street; 640 SH 121 Business, Lewisville</td>
<td>14th Street and Los Rios Boulevard: 4000 14th Street, Plano</td>
</tr>
<tr>
<td><strong>General Site Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approximate size</td>
<td>279 acres</td>
<td>236 acres</td>
<td>30 acres</td>
<td>56 acres</td>
<td>77 acres</td>
<td>32 acres</td>
</tr>
<tr>
<td>Available for VSMF</td>
<td>71 acres</td>
<td>118 acres</td>
<td>30 acres</td>
<td>41 acres</td>
<td>46 acres</td>
<td>32 acres</td>
</tr>
<tr>
<td>Main line frontage</td>
<td>4,970 feet</td>
<td>3,600 feet</td>
<td>1,990 feet</td>
<td>2,180 feet</td>
<td>2,630 feet</td>
<td>2,060 feet</td>
</tr>
<tr>
<td>Current use</td>
<td>Undeveloped; gas wells on site; gas pipeline</td>
<td>Undeveloped; gas well on site</td>
<td>Occupied by several businesses; gas pipeline, sewers line</td>
<td>Undeveloped; gas pipeline</td>
<td>Existing rail operations and maintenance facility</td>
<td>Undeveloped</td>
</tr>
<tr>
<td>Compatibility with surrounding land use</td>
<td>Moderate to high</td>
<td>High</td>
<td>Low to moderate</td>
<td>High</td>
<td>High</td>
<td>Moderate</td>
</tr>
<tr>
<td>Area available for expansion</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Limited</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Proximity and Accessibility</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proximity to main line</td>
<td>Direct access</td>
<td>Direct access</td>
<td>Direct access</td>
<td>Direct access</td>
<td>6.7 miles via DCTA/DGNO tracks</td>
<td>0.25 miles east of eastern terminus</td>
</tr>
<tr>
<td>Proximity to TEX Rail</td>
<td>&lt; 0.5 miles</td>
<td>0 miles</td>
<td>6.5 miles</td>
<td>8 miles</td>
<td>15.5 miles</td>
<td>26 miles</td>
</tr>
<tr>
<td>Local roadway access</td>
<td>More than one access road</td>
<td>One access road</td>
<td>Limited accessibility – one driveway, which crosses tracks</td>
<td>More than one access road</td>
<td>One access road</td>
<td>More than one access road</td>
</tr>
<tr>
<td>Highway and interstate access</td>
<td>Within 0.5 miles</td>
<td>Within 0.5 miles</td>
<td>Within 1.6 miles</td>
<td>Within 0.5 miles</td>
<td>Within 1 mile</td>
<td>Within 3 miles</td>
</tr>
<tr>
<td>At-grade roadway crossing</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Freight tracks crossed</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
### Table 3
Cotton Belt Regional Rail - Proposed Vehicle Storage and Maintenance Facility
Vehicle Storage and Maintenance Facility – Preliminary Site Inventory

<table>
<thead>
<tr>
<th>A – Airport 1</th>
<th>B – Airport 2</th>
<th>C – Lattimore</th>
<th>D – Luna Road</th>
<th>F – DCTA ROMF</th>
<th>K – Plano</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Environmental Concerns</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Flood Plain</strong></td>
<td>Flood plain is located east of proposed site.</td>
<td>The eastern portion of the proposed site is slightly impacted by flood plain.</td>
<td>Partially in the floodplain (pending approval of the new DFIRM).</td>
<td>Partially in the floodplain (pending approval of the new DFIRM).</td>
<td>Approximately 9 acres are in the floodplain.</td>
</tr>
<tr>
<td><strong>Elevation</strong></td>
<td>Site gently rises to the west; elevation difference between the proposed site and the rail line is minimal.</td>
<td>Site gently rises to the west; elevation difference between the proposed site and the main line is minimal.</td>
<td>Site is visibly lower than built-up rail line.</td>
<td>Portions of the site seem to have been artificially built up with material of unknown origin; site is visibly lower than rail line in the west.</td>
<td>Site rises to the west; there is minimal elevation difference between existing facility and main line tracks.</td>
</tr>
<tr>
<td><strong>Historic and archeological resources</strong></td>
<td>No entries were found in the public THC database within 0.5 miles.</td>
<td>No entries were found in the public THC database within 0.5 miles.</td>
<td>No entries were found in the public THC database within 0.5 miles.</td>
<td>Site was environmentally cleared prior to construction of existing facility.</td>
<td>No entries were found in the public THC database within 0.5 miles.</td>
</tr>
<tr>
<td><strong>Limited field observations</strong></td>
<td>Partial grassland, woodland, and shrubs; creek</td>
<td>Grasland and woodland; creek</td>
<td>Wooded area in NW corner; SE corner adjacent to river</td>
<td>Creek adjacent to eastern edge; mostly cleared, some shrubs</td>
<td>Mostly cleared, some shrubs</td>
</tr>
<tr>
<td><strong>Ease of Implementation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Existing businesses</strong></td>
<td>Gas wells</td>
<td>Gas well</td>
<td>Several businesses are currently located on the site</td>
<td>(None)</td>
<td>(n/a)</td>
</tr>
<tr>
<td><strong>Number of owners (number of parcels)</strong></td>
<td>5 (5)</td>
<td>2 (4)</td>
<td>5 (5)</td>
<td>4 (6)</td>
<td>1 (2)</td>
</tr>
<tr>
<td><strong>Recent valuation</strong></td>
<td>$10.61 million for three out of five parcels (valuation for airport parcels not disclosed)</td>
<td>Unknown (valuation for airport parcels not disclosed)</td>
<td>$1.59 million</td>
<td>$0.97 million</td>
<td>(n/a)</td>
</tr>
</tbody>
</table>
Site A - Airport 1

Site A, consisting largely of airport-held properties, would provide sufficient space for the location of the proposed VSMF site. Four gas wells are located on the parcels under review, but are outside of the proposed site boundary. The remainder of the parcels is undeveloped. The site possesses extensive main line frontage and has the advantage of being located at the end of the line, thus minimizing dead-head travel and patron confusion.

Site A is located less than 2.5 miles northwest of the nearest airport terminal. Immediately west of this site, along Texan Trail Road, is mostly undeveloped land with dispersed new commercial development stretching from Coppell Road south. The area north of Coppell Road includes a relatively new waterpark and a hotel. Immediately southwest of the site are warehousing and trucking facilities.

The proposed Airport 1 site would be located directly adjacent to the Cotton Belt corridor and within immediate proximity to the anticipated west-bound TEX Rail service, which would be provided by The T. Site A would be particularly conducive to a co-location of The T’s and DART’s VSMF operations, as the site is located just north of the proposed Airport North Station, which would be shared by both rail services.

Access to the proposed Airport 1 site is provided by Texan Trail and E Wall Street. Texan Trail offers convenient access to State Highways (SH) 26, 114, and 121. The site is also in close proximity to Interstate (I) 635, which can be accessed via SH 121 to the east.

The reviewed parcels would provide sufficient area if a future expansion of the proposed VSMF site was desired.

The initial, limited-scope, desk-top environmental review did not reveal any major environmental concerns. However, these preliminary observations are not sufficient to make a final determination for a VSMF location for DART’s Cotton Belt rail service. A list of rare, endangered, or threatened plant and animal species is provided in Appendices B and C respectively, but specific field investigations to confirm their occurrence were not conducted at the time of the site visit. Care must also be taken with the underground gas pipeline that was observed.

The Airport 1 site is currently undeveloped, with the exception of four gas wells. The property valuation of the airport-owned parcels was not disclosed in the appraisal district’s records and the valuation of the other affected parcels, which accounted for three out of five parcels under consideration, totaled a combined $10.61 million. However, only portions of these parcels would be needed for the siting and construction of a fully functional VSMF site. Close coordination with DFW Airport is needed to ensure that a potential VSMF site and associated operations would not interfere with airplanes approaching the runways.

Figure 2 below and the photographs listed on the pages thereafter show the Airport 1 site in detail.
Figure 2
Cotton Belt Regional Rail - Proposed Vehicle Storage and Maintenance Facility
Site A - Airport 1
Task 4.10 Regional Rail Vehicle Storage and Maintenance Facility (VSMF) – Preliminary Site Inventory

- Site A - W of Site A - looking N - rail crossing over Texan Trail
- Site A - W of Site A - looking WSW - Grapevine Station Medical Buildings
- Site A - NW corner of Site A - Wall St., E of Texan Trail - looking SE
- Site A - NW corner of Site A - Wall St., E of Texan Trail - looking S - rail crossing in the background
- Site A - Wall St., E of Texan Trail, S of Wolf Lodge - looking S - view of gas well
- Site A - Wall St., E of Texan Trail - looking SW
Site A - Wall St., E of Texan Trail - looking NW - view of Wolfe Lodge

Site A - Wall St., E of Texan Trail - looking N - view of Wolfe Lodge and water park in the background

Site A - Gate on Wall St., S of Wolfe Lodge - looking SE - Airport Property

Site A - Gate on Wall St., S of Wolfe Lodge - looking E

Site A - Wall St., E of Texan Trail - looking S - gas well in the background

Site A - Gate on Wall St., S of Wolfe Lodge - looking E - Airport Property
Task 4.10 Regional Rail Vehicle Storage and Maintenance Facility (VSMF) – Preliminary Site Inventory

Site A - Gate on Wall St., S of Wolfe Lodge - looking NE - Airport Property, gas line marker and approaching airplane (as marked by the red circle)

Site A - Gate on Wall St., S of Wolfe Lodge - looking SE - Airport Property, drilling activity in the background

Site A - E of Site, A Royal Ln. N of Cotton Belt rail corridor - looking W

Source: ATG, 2012
Site B - Airport 2

Consisting entirely of airport-held properties, Site B would provide ample space for the location of the proposed VSMF site. The parcels under review are currently undeveloped, with the exception of one gas well, which is located within the proposed site boundary and would require the access tracks to be constructed so as to not interfere with the existing well. Site B possesses extensive main line frontage and also has the advantage of being located at the end of the line, thus minimizing dead-head travel and patron confusion.

The Airport 2 site would be located on the same parcel as the proposed Airport North Station and within two miles of the nearest airport terminal. Immediately west of this site, along Texan Trail Road, warehousing/trucking facilities are located. North, east, and south of the proposed site, additional airport parcels are located.

Site B would be located directly adjacent to the Cotton Belt corridor and within immediate proximity to the anticipated west-bound TEX Rail service, which would be provided by The T. Like Site A, the Airport 2 site would be equally conducive to a co-location of The T’s and DART’s VSMF operations, as the site is located directly adjacent to the proposed Airport North Station, which would be shared by both rail services.

Access to the Site B is provided by Texan Trail, via E Dallas Road. Texan Trail offers convenient access to SH 26, 114, and 121. The site is also in close proximity to I-635, which can be accessed via SH 121 to the east.

Just as the Airport 1 site, Site B would provide sufficient area if a future expansion of the proposed VSMF site was desired.

The initial, limited-scope, desk-top environmental review did not reveal any major environmental concerns. However, these preliminary observations are not sufficient to make a final determination for a VSMF location for DART’s Cotton Belt rail service. A continuation of the underground gas pipeline marked on Site A is likely.

The Airport 2 site is currently undeveloped, with the exception of one gas well. The property valuation of the airport-owned parcels was not disclosed in the appraisal district’s records. Two of the reviewed parcels would be needed in their entirety, whereas only portions of the remaining two would be required for the siting and construction of a fully functional VSMF site. Since the anticipated Airport North Station would be co-located on one of the parcels in question, property acquisition efforts could cover both the purchase of land for the station area as well as the land acquisition required for the proposed VSMF location. As with Site A, close coordination with DFW Airport is needed to ensure that a potential VSMF site and associated operations would not interfere with airplanes approaching the runways.

Figure 3 below and the photographs listed on the pages thereafter show the Airport 2 site in detail.
Figure 3
Cotton Belt Regional Rail - Proposed Vehicle Storage and Maintenance Facility
Site B - Airport 2
Site B - Gate on Dallas Rd., S of Challenger Freight Systems - looking NE

Site B - Gate on Dallas Rd., S of Challenger Freight Systems - looking E

Site B - W of Site B (also south of Site A) - looking E - Towne Air Freight

Source: ATG, 2012
**Site C - Lattimore**

The Lattimore site is the smallest of all proposed locations at approximately 30 acres. The use of the site would require considerable grading and build-up, as it is neither level across its length, nor is it at the same elevation as the main line track. In most areas, the Cotton Belt corridor is approximately ten feet higher than the site itself. The site possesses the shortest main line frontage of all locations included in the detailed evaluation.

The site is currently home to several businesses, including Lattimore Materials and Yucatan Beach Club. It is hemmed in on the east by a steep river bank; the Cotton Belt rail corridor represents its southern boundary, beyond which a mini storage is located; to the west, the terrain is marked by a significant drop and the rail line is elevated in that area; the site is also bordered on the north and west by a golf course and related, extensive residential areas. Given the surrounding developments and terrain restraints, this site could not accommodate a future expansion.

The Lattimore site has direct Cotton Belt corridor access and is located approximately 6.5 miles from The T’s proposed TEX Rail service. At this time, it can only be reached via a driveway that has to cross the mainline tracks, which greatly impacts its accessibility. Site C is located a short distance from President George Bush Turnpike.

The initial, limited-scope, desk-top environmental review did not reveal any major environmental concerns. However, these preliminary observations are not sufficient to make a final determination for a VSMF location for DART’s Cotton Belt rail service. It should be noted that, according to field observations made at the site, a gas transmission line and a sewer line seem to run parallel to the Cotton Belt rail corridor right-of-way. A large portion of the site is currently shown as being in the flood plain. Although approval has been delayed, new DFIRM information from FEMA could provide additional insight.

Anticipated ease of implementation would be lower in comparison, as not only terrain challenges would have to be dealt with, but use of this site would also require the relocation of several businesses. According to the most recent appraisal values, the five parcels have a combined valuation of $1.59 million.

**Figure 4** below and the photographs listed on the pages thereafter show the Lattimore site in detail.
Figure 4
Cotton Belt Regional Rail - Proposed Vehicle Storage and Maintenance Facility
Site C - Lattimore

[Map of proposed vehicle storage and maintenance facility at Site C - Lattimore]
Site C - NE of Belt Line Rd. and Fairway Dr. intersection - looking E - elevated rail line, Site C visible in the background

Site C - N of Belt Line Rd. and E of Fairway Dr. - looking E - elevated rail line

Site C - N of Belt Line Rd. and E of Fairway Dr., W of Site C - looking E - gas pipeline marker

Site C - SW corner of Site C - looking N - sewer line marker

Site C - SW corner of Site C - looking NW - near gas pipeline and sewer line

Site C - S boundary of Site C - looking ENE - elevation difference visible to the left and debris deposited in low spot on the right
Site C - S boundary of Site C - looking E - close up of debris

Site C - S boundary of Site C - looking N - close up of elevation difference

Site C - View of Site C from across Belt Line Rd. near mini storage - looking NNW - close up of elevation difference between track and mineral storage visible

Site C - View of Site C from across Belt Line Rd. near mini storage - looking NE - elevation difference near site center

Site C - SE corner of Site C - looking SE - view of Trinity River rail bridge

Site C - SE corner of Site C - looking E - view of gas pipeline just N of Trinity River rail bridge
Site C - SE corner of Site C - looking W - view of buildings on site, note the rise in elevation

Site C - SE corner of Site C - looking NW - close-up of business signs

Site C - center of Site C - looking NW - close-up of business sign

Site C - Western edge of Yucatan Beach parking area - looking NW - view of RM Rock Materials

Site C - Western edge of Yucatan Beach parking area - looking W - view of RM Rock Materials driveway

Site C - Western edge of Yucatan Beach parking area - looking S - view of elevation difference to main line track

Source: ATG, 2012
Site D - Luna Road

The Luna Road site would provide sufficient space with approximately 41 acres. The site possesses adequate main line frontage. The use of this site as the proposed VSMF location would require grading and additional build-up, as it is sits lower than the main line track, particularly at the site's west end. The Luna Road site is currently undeveloped. The smaller, western-most parcel was for sale at the time of the field investigation (October 2012), as was the small, northeastern parcel. A gas line was observed near the railroad right-of-way in the southwest corner of the proposed site.

The Luna Road site is flanked on the north and east by industrial area; a church and private school are found just south of Belt Line Road, and President George Bush Turnpike is located just across Luna Road to the west.

The site has direct Cotton Belt corridor access and is located eight miles away from the anticipated TEX Rail service to be provided by The T. The site can be easily accessed from both Luna Road as well as Capital Drive. The highway and interstate system is located within close proximity and can be reached via Luna Road, giving this site excellent accessibility.

A future expansion could be accommodated, but would require major drainage improvements and build-up of the northern parcel to allow access to an additional 15 acres, of which 12 acres are currently impacted by surface water.

It should be noted that, based on field observations at the site, a gas transmission line runs parallel to the Cotton Belt rail corridor right-of-way. The site also seems to have been built-up in several locations to raise it above the base flood plain; the material used in that process is of unknown origin and further investigation is recommended. A large portion of the site is currently shown as being in the flood plain. Although approval has been delayed, new DFIRM information from FEMA could provide additional insight. The initial, limited-scope, desk-top environmental review did not reveal any additional major environmental concerns. However, these preliminary observations are not sufficient to make a final determination for a VSMF location for DART’s Cotton Belt rail service.

The six parcels comprising the Luna Road site are owned by two individuals and two property developers. The combined valuation is $0.97 million. Two of the parcels were for sale at the time of the field investigation.

Figure 5 below and the photographs listed on the pages thereafter show the Luna Road site in detail.
Figure 5
Cotton Belt Regional Rail - Proposed Vehicle Storage and Maintenance Facility
Site D - Luna Road

41 Acres
Main Line Frontage 2180 feet
Site D - SW corner of Site D - looking NE - for sale sign and elevation difference to northern parcel visible

Site D - SW corner of Site D - looking N - additional for sale sign

Site D - SW corner of Site D - looking E - in the background, build-up of neighboring parcel is visible

Site D - SW corner of Site D - looking SE - elevation difference between this and the neighboring parcel visible

Site D - SW corner of Site D - looking SE - gas pipeline, main line tracks visible in tree gap

Site D - S of Crescent Dr. and W of Capital Dr. - looking W - parcel used for storage by nearby business
Site D - S of Crescent Dr. and E of Capital Dr. - looking E - for sale sign on undeveloped land

Site D - S of Crescent Dr. and E of Capital Dr. - zoomed image of for sale sign on northeastern parcel

Site D - N of Capital Dr. - looking N - built-up area just behind the industrial buildings fronting on Capital Dr.

Site D - Capital Dr. in center of Site D - looking W - shrubs mark drop-off to the right

Site D - N of Capital Dr. in center of site - looking N - view of surface water

Site D - N of Capital Dr. in center of site - looking N - +/- 5ft elevation difference between roadway and water feature
Site D - N of Capital Dr. in center of site - looking N - elevation difference from roadway to built-up area of northwestern parcel, concrete chunks (possible fill material) visible

Site D - Capital Dr. in center of site - looking W - parcel rises slightly, but not all the way to Luna Rd, President George Bush Turnpike in the background

Site D - S of Capital Dr. in center of site - looking S - elevation difference from one parcel to the next

Site D - S of Capital Dr. just east of site center - looking S - with rail tracks just beyond the tree line in the background

Site D - S of Capital Dr. just east of site center - looking SE - with rail tracks just beyond the tree line in the background

Site D - Capital Dr. just south of small parcel used for storage - looking W – trash and old tires

Source: ATG, 2012
Site F - DCTA ROMF

The DCTA site is the home of the existing Denton County Transportation Authority’s (DCTA) Rail Operations and Maintenance Facility (ROMF). The two large tracts comprise 77 acres in total. The eastern parcel measures 46 acres and encompasses the 41,000 square foot maintenance building. The large building is home to offices, a crew room, and the TRE back-up dispatch on its upper floor, whereas the main floor houses a staff break room and the maintenance shop, which contains the maintenance pits for both rail diesel car (RDC) and Stadler’s “gelenktriebwagen” (GTW) vehicles, along with a catwalk and a turntable. Light daily maintenance, washing, and fueling of the DCTA rail vehicles can also be performed in the smaller, covered pit, located just south of the fully enclosed maintenance building. The DCTA site possesses a more than adequate main line frontage, along with 3 separate storage tracks, totaling over 5,800 feet in vehicle storage space.

Nearby land use consists of a mobile home park to the west, undeveloped land to the south, largely industrial use to the east and north, as well as a small residential area southeast of the site.

The DCTA site can only be accessed via DGN0-owned tracks and is situated about 6.7 miles north of the Cotton Belt corridor. The site is located approximately 15.5 miles from The T’s anticipated TEX Rail service. The site has one access road, and excellent connections to the highway and interstate system, with SH 121 (Business) located just north of the site, and I-35E less than one mile to the west of the location.

The DCTA ROMF location was designed with extra capacity in mind, which would allow the co-location of DART’s Cotton Belt VSMF operations. A potential future expansion would have to take into consideration the site’s flood plain, which is impacting the area southwest of the current maintenance building and storage tracks.

Site F is the current home of DCTA Rail Operations and Maintenance Facility. As such, the site has already undergone environmental clearance, and additional environmental impacts associated with the location of DART’s Cotton Belt VSMF operations are not anticipated.

A mutual agreement would have to be reached with DCTA concerning the use of the facility by DART’s Cotton Belt regional rail vehicles. At this time, the DCTA ROMF already houses a back-up dispatch center for the TRE rail service and has indicated that a co-location of DART regional rail maintenance activities would be considered favorably.

Figure 6 below and the images on the pages thereafter show the DCTA site in detail.
Site F - N side of DCTA ROMF - looking E towards S Railroad St. - drainage structure

Site F - W side of the ROMF yard - looking ENE - view of the maintenance building, train entrances, stored rail vehicle, and parking area

Site F - W side of the ROMF yard - looking SE - view of the maintenance building, train entrances, stored rail vehicle, and parking area

Site F - N of DCTA ROMF, across the rail tracks on S Railroad St. - looking S - main line tracks are shown in the foreground and maintenance-of-way storage area is visible in the back

Site F - W side of the ROMF yard, N of drainage structure - looking W - view of debris outside of ROMF enclosure fence

Site F - W side of the ROMF yard, N of drainage structure - looking W - view of debris outside of ROMF enclosure fence

Site F - N of DCTA ROMF, across the rail tracks on S Railroad St. - looking S - main line tracks are shown in the foreground and maintenance-of-way storage area is visible in the back

Source: ATG, 2012
Site K - Plano

The Plano site is the second smallest with approximately 32 acres. It has a unique configuration, which can generally be described as a squat and wide “U” shape, and thus would require an innovative facility layout to allow accommodation of all required VSMF functions. The site possesses sufficient main line frontage and has the advantage of being located at the end of the line, thus minimizing dead-head travel and patron confusion.

Site K is currently undeveloped and would be moderately compatible with nearby parcels, which are occupied by commercial and light industrial uses to the south, commercial establishments to both the west and east, as well as a church just west of the site; extensive residential areas are located to the north of the proposed location and Geomap Company is tucked into the middle of the “U” shaped site along the northern boundary of the proposed location.

The Plano site is located just 1,150 feet east of the Cotton Belt corridor’s eastern terminus at Shiloh Road. It is located farthest from The T’s anticipated TEX Rail service – approximately 26 miles.

The site can be easily accessed from both 14th Street as well as Los Rios Boulevard. No at-grade crossings of public roadways or freight tracks would be required. The Plano site is also located just north of Plano Parkway. Plano Parkway is a designated truck route that provides direct east-west access to and from U.S. Highway (US) 75. US 75 is located approximately 3.3 miles west of the site. Access to President George Bush Turnpike is available approximately 2.5 miles to the south via Shiloh Road.

As the site is boxed in on three of four sides, expansion potential would be limited to the parcels located just west of the proposed site, which are currently owned by Sehion Mar Thoma Church (approx. 1.5 acres south of the current church building) and Dai Bi Buddhist Center (approx. 6.2 acres). These additional areas would expand the site to create a W-shaped parcel that would only be useful if the facility expansion would be inventive in design as well.

The initial, limited-scope, desk-top environmental review did not reveal any major environmental concerns. However, these preliminary observations are not sufficient to make a final determination for a VSMF location for DART’s Cotton Belt rail service.

This site is currently undeveloped; at the time of the two field visits (June 2011 and December 2012), signs along Los Rios Boulevard indicated that a portion of the property (23 acres), is for sale. The combined market value of both parcels under consideration is set at just under $3.19 million (2012 valuation).

Figure 7 below and the photographs listed on the pages thereafter show the Plano site in detail.
Figure 7
Cotton Belt Regional Rail - Proposed Vehicle Storage and Maintenance Facility
Site K - Plano
Site K - NW corner of site - looking W along 14th St.

Site K - NW corner of site - looking E along 14th St.

Site K - NW corner of site - looking SW - church located on the W property line (right side of photo)

Site K - Corner of Geomap Ln. - looking N toward 14th St. - residential properties to the N and Geomap Company to the E

Site K - Corner of Geomap Ln. and Contour Ln. - looking N – W side of Geomap Company

Site K - Corner of Geomap Ln. and Contour Ln. - looking SE - warehouses (in the background) located just south of the rail line (south property line)
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Site K - Corner of Geomap Ln. and Contour Ln. - looking E

Site K - Corner of 14th St. and Contour Ln. - looking SE

Site K - Corner of 14th St. and Los Rios Blvd. - looking S - bank located on SE corner of intersection, adjacent to the potential VSMF shop

Site K - E of Los Rios Blvd. - looking S - approaching at-grade rail crossing, Los Rios Blvd. is the E property line (site is off to the right in this photo)

Site K - SE of site - looking W at potential VSMF site - rail line (at-grade crossing) at Los Rios Blvd.

Site K - W of site - for sale sign on site along Los Rios Blvd.
Site K - S property line (rail line) - looking NE

Site K - S property line (rail line) - looking E – warehousing and trucking facilities located just S of rail line (right side of photo)

Site K - S property line (rail line) - looking NW

Site K - S property line (rail line) - looking N

Source: The pictures depicting Site K were originally shown in the unfinished technical memorandum prepared by URS, dated June 7, 2011.
**Conclusion**

The primary purpose of this memorandum was (a) to review and combine information compiled in two previous reports\(^4\) written by GPC team members, (b) to identify additional sites that had not yet been investigated, as well as (c) to gather data about select potential locations for a preliminary site inventory.

Due to a change in the implementation plan for the project, the GPC team was asked to halt ongoing work and document all preliminary engineering results and environmental assessment findings to date, including this inventory of potential VSMF locations.

To that effect, this technical memorandum provides a list of eleven potential Vehicle Storage and Maintenance Facility locations and a site inventory of those six potential VSMF sites along the Cotton Belt corridor that should be further investigated. Per client request, a detailed site assessment was not carried as prescribed in the original scope of the project.

The next step should be a detailed study, conceptual VSMF site layouts, and additional environmental review, which would result in the ranking of the discussed sites, based on their respective feasibility, leading to the final determination of the VSMF site for DART’s Cotton Belt regional rail service.

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\(^4\) An unfinished technical memorandum with an initial assessment of VSMF sites, dated June 7, 2011, prepared by URS; and *Field Investigation(s) of Potential O&M Facilities Sites, DART/Cotton Belt Regional Rail*, dated May 15, 2012, prepared by Stantech.
Appendix A

Maps of Potential Sites, eliminated after the initial assessment
Figure A-1
Cotton Belt Regional Rail - Proposed Vehicle Storage and Maintenance Facility
Site E - Mercer Crossing
Figure A-2
Cotton Belt Regional Rail - Proposed Vehicle Storage and Maintenance Facility
Site G - “Old” Mercer Yard

Cotton Belt PE/EIS
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Figure A-3
Cotton Belt Regional Rail - Proposed Vehicle Storage and Maintenance Facility
Sites H and I - Near Glidden Building and "New" Mercer Yard

25 Acres
Main Line Frontage 1165 feet

42 Acres
Main Line Frontage 0 feet

[Diagram of Cotton Belt Regional Rail - Proposed Vehicle Storage and Maintenance Facility Sites H and I - Near Glidden Building and "New" Mercer Yard]
Figure A-4
Cotton Belt Regional Rail - Proposed Vehicle Storage and Maintenance Facility
Site J - Zacha Junction
Appendix B

List of Endangered or Threatened Species, Collin, Dallas, Denton, and/or Tarrant Counties
Back to Start

List of species by county for Texas:

Counties Selected: Collin, Dallas, Denton, Tarrant

Select one or more counties from the following list to view a county list:

- Anderson
- Andrews
- Angelina
- Aransas
- Archer

View County List

Collin County

**Whooping Crane (Grus americana)**

**Dallas County**

- Black-capped Vireo (Vireo atricapilla)
- Golden-cheeked Warbler (Dendroica chrysoparia)

- Least Tern (Sterna antillarum)
- Piping Plover (Charadrius melodus)
- Whooping Crane (Grus americana)

Denton County

- Least Tern (Sterna antillarum)
- Piping Plover (Charadrius melodus)
- Whooping Crane (Grus americana)

Tarrant County

- Least Tern (Sterna antillarum)
- Whooping Crane (Grus americana)

Last updated: November 1, 2012

http://www.fws.gov/southwest/es/ES ListSpecies.cfm

12/26/2012

Cotton Belt PE/EIS

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Appendix C

List of Rare Plants,
Collin, Dallas, Denton, and/or Tarrant Counties
<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Rank*</th>
<th>Status**</th>
<th>Family</th>
<th>Distribution***</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Hexalectris warnockii</em></td>
<td>G2 G3</td>
<td>S2</td>
<td>ORCHIDACEAE</td>
<td>Dallas County</td>
</tr>
<tr>
<td>Warnock's coral-root</td>
<td></td>
<td></td>
<td>Orchid Family</td>
<td></td>
</tr>
<tr>
<td><em>Yucca neocarpa</em></td>
<td>G1 G2</td>
<td>S1 S2</td>
<td>AGAVACEAE</td>
<td>Dallas (H), Denton, and Tarrant Counties</td>
</tr>
<tr>
<td>Glen Rose yucca</td>
<td></td>
<td></td>
<td>Agave Family</td>
<td></td>
</tr>
</tbody>
</table>

**Explanation of Terms and Symbols**

*Rank - Two ranking categories are provided for each plant as follows:

Global Rank (denoted by G and a number or letter)

G1 = less than 6 occurrences known globally; critically imperiled, especially vulnerable to extinction
G2 = 6-20 occurrences known globally; imperiled and very vulnerable to extinction throughout its range
G3 = 21-100 occurrences known globally; either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range (e.g., a single state or physiographic region), or because of other factors making it vulnerable to extinction throughout its range
G4 = more than 100 occurrences known; apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery
G5 = demonstrably secure globally, though it may be quite rare in parts of its range, or GH = of historical occurrence throughout its range, i.e., formerly part of the established biota, with expectation that it may be rediscovered

State Rank (denoted by S and a number or letter)

S1 = less than 6 occurrences known in Texas; critically imperiled in Texas; especially vulnerable to extirpation from the state
S2 = 6-20 known occurrences in Texas; imperiled in the state because of rarity; very vulnerable to extirpation from the state
S3 = 21-100 known occurrences in Texas; either rare or uncommon in the state
S4 = more than 100 occurrences in Texas; apparently secure in the state, though it may be quite rare in some areas of the state
S5 = demonstrably secure in Texas
SH = historical in Texas, not verified within the past 40 years but suspected to be extant
SR = reported from Texas in literature but not verified via specimens or field observations
SX = presumed extirpated from Texas

A global or state rank followed by "Q" indicates that the taxonomic status of the plant is a matter of conjecture.
A rank followed by "*" indicates that the rank is not certain. A "*" subrank following a global rank denotes the rank for subspecific taxa.
Two G or S ranks together (G2G3; S1S2; etc.) indicate that the plant is borderline between the ranks.
**Status - Two status categories are provided for each plant as follows:**

Federal Legal Status (according to the United States Fish & Wildlife Service)

- LE = federally listed as an endangered plant
- LT = federally listed as a threatened plant
- PE = proposed to become listed as endangered
- PT = proposed to become listed as threatened
- C = category 1 candidate for listing as threatened or endangered
- PDL = proposed to be delisted
- DL = delisted

State Legal Status (according to the Texas Parks & Wildlife Department)

- E = listed as a state endangered plant
- T = listed as a state threatened plant

***Distribution

Abbreviations for states in the U.S. are those of the U.S. Postal Service. Alphabetical qualifiers following counties or states are defined as follows:

- H = historical (not observed or collected within 50 years); I = introduced; M = misidentification; R = reported but not verified by the authors of this list; X = presumed extirpated; and ? = questionable locality or identification.

This list is produced jointly by the Wildlife Diversity Program of the Texas Parks and Wildlife Department and the Texas Conservation Data Center of The Nature Conservancy of Texas. It is reviewed periodically and necessary revisions are incorporated. Should you have any comments or questions regarding this list, please contact the Wildlife Diversity Program, Texas Parks and Wildlife Department, 4200 Smith School Road, Austin, TX 78744, (512) 389-8111; or The Nature Conservancy of Texas, P. O. Box 1440, San Antonio, Texas, 78295-1440, (210) 224-8774.