

SKYLINE RECYCLING AND DISPOSAL FACILITY

APPENDIX IIE

ENDANGERED OR THREATENED SPECIES DOCUMENTATION



October 17, 2011
AVO 26404

Mr. Omar Bocanegra
U.S. Fish and Wildlife Service
Arlington Field Office
711 Stadium Drive, Suite 252
Arlington, TX 76011

Re: Threatened and endangered species assessment for the proposed Skyline Recycling and Disposal Facility in Dallas and Ellis Counties, Texas

Dear Mr. Bocanegra,

Waste Management, Inc. intends to expand the existing permitted municipal solid waste disposal facility on the border of Dallas and Ellis Counties, Texas. The Skyline Recycling and Disposal Facility is a Type I Municipal Solid Waste Disposal Facility, located west of Interstate 45, south of Ten Mile Creek, and north of Ferris, Texas. The facility provides waste disposal for municipal solid waste customers in the Dallas-Fort Worth Metroplex and the north central Texas region in general.

The property has a landfill permit history dating back to 1976. Although the USGS Quadrangle Map for "Ferris, Texas" shows the study area with rolling topography falling generally north toward Ten Mile Creek with two unnamed tributaries of Ten Mile Creek flowing south to north across the study area interior, more recent aerial photography show the modern day limits of the landfill to extending east to west across the width of the study area.

We are requesting information regarding federally listed threatened or endangered species or their critical habitat within the project site. This information is required by the Texas Administrative Code Chapter 330: Municipal Solid Waste Regulations. Consistent with the code, coordination with the state fish and wildlife agency is also required. Attached is the Texas Parks and Wildlife Department (TPWD) Wildlife Habitat Assessment Program Questionnaire for Threatened and Endangered Species that was submitted to TPWD, with a preliminary site assessment included for listed species.

If you have any questions or require any additional information, please do not hesitate to call at (214) 346-6367.

Sincerely,
HALFF ASSOCIATES, INC.

A handwritten signature in black ink, appearing to read "Russell Marusak".

Russell Marusak
Environmental Scientist

C: Mr. Kenneth Welch, P.E. – Biggs and Mathews Environmental
Mr. Walter Hunt – Waste Management of Texas



October 17, 2011
AVO 26404

Ms. Karen Clary
Texas Parks and Wildlife Department
Wildlife Division
4200 Smith School Road
Austin, TX 78744-3291

Re: Threatened and endangered species assessment for the proposed Skyline Recycling and Disposal Facility in Dallas and Ellis Counties, Texas

Dear Ms. Clary:

Waste Management, Inc. intends to expand the existing permitted municipal solid waste disposal facility on the border of Dallas and Ellis Counties, Texas. The Skyline Recycling and Disposal Facility is a Type I Municipal Solid Waste Disposal Facility, located west of Interstate 45, south of Ten Mile Creek, and north of Ferris, Texas. The facility provides waste disposal for municipal solid waste customers in the Dallas-Fort Worth Metroplex and the north central Texas region in general.

The property has a landfill permit history dating back to 1976. Although the USGS Quadrangle Map for "Ferris, Texas" shows the study area with rolling topography falling generally north toward Ten Mile Creek with two unnamed tributaries of Ten Mile Creek flowing south to north across the study area interior, more recent aerial photography show the modern day limits of the landfill extending east to west across the width of the study area.

We are requesting information regarding federal- and state-listed threatened or endangered species or their critical habitat within the project site. This information is required by the Texas Administrative Code Chapter 330: Municipal Solid Waste Regulations. Attached is the Texas Parks and Wildlife Department Wildlife Habitat Assessment Program Questionnaire for Threatened and Endangered Species, with a preliminary site assessment included.

If you have any questions or require any additional information, please do not hesitate to call at (214) 346-6367.

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Russell Marusak
Environmental Scientist

C: Mr. Kenneth Welch, P.E. – Biggs and Mathews Environmental
Mr. Walter Hunt – Waste Management of Texas



WILDLIFE HABITAT ASSESSMENT PROGRAM Review Requests

(Including Threatened and Endangered Species)

Name: Russell Marusak Date: October 3, 2011

Your Company: Half Associates, Inc. Phone: 214.346.6200

Your Company Address: 1201 North Bowser Road Fax: 214.739.0095

City, State, Zip: Richardson, TX 75081 Email: rmarusak@half.com

Project Title, Number and Site Location: Skyline Recycling and Disposal Facility, Ferris, Texas County(ies): Dallas and Ellis

1) Scope of the Project:

(a) What regulations will this review help you to comply with? Or, if not regulatory, why is the review being requested? Who is the project sponsor?

The Skyline Recycling and Disposal Facility (Skyline RDF) will be permitted in accordance with 30 Texas Administrative Code (TAC) Chapter 330 Municipal Solid Waste Management Regulations. The Texas Commission on Environmental Quality (TCEQ) is the agency responsible for permitting and regulating municipal solid waste facilities.

The TCEQ requires an applicant to address protection of endangered and threatened species and document coordination with the applicable state and federal agencies regarding the Endangered Species Act in accordance with the following regulations:

- §330.61 (n) The applicant shall consider the impact of the facility upon endangered and threatened species as required under state and federal laws.

(b) What and where is the project site? What activities will be conducted at the site? (Especially activity types, extent boundaries, length & width, waterways vegetation disturbance, and total acreage of site and acreage of the site that will be disturbed.)

Waste Management of Texas, Inc. has proposed to expand the Skyline RDF in Ferris, Texas. The 666.9-acre Skyline RDF property is located west of Interstate 45 (IH 45), south of Ten Mile Creek, and north of Ferris, Texas. **Figure 1** shows the Skyline RDF in the general Dallas-Fort Worth vicinity, and **Figure 2** depicts the existing Skyline RDF landfill permit boundary (i.e. study area). The permitted Skyline RDF dates back over three decades, with a municipal solid waste (MSW) permit issued to Trinity Valley Reclamation (TVR), Inc. in 1976 (MSW 42A). In 1987, TVR was acquired by the Applicant, who then developed a landfill permit to expand the landfill operations (MSW 42C). MSW 42C was approved by the landfill regulatory agency in 1995. The Applicant is currently seeking to modify and expand the existing landfill operations under MSW 42C through a third MSW permit ("project"). Approximately 1,200,000 cubic yards of material would be excavated within the proposed expansion areas. This area would then be incorporated into landfill operations, eventually attaining a height to elevation 688.0 feet-msl, providing an additional 20 million cubic yards of waste volume over the 22.9 acres, for a total of 60.2 million cubic yards of waste for the entire landfill operation.

Drainage swales, similar to what has already been constructed on the south, west, and east sides of the existing waste disposal footprint, will be constructed at the north base of the expanded footprint to capture and direct runoff to treatment areas.

In addition to these excavation and filling activities, an existing on-channel impoundment wetland would be dredged, restoring the original treatment capacity of the pond. The upstream drainage swale portions of this wetland would remain untouched and will still provide filtering function.

Implementation of the project would fill three open water ponds, one ephemeral stream, and two emergent wetlands on the site. It is not anticipated that the removal of the ephemeral stream will have cumulative



WILDLIFE HABITAT ASSESSMENT PROGRAM Review Requests (Continued)

(Including Threatened and Endangered Species)

impacts to adjacent wetlands to Ten Mile Creek. Hydrology to forested wetlands will be maintained by local drainage and overbank flood events from Ten Mile Creek. Impacts to one of the emergent wetland impoundments are considered temporary as it is anticipated that the impoundment, as part of its intended treatment function, will eventually revert back to a cattail-dominated community.

(c) **If this request is for a site investigation or risk assessment, why is the site being investigated? If applicable, what containment pathways are being evaluated?**

Not applicable.

(d) **Schedule of activities – Approximately when (which calendar month, how many years) will the project be active on the site?**

Actual landfilling of areas proposed to be impacted would likely begin in 2015 pending approval of all required permits and authorizations.

2) Vegetation: Species, dominant plants, structure and composition, vegetation layers, height of layers, natural vegetation community types.

According to the Level Three Ecoregions of Texas, the site is located in the Texas Blackland Prairies. The Texas Parks and Wildlife Department (TPWD) Texas Ecological Systems Classification identifies several vegetation types within the property boundary. The most prolific of these include: Southern Blacklands Tallgrass Prairie, Blackland Prairie Disturbance or Tame Grassland; Agriculture and other Human-related Azonal Subsystems, Rowcrops; and Mainly Natural Azonal Subsystems, Native Invasive: Deciduous Woodland. Site investigations confirmed that existing site conditions are generally consistent with the TPWD Ecological Classifications for the northern third of the study area; however no row crops were observed on the site and a majority of the southern third of the study area is working landfill.

Site investigations identified a variety of vegetative communities. Hillslopes generally consisted of grasslands dominated by silver bluestem (*Bothriochloa laguoides*) and western ragweed (*Ambrosia psilostachya*). Giant ragweed (*Ambrosia trifida*) and common iva (*Iva annua*), were very common, dominating non-forested old field habitats in the floodplain of Ten Mile Creek. Common, more hydrophytic herbaceous vegetation included species such as switchgrass (*Panicum virgatum*) and cattail (*Typha latifolia*). However, both of these species were generally associated with man-made aquatic features, with cattail usually found in the permanently inundated littoral fringe of open water impoundments, and switchgrass found in drainage areas that have experienced a high degree of sedimentation.

Tree and shrub species were equally diverse, but cedar elm (*Ulmus crassifolia*), hackberry (*Celtis laevigata*), and eastern red-cedar (*Juniperus virginiana*) were consistently found throughout the site. Green ash (*Fraxinus pennsylvanica*) was common in wetter areas, with buttressing (a morphological adaptation for hydrophytic vegetation) observed on numerous sapling and young tree specimens.

WILDLIFE HABITAT ASSESSMENT PROGRAM
Review Requests (Continued)

(Including Threatened and Endangered Species)

3) Other Natural Resources/Physical Features:

(a) Soils, geology, watercourses, aquifers, flood zones, etc.

According to the Natural Resource Conservation Service Soil Survey of Dallas and Ellis Counties, the following soils are mapped within the property boundary. A map of the soils is attached as **Figure 3**.

Soil ID	Soil Map Unit	Topography	Drainage Class	Permeability	Available Water Capacity	Runoff
4	Arents, clayey	gently undulating	--	slow	high	medium
34	Ferris-Heiden complex	5-12% slopes	well drained	very slow	high	rapid
37	Frio silty clay	frequently flooded	well drained	moderately slow	high	slow
42	Heiden clay	2-5% slopes, eroded	well drained	very slow	high	rapid
44	Houston Black clay	1-3% slopes	moderately well drained	very slow	high	medium
73	Trinity clay	frequently flooded	somewhat poorly drained	very slow	high	slow
Cp	Clay pits	--	--	--	--	--
HcC2	Houston clay	3-5% slopes	well drained	slow	high	medium
HcD2	Houston clay	5-8% slopes	well drained	slow	high	medium
W	Water	--	--	--	--	--

Three soil map units make up the majority of the study area: Ferris-Heiden complex, Houston Black clay, and Heiden clay.

According to the Flood Insurance Rate Map (FIRM) published by the National Flood Insurance Program, the portion of the study area along Ten Mile Creek is mapped as floodway. A narrow band parallel to the floodway is mapped as having 1% chance annual flood hazard, and is bordered to the south by a very narrow band mapped as a 0.2% annual chance flood hazard. The remainder of the study area is out of the floodplain in Zone X (areas determined to be outside of the 0.2% annual chance flood) (**Figure 7**).

Ten Mile Creek represents the northern boundary of the study area. Three ephemeral tributaries and five open water features were identified in the study area. Eight emergent wetland, three shrub/scrub wetlands, four forested wetlands, and one floating/submergent wetland were mapped within the study area. The majority of the identified water features are located in the north and east sides of the study area.

(b) Habitat, animals, animal assemblages, other sensitive features, etc.

Since the majority of the study area is a working landfill and residential development and agricultural operations surround the study area, wildlife species observed are those commonly found in urban settings. During site visits, bird species including the Turkey vulture (*Cathartes aura*), cattle egret, (*Bubulcus ibis*), and great blue heron (*Ardea herodias*) were observed.

WILDLIFE HABITAT ASSESSMENT PROGRAM
Review Requests (Continued)

(Including Threatened and Endangered Species)

- 4) **Existing Site Development: Extent of pavement, gravel, shell, or other cover; buildings, landscaped, xeriscaped, drainage system, etc.**

Offices and haul roads servicing the existing landfill are located on the east side of the study area. The landfill makes up the majority of the center of the study area. The northern and southern portions of the study area are undeveloped.

- 5) **Historic Use/Function of Site: Pasture, forest, urban, row crops, rangeland, wetland, etc. If the request is for a risk assessment, when was, or for how long, has the site been active, inactive? Are cultural resources present on the site or will the project cross or impact state or federal lands, local parklands?**

As mentioned above, the study area has been utilized as a landfill since 1976. The USGS topographic map (**Figure 4**) shows the eastern portion of the study area as a clay pit. Black and white aerial photography from the NRCS Soil Surveys of Dallas and Ellis County date to 1962 and 1975, respectively, and show the study area as undeveloped.

An intensive cultural resources survey and assessment for the Skyline RDF was conducted in 1994 for earlier permitting phases of the project. Four sites were reported in the earlier study, but the survey was conducted prior to the current Texas Historic Commission (THC) survey standards, so survey methods are not known. The Permittee has coordinated with the THC requesting cultural resources clearance or further recommendations, and a "No Historic Properties Affected" opinion was received from THC on January 30, 2009.

- 6) **Has a threatened and endangered species survey or assessment, wetland delineation, or other biological assessment already been performed? (In general, TPWD recommends an on-site habitat assessment be performed.)** Yes No

(a) If yes, provide surveyor name, qualifications, methods or protocols acreages surveyed, level of effort, weather conditions, time of day, and dates the survey was performed.

Prior to conducting the field investigation, the most current species list from the U.S. Fish and Wildlife Service (USFWS) and TPWD were obtained. Also as a requirement of TAC Chapter 30, a wetland delineation was conducted over several days in October 2009 to delineate the present-day extent of waters of the United States, including wetlands, on the property. Site conditions were clear, dry, and temperate. To intersect potential wetland areas, transects were established perpendicular to the hydrological gradients of Ten Mile Creek, which represents the major drainage in the study area. Transects were generally aligned from north to south, with multiple wetland data points recorded, documenting vegetation, hydrology, and soil characteristics along each transect. The collection of wetland data points was consistent with the USACE guidelines for wetland delineations per the "1987 Corps of Engineers Wetlands Delineation Manual," in addition to the "Final Regional Supplement to the Corps of Engineers Wetlands Delineation Manual: Great Plains Region." Although the site inspection was specific to procedures for wetland delineations, these procedures allowed for a thorough reconnaissance of the property. The collection and classification of vegetation and hydraulic conditions on the site allowed for a preliminary assessment of federal- and state-listed threatened and endangered species and their potential for occurrence on the property.

The site investigation was conducted by Mr. Russell Marusak of Halff Associates, Inc. (Halff). Mr. Marusak is an Environmental Scientist and an ISA Certified Arborist who has extensive experience in endangered species coordination, primarily associated with Department of the Army Section 404 permits. Mr. Marusak has coordinated with Mr. Omar Bocanegra, a Staff Biologist with the USFWS Branch Office in Arlington, Texas on numerous endangered species issues in the Dallas-Fort Worth area, most notably those involving the interior least tern.



WILDLIFE HABITAT ASSESSMENT PROGRAM Review Requests (Continued)

(Including Threatened and Endangered Species)

(b) If yes, please provide results and copy of survey/assessment report.

Please see attached memorandum summarizing the results of a listed species review and assessment of existing site conditions.

7) Could current on-site or adjacent habitat support rare species? Yes No
Specifically, explain why or why not.

State listed rare species, or species of concern include the Black lordithon rove beetle, Arctic peregrine falcon, Henslow's sparrow, Sprageue's pipit, western burrowing owl, cave myotis bat, plains spotted skunk, Texas garter snake, three mollusk species, and two plant species. It should be noted that none of these species was observed during the site investigation. The study area could support the plains spotted skunk and Texas garter snake given the general habitat requirements for these species. Please see the attached memorandum which includes species descriptions for additional discussion.

8) Provide a description of potential negative direct and indirect impacts from proposed project activities or former and current site activities, such as types or habitat and acreage to be degraded or lost, temporarily and permanently. Also, describe cumulative effects that could be anticipated from the project on the natural environment.

The landfill would be centrally located on the property thereby minimizing the disturbance to riparian corridors, creeks, and wetlands identified on the property. The larger riparian corridor on the northern portion of the property would be preserved in its current state. **Sheet 6 of 9** and **Sheet 7 of 9** of the Individual Permit application show the changes to the limits of the existing waste disposal facility proposed by the project.

9) Provide a description of planned beneficial mitigation and enhancement or restoration efforts. Be sure to note the avoidance, minimization, and compensatory mitigation measures planned to address the threat of negative impacts (e.g. which erosion control measures will be used, what will site restoration activities encompass, etc.).

The project will impact waters of the United States as regulated under Section 404 of the Clean Water Act. Consistent with goals of the Section 404 program, mitigation will first focus on avoiding and minimizing impacts to aquatic resources to the extent practicable. The permit application is currently under review with the U.S. Army Corps of Engineers Fort Worth District and the final design and has focused on avoiding and minimizing impacts to streams and other waters of the United States on the site. Mitigation bank credits will be purchased to comply with compensatory mitigation requirements.

To date coordination with other agencies has not resulted in the identification of negative impacts to threatened and endangered species that would require mitigation, however if it is determined that there is a strong likelihood for a state- or federally-listed species or their habitat to occur on the property, an operational mitigation plan could be developed as a preventative measure. In addition, over the life of the project, general landscaping maintenance requirements will be implemented for overall aesthetics and to ensure soil and grade stabilization.



WILDLIFE HABITAT ASSESSMENT PROGRAM Review Requests (Continued)

(Including Threatened and Endangered Species)

10) Include copies of coordination with other agencies relevant to impacts or enhancements of natural resources for the project & contact name.

A Texas Natural Diversity Database (TXNDD) search conducted in September 2011 identified several plant and animal species which have historically occurred in adjacent USGS quadrangles to that which includes the study area. The TXNDD was searched for Element Occurrence Records (EORs) to determine if any reported sightings of species have occurred within the study area. Two EORs were recorded for the USGS quadrangle which contains the study area.

An Individual Permit has been submitted and is in review at the Fort Worth District United States Army Corps of Engineers for approval. The Environmental Protection Agency (EPA), Texas Parks and Wildlife Department (TPWD), and Texas Commission on Environmental Quality (TCEQ) were the federal and state agencies contacted to provide comments as part of the Individual Permit process. Their response to the public notice request are as follows:

- EPA – Donna Mullins – EPA had no comments regarding the project.
- TPWD – Beth Bednik, Watershed Conservation Team Leader – TPWD comments focused on ensuring adequate and appropriate compensatory mitigation. No comments regarding threatened and endangered species were provided.
- TCEQ – Pete Schaefer – TCEQ comments were consistent with TPWD, and further inquired about impact avoidance and minimization measures regarding Ten Mile Creek.

11) Clearly delineate exact location of site and its boundaries using an applicable USGS quad (most preferable) as the base layer or best map available. The topographic map citation should include the USGS quad name. The map must contain identifiable features and scale that allows us to find your site and accurately pinpoint your site boundaries. When using internet maps, provide both a location map (zoomed out for highway reference) and a layout map (zoomed in for site features, boundaries, and neighboring street reference).

See attached maps.

12) Originals or color-copy photographs of site and surrounding area with captions or narratives.

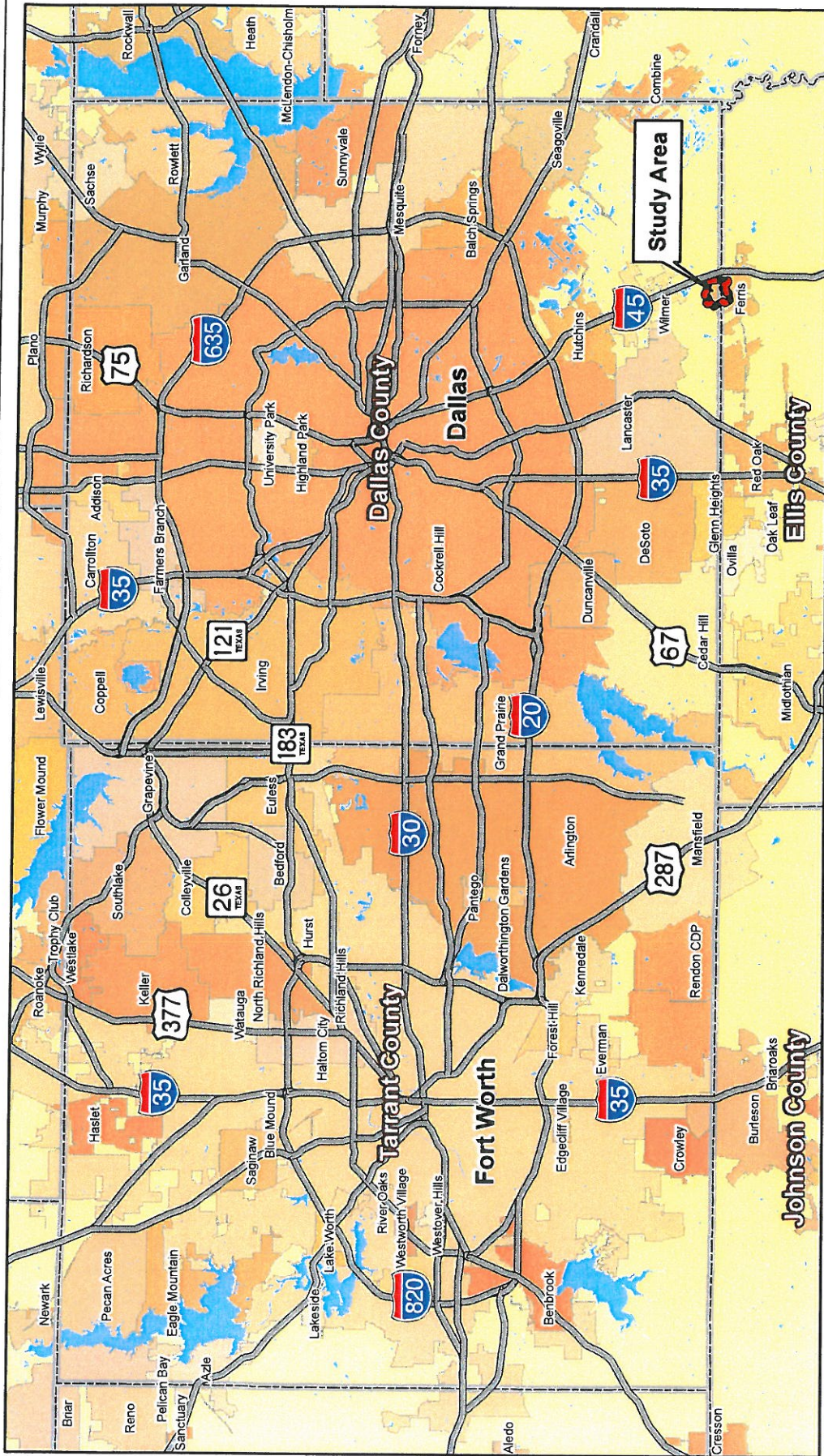
See attached photos.

13) Aerial photographs with pertinent features labeled. Aerials should show the year photograph was taken.

Please see attached maps.

Send completed form to:

Texas Parks and Wildlife Department
 Wildlife Division
 Wildlife Habitat Assessment Program
 4200 Smith School Road
 Austin, Texas 78744-3291
 (512) 389-4571 (Phone) (512) 389-4599 (Fax)



Legend



- Study Area
- Major Highway
- County Boundary

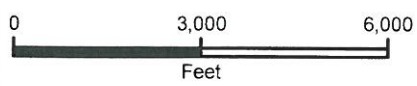


WASTE MANAGEMENT SKYLINE RDF
 Individual Permit Application #200900371
 Ferris, Texas

PROJECT NO.: 26404
 Project Vicinity Map

FIGURE 1

SEPTEMBER 2011



Source/Year of Aerial Photograph:
Landiscor/2009

Legend

- Study Area
- County Boundary
- Major Road
- City Boundary



WASTE MANAGEMENT SKYLINE RDF
 Individual Permit Application #200900371
 Ferris, Texas

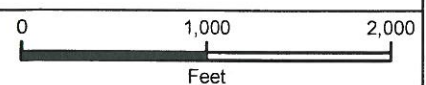
PROJECT NO.: 26404
 Project Area Map
 FIGURE 2
 SEPTEMBER 2011



Legend

- Study Area
- 4 - Arents, clayey, gently undulating
- 34 - Ferris-Heiden complex, 5 to 12 percent slopes
- 37 - Frio silty clay, frequently flooded
- 42 - Heiden clay, 2 to 5 percent slopes, eroded
- 44/HaB - Houston black clay, 1 to 3 percent slopes
- 73 - Trinity clay, frequently flooded

- Cp - Clay pits
- HcC2 - Houston clay, 3 to 5 percent slopes, eroded
- HcD2 - Houston clay, 5 to 8 percent slopes, eroded
- SueE3 - Ferris clay, 5 to 12 percent slopes severely eroded
- W- Water



Source/Year of Soil Data: USDA Soil Survey Data, Dallas and Ellis Counties, 2007 and 2009 Source/Year of Aerial Photograph: Landiscor/2009



WASTE MANAGEMENT SKYLINE RDF

Individual Permit Application #200900371
 Ferris, Texas

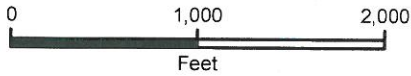
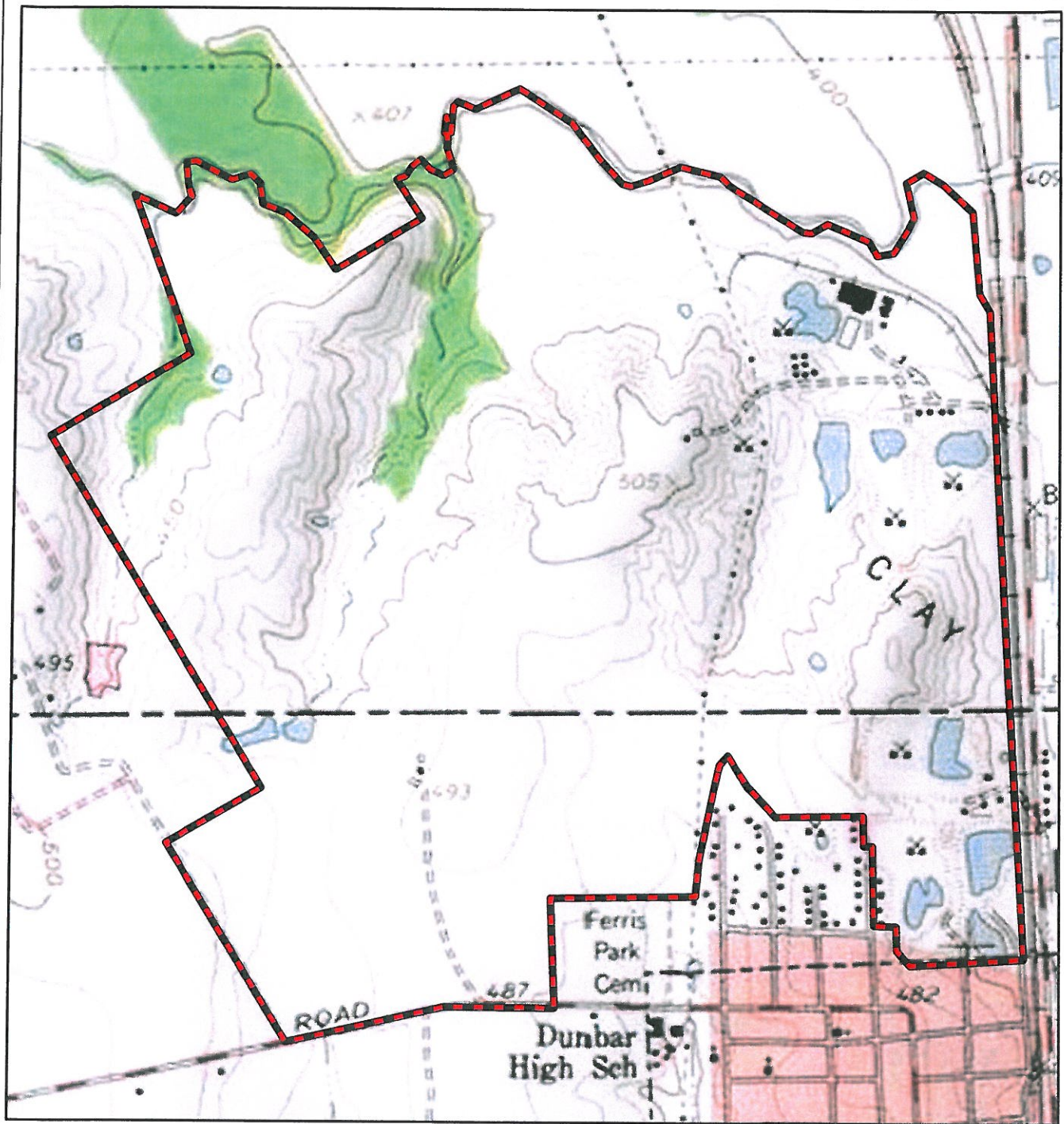


PROJECT NO.: 26404

Soil Survey Map

FIGURE 3

SEPTEMBER 2011



Legend

 Study Area



Source/Year of Topographic Data: 7.5 Minute Ferris, Texas Quadrangle/1968



WASTE MANAGEMENT SKYLINE RDF

Individual Permit Application #200900371
 Ferris, Texas

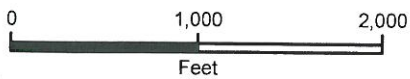


PROJECT NO.: 26404

USGS Quadrangle Map

FIGURE 4

SEPTEMBER 2011



Legend

 Study Area



Source/Year of Aerial Photograph: Texas Natural Resources Information System (TNRIS)/1996



WASTE MANAGEMENT SKYLINE RDF

Individual Permit Application #200900371
 Ferris, Texas

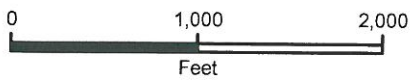


PROJECT NO.: 26404


1996 Aerial Photo Map

FIGURE 5

SEPTEMBER 2011



Legend

 Study Area



Source/Year of Aerial Photograph: USDA, National Agriculture Imagery Program (NAIP)/2010



WASTE MANAGEMENT SKYLINE RDF

Individual Permit Application #200900371
 Ferris, Texas



PROJECT NO.: 26404





2010 Aerial Photo Map

FIGURE 6

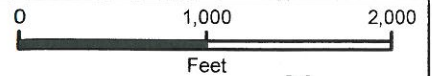
SEPTEMBER 2011



Legend

-  Study Area
-  Zone AE - 1% Annual Chance Flood Hazard, base elevations determined, floodway
-  Zone AE - 1% Annual Chance Flood Hazard, base elevations not determined
-  Zone X - 0.2% Annual Chance Flood Hazard

Source/Year of Floodplain Data:
Federal Emergency Management Agency/2001



WASTE MANAGEMENT SKYLINE RDF

Individual Permit Application #200900371
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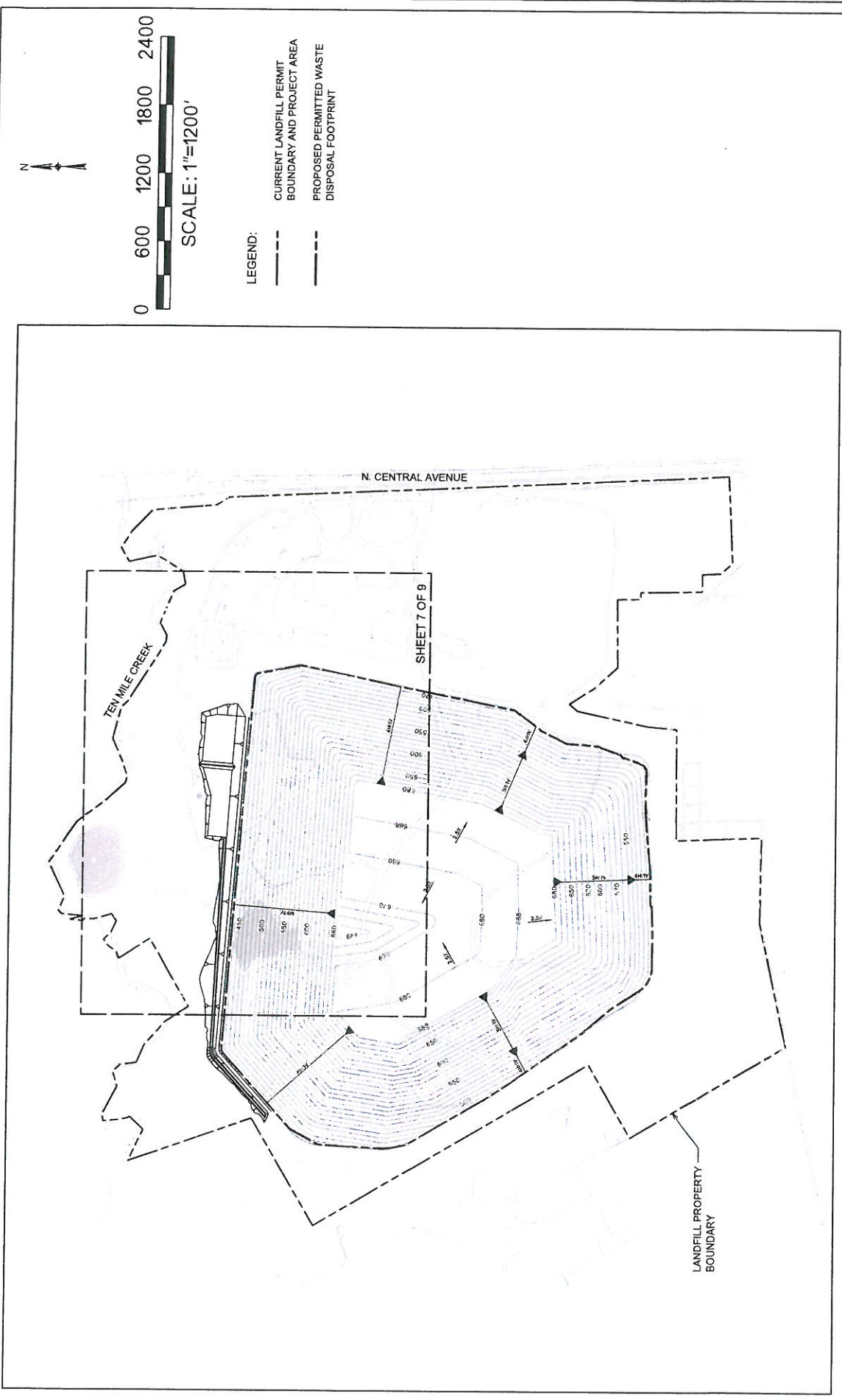


PROJECT NO.: 26404

FEMA Floodplain Map

FIGURE 7

SEPTEMBER 2011



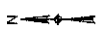
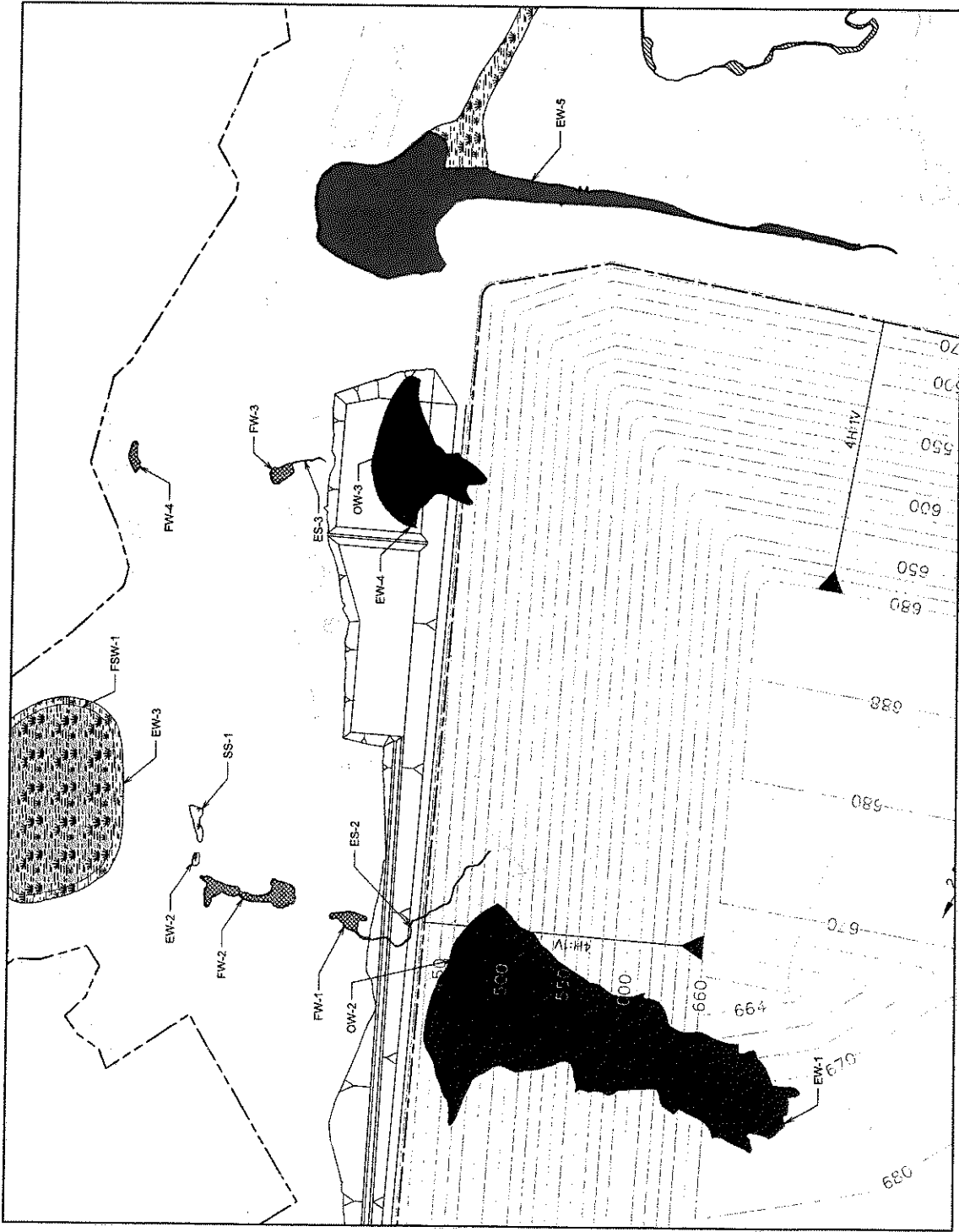
LEGEND:

- CURRENT LANDFILL PERMIT BOUNDARY AND PROJECT AREA
- - - PROPOSED PERMITTED WASTE DISPOSAL FOOTPRINT



WASTE MANAGEMENT SKYLINE RDF
 Individual Permit Application #200900371
 Ferris, Texas

Project No.:	26404
Issued:	MARCH 2011
PROPOSED LIMITS OF WASTE DISPOSAL	
	Sheet 6 of 9



SCALE: 1"=500'

LEGEND:

- CURRENT LANDFILL PERMIT BOUNDARY AND PROJECT AREA
- PROPOSED PERMITTED WASTE DISPOSAL FOOTPRINT
- [Pattern] EMERGENT WETLAND (WATER OF THE US)
- [Pattern] SCRUB/SHRUB WETLAND (WATER OF THE US)
- [Pattern] FORESTED WETLAND (WATER OF THE US)
- [Pattern] FLOATING/SUBMERGENT WETLAND (WATER OF THE US)
- [Pattern] OPEN WATER (NON-WATER OF THE US)
- [Pattern] EMERGENT WETLAND (NON-WATER OF THE US)
- [Pattern] TEMPORARILY IMPACTED WATERS OF THE US
- [Pattern] PERMANENTLY IMPACTED WATERS OF THE US

FEATURE ID	IMPACTS (ACRES)	IMPACT TYPE
EW-1	4.77	PERMANENT
EW-4	0.45	PERMANENT
OW-2	4.46	PERMANENT
OW-3	1.54	PERMANENT
ES-2	0.07	PERMANENT
EW-5	4.57	TEMPORARY

Project No.: 26404
 Issued: MARCH 2011
 IMPACTS TO WATERS OF THE U.S.
 Sheet 7 of 9

WASTE MANAGEMENT SKYLINE RDF
 Individual Permit Application #200900371
 Ferris, Texas





Half Associates, Inc.
1201 North Bowser Road
Richardson, Texas 75081
(214) 346-6200
Fax (214) 739-0095

MEMORANDUM

TO: File **DATE:** September 22, 2011
FROM: Hilary Schneider **AVO:** 26404
EMAIL: hschneider@half.com
SUBJECT: Threatened and endangered species desktop review for Skyline Recycling and Disposal Facility Project

Half conducted a "desktop" investigation of state- and federal-listed threatened and endangered species in August 2011 for the referenced site (hereinafter referred to as "study area") which is located in Dallas and Ellis Counties, Texas. This investigation included a review of current species lists from Texas Parks and Wildlife Department (TPWD) and United States Fish and Wildlife Service (USFWS) for Dallas County, Texas, and a search request from the Texas Natural Diversity Database (TXNDD). The TXNDD is a record of occurrences (sorted per USGS quadrangle) for rare plant and animal resources that is based upon the best available information to TPWD. The TXNDD data is to support determinations of potential species occurrence for the study area, and provide specific information where available. An absence in the TXNDD data is not equated to the absence of a species in the study area. Supplemented by general observations from the 2009 jurisdictional determination of waters of the United States, including wetlands, the literature review and document search concludes below with a determination (a) if preferred habitat or designated critical habitat for any listed species is present within the study area and (b) whether any listed species is likely to occur in the study area.

Policy and Database Review

The USFWS has authority under the Endangered Species Act (ESA) to list and monitor the status of species whose populations are considered imperiled. USFWS regulations that implement the ESA are codified and regularly updated in 50 CFR Part 17. The federal process identifies potential candidates based upon the species' biological vulnerability. The vulnerability



Halff Associates, Inc.
1201 North Bowser Road
Richardson, Texas 75081
(214) 346-6200
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decision is based upon many factors affecting the species within its range and is linked to the best scientific data available to the USFWS at the time. Species listed as threatened or endangered by the USFWS are provided full protection under the ESA including a prohibition of indirect take such as destruction of known critical habitat (i.e., areas formally designated by USFWS in the Federal Register).

Texas endangered species legislation in 1973 and subsequent amendments have established a state regulatory program for the management and protection of endangered species (i.e., species in danger of extinction) and threatened species (i.e., likely to become endangered within the foreseeable future). Chapters 67 and 68 of the Texas Parks and Wildlife Code authorize the TPWD to formulate lists of threatened and endangered fish and wildlife species and to regulate the taking or possession of the species. Under this statutory authority, the TPWD regulates the taking, possession, transport, export, processing, selling or offering for sale, or shipping of threatened or endangered species of fish and wildlife.

Table 1 lists wildlife species that are considered endangered or threatened by the USFWS and/or TPWD, or are designated a species of concern (SOC) by TPWD, and whose geographic range includes any portion of Dallas or Ellis County. It should be noted that inclusion in the table does not imply that a species is known to occur in the study area but only acknowledges the potential for occurrence; the estimate of likelihood of a species to occur within the study area is based on a brief analysis of habitat observed during the jurisdictional determination and the known habitat preferences for each species. There is no USFWS-designated critical habitat within the study area for any of the federally-protected species in **Table 1**. A discussion of each species' habitat follows **Table 1**, grouped first by state- or federal-listed threatened or endangered species, and followed by the SOC.

A TXNDD search was conducted in September 2011 for Element Occurrence Records (EORs) to determine if any reported sightings of species have occurred within the study area. Two EORs were recorded for the USGS quadrangles (Ferris, Texas) containing the study area. These EORs are listed below:



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- EOR 588 Little bluestem-indiangrass (*Schizachyrium scoparium-Sorghastrum nutans*) Series – This EOR is a small, mostly native meadow with Johnsongrass in Ferris on the east side of 45 south of FM 660 approximately 1.5 miles southeast of the study area. This EOR was last observed in 1985. This EOR is not located in the study area and none of the species recorded are listed as threatened, endangered, or rare by the TPWD or USFWS.
- EOR 19 Interior least tern (*Sterna antillarum athalassos*) – This EOR is an observation of five adults and four fledgling interior least tern at a gravel mine near Beltline Road and Post Oaks Road approximately four miles northeast of the study area in August 2004.

Table 1. Listed Endangered, Threatened, or Rare Species for Dallas County.

Common Name	Scientific Name	Listing Status ¹		Species Likely to Occur within Study Area?
		Federal	State	
INSECTS				
Black lordithon rove beetle	<i>Lordithon niger</i>		SOC	No
BIRDS				
American peregrine falcon	<i>Falco peregrinus anatum</i>		T	No
Arctic peregrine falcon	<i>Falco peregrinus tundrius</i>		SOC	No
Bald eagle	<i>Haliaeetus leucocephalus</i>		T	No
Black-capped vireo	<i>Vireo atricapillus</i>	E	E	No
Golden-cheeked warbler	<i>Dendroica chrysoparia</i>	E	E	No
Henslow's sparrow	<i>Ammodramus henslowii</i>		SOC	No
Interior least tern	<i>Sterna antillarum athalassos</i>	E	E	No
Piping plover	<i>Charadrius melodus</i>	E,T	T	No
Sprague's pipit	<i>Anthus spragueii</i>		SOC	No
Western burrowing owl	<i>Athene cucularia hypugaea</i>		SOC	No
White-faced ibis	<i>Plegadis chihi</i>		T	Yes ²
Whooping crane	<i>Grus americana</i>	E	E	No
Wood stork	<i>Mycteria americana</i>		T	Yes ²
MAMMALS				
Cave myotis bat	<i>Myotis velifer</i>		SOC	No
Plains spotted skunk	<i>Spilogale putorius interrupta</i>		SOC	Yes
Red Wolf	<i>Canis rufus</i>		E	No
MOLLUSKS				
Fawnsfoot	<i>Truncilla donaciformis</i>		SOC	Yes
Little spectaclecase	<i>Villosa lienosa</i>		SOC	No
Louisiana pigtoe	<i>Pleurobema riddellii</i>		T	Yes
Texas heelsplitter	<i>Potamilus amphichaemus</i>		T	Yes
Texas pigtoe	<i>Fusconaia askewi</i>		T	Yes
Wabash pigtoe	<i>Fusconaia flava</i>		SOC	No
REPTILES				
Alligator snapping turtle	<i>Macrochelys temminckii</i>		T	Yes
Texas garter snake	<i>Thamnophis sirtalis annectens</i>		SOC	Yes
Texas horned lizard	<i>Phrynosoma cornutum</i>		T	No
Timber/canebrake rattlesnake	<i>Crotalus horridus</i>		T	Yes
PLANTS				
Glen Rose yucca	<i>Yucca necopina</i>		SOC	No
Warnock's coral-root	<i>Hexalectris warnockii</i>		SOC	Yes
Sources: USFWS, August 2011 and TPWD, August 2011.				
Notes:				
1. USFWS listing codes: E = Endangered (i.e., in danger of extinction); T = Threatened (i.e., severely depleted population that may become endangered); blank = no federal status. TPWD listing codes: E = Endangered; T = Threatened; SOC = Unlisted Species of Concern (i.e., rare species with no regulatory listing status).				
2. Assumed to be a transient species, potentially migrating through the study area and using suitable habitat for stopovers.				

FEDERAL LISTINGS

Black-capped vireo – Preferred black-capped vireo (*Vireo atricapillus*) habitat consists of scattered trees and numerous dense clumps of shrubs close to ground level, interspersed with open areas of bare ground, rock, grasses, or forbs. Foliage that extends to ground level is the most important requirement for nesting. Plant species most commonly used for nesting include evergreen sumac (*Rhus virens*) and shin oak (*Quercus incana*) but may also include juniper species (*Juniperus* sp.), live oak (*Quercus virginiana*), yaupon holly (*Ilex vomitoria*), and deciduous holly (*Ilex decidua*). Threats and reasons for decline include habitat loss due to urbanization, brush clearing, natural succession, and human disturbance. There are birds currently known to nest in nearby Bosque and Somervell counties. Small, fragmented populations also exist in Cooke and Grayson counties.

Within the study area, juniper and holly species are present with foliage extending to ground level. However, distribution is limited to a narrow, linear corridor along steep side slopes in the north central portion of the study area. Herbaceous areas adjacent to this corridor consist of a mix between bunch grass and forb species. However, herbaceous growth patterns are dense and tall, devoid of interspersed open areas or rock outcroppings. Habitat suitability is therefore considered to be marginal. In addition to the marginal condition of the habitat, the proximity of the existing active landfill areas to the north and the broad floodplain of Ten Mile Creek to the south serve to isolate this habitat. In sum, it is not anticipated that the black-capped vireo would occur within the project area.

Golden-cheeked warbler - Typical golden-cheeked warbler (*Dendroica chrysoparia*) nesting habitat is found in tall, dense mature stands of Ashe juniper (*Juniperus ashei*), mixed with trees such as Texas (Spanish) oak (*Quercus buckleyi*), Lacey oak (*Quercus laceyi*), live oak, post oak (*Quercus stellata*), Texas ash (*Fraxinus texensis*), cedar elm (*Ulmus crassifolia*), hackberry (*Celtis laevigata*), bigtooth maple (*Acer grandidentatum*), sycamore (*Platanus occidentalis*), Arizona walnut (*Juglans major*), escarpment cherry (*Prunus serotina* subsp. *eximia*), and pecan

(*Carya illinoensis*), as the golden-cheeked warbler is dependent upon the presence of mature Ashe juniper for nest construction. This type of woodland generally grows in relatively moist areas such as steep-sided canyons, slopes, and adjacent uplands. Golden-cheeked warblers can also be found in drier upland juniper-oak woodlands over flat topography. The warbler breeds exclusively in Texas and is present from early March to late August. Although golden-cheeked warblers have retracted from their historical range in north central Texas, there are small, active populations in nearby Bosque and Somervell counties. Another colony is suspected to nest near Cedar Hill, Texas on the east end of Joe Pool Lake.

Although some habitat requirements as described for the golden-cheeked warbler are present in the project area, the presence of Ashe juniper as a key component for nest construction is absent. Habitat suitability is therefore considered to be marginal. In addition to the marginal condition of the habitat, the proximity of the existing active landfill areas to the north and the broad floodplain of Ten Mile Creek to the south serve to isolate this habitat. In sum, it is not anticipated that the golden-cheeked warbler would occur within the project area.

Interior least tern – Premier interior least tern (*Sterna antillarum athalassos*) nesting sites are salt flats, broad sandbars, and barren shores along wide shallow rivers. Important breeding requirements include:

- presence of bare ground or alluvial islands for nesting;
- availability of food (e.g. small fish); and
- favorable water levels during the nesting season (so nests remain above water).

Preferred nest sites are devoid of vegetation. As natural sites have become sparse, interior least terns have used non-traditional nesting habitats that include dredge islands, gravel mined areas, gravel haul roads and gravel rooftops. Since 1992, terns have nested at non-traditional habitat near the West Fork of the Trinity River in southeast Dallas County. Nesting activity was expanded in 2000 to include an area along the Elm Fork Trinity River in northwest Dallas County and the West Fork Trinity River in Tarrant County. All known sites are within two miles



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from the Trinity River. Multiple colonies are known and monitored in Dallas County. Nesting sites include a wastewater treatment plant, a sand and gravel operation, and the roof of a warehouse.

Ten Mile Creek and an open water pond are perennial water sources in the vicinity of the project area. Ten Mile Creek is comparatively small relative to other known river habitats in the area for this species, and it is unlikely that the deep cut banks provide suitable nesting habitat for the interior least tern. Open water ponds in the area are densely vegetated along the shoreline which would also represent less than suitable habitats. Therefore, it is not anticipated that the interior least tern would occur within the project area.

Piping plover – Piping plover (*Charadrius melodus*) nest sites may include sandy beaches along the ocean or inland lakes, alluvial islands in rivers, gravel pits along rivers, and gravel roads. This species nests along the Atlantic Coast, Great Lakes, and northern Great Plains and is known to winter along the Gulf Coast (statewide migrant). Wintering piping plovers in Texas prefer bare or very sparsely vegetated tidal mudflats, sand flats, or algal flats – areas which are periodically covered with water and then exposed either by tides or wind. Loss or modification of habitat due to urbanization is the primary reason for population decline. Increased predation associated with increased urbanization is also a recognized threat. As noted before, bare shores are not available within the project area. Due to the lack of suitable habitat, it is unlikely that this species would occur within the project area.

Whooping crane – The whooping crane (*Grus americana*) is a tall wading bird most often observed in flocks of two to 20. Premier whooping crane winter habitats are marshes, tidal flats, and barrier islands. Migratory habitats vary, with croplands used for feeding and palustrine wetlands used for roosting. Densely vegetated wetlands are rarely used. Whooping cranes winter in Aransas National Wildlife Refuge on the Texas Gulf Coast and may be a migrant throughout most of Texas. Destruction of winter and breeding habitat is the primary reason for population decline. Local bird watch lists note the whooping crane as only a casual migrant. However, Lake Weatherford and Lake Bardwell both north central Texas lakes, had confirmed

sightings in recent years in the shallow, upstream ends of these reservoirs which are similar to the tidal flats and coastal marshes that the birds use for feeding. Neither comparable habitat to that described in the north central Texas area, nor other suitable habitat for the whooping crane exists in the project area, and it is unlikely this species would use the area as a migrant.

STATE LISTINGS

Peregrine falcon – The peregrine falcon (*Falco peregrinus*) nests on cliffs and in cliff-like areas near wetlands and water bodies. The American subspecies (*Falco peregrinus anatum*) breeds throughout the western United States, Canada, and Mexico, and in the Trans-Pecos region of Texas. This subspecies is not easily distinguished at a distance from the Arctic subspecies (*Falco peregrinus tundrius*), which breeds within the tundra regions of Alaska, Canada, and Greenland. Both subspecies migrate through Texas, and can be found seasonally along the Texas Gulf Coast. Preferred habitat for these subspecies is absent within the study area, and there exists little potential for the area to be used for stopover during migration.

Bald eagle – In Texas, preferred bald eagle (*Haliaeetus leucocephalus*) nesting habitat is along river systems or within two miles of large bodies of water. In Texas, bald eagle nesting typically occurs from October to July. Given the isolation of the study area from large bodies of water and lack of other suitable habitat, it is not anticipated that the bald eagle would occur in the study area.

White-faced ibis – The white-faced Ibis (*Plegadis chihi*) is a dark-colored, long-legged wading bird with a long down-curved bill. This species prefers freshwater marshes, rivers, sloughs, and irrigated rice fields, but will also visit brackish and saltwater habitats. The ibis nests in marshes, on the ground in bulrushes or reeds, on floating mats of dead vegetation, or in low trees. The white-faced Ibis nests in isolated colonies from Oregon to Kansas, but its center of greatest abundance seems to be in Utah, Texas and Louisiana. Permanent resident populations exist in southern California and along the Gulf Coast of Louisiana and Texas. In Texas, they breed

(April-June) and winter along the Gulf Coast. They occur as migrants in the Panhandle and West Texas, but may wander throughout the state. Their potential use of the study area should be considered incidental relative to the large area regarded as their migration corridor and because of the general absence of preferred habitat.

Wood stork – The preferred habitat of the wood stork (*Mycteria americana*) consists of low-lying wetland areas that may be seasonably flooded and/or drying. This stork forages in swamps, prairie ponds, wet meadows, flooded pastures or fields, ditches, and other shallow standing water, including coastal areas. This stork usually roosts communally in tall snags, sometimes in association with other wading birds. The open water ponds and adjacent wetlands in the study area could potentially be utilized for foraging or as a stop-over area by this species during migration; however the potential for occurrence should be considered incidental relative to the large area regarded as their migration corridor and the availability of suitable habitat within this migration corridor.

Louisiana pigtoe – The Louisiana pigtoe (*Pleurobema riddellii*) is a mollusk usually found in the flowing water of streams and moderate-sized rivers with a substrate of mud, sand, and gravel. It has historically been found in the Trinity River basin. In the study area, Ten Mile Creek could potentially provide habitat for this species; therefore the Louisiana pigtoe has the potential to occur within the study area.

Texas heelsplitter – The Texas heelsplitter (*Potamilus amphichaemus*) is a fresh-water mussel usually found in the mud or sand substrate of calm waters in the Sabine, Neches, and Trinity River basins. In the study area, Ten Mile Creek could provide habitat for this species; therefore the Texas heelsplitter has the potential to occur within the study area.

Alligator snapping turtle – The alligator snapping turtle (*Macrochelys temminckii*) can be found in perennial water bodies, deep water of rivers, canals, lakes, and oxbows, and also swamps, bayous, and ponds near deep running water. These turtles sometimes enter brackish coastal waters but prefer fresh water systems with mud bottoms and abundant aquatic



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vegetation. They may migrate several miles along rivers to find suitable feeding and breeding habitat. This species is active from March through October and breed between April and October. In the study area, Ten Mile Creek could provide habitat for this species; therefore the alligator snapping turtle has the potential to occur within the study area.

Texas horned lizard – The historical range of the Texas horned lizard (*Phrynosoma cornutum*) included the entire state in flat terrain with scattered vegetation and sandy or loamy soils. Over the last several decades, declines have been linked to loss of habitat, over-collection by the pet trade, and the accidental introduction of the imported fire ant. Despite low numbers in east and central Texas, the Texas horned lizard is still locally common in portions of the Rio Grande Plains of south Texas, the Rolling and High Plains of northwest Texas and the Trans Pecos of far west Texas. Though the study area is within the historical range of the Texas horned lizard, preferred habitat is absent within the study area and it is not anticipated that the Texas horned lizard would occur in the study area.

Timber rattlesnake – The timber rattlesnake (*Crotalus horridus*) is a forest-dwelling species sensitive to human disturbance. Preferred habitat is forested areas with dense ground cover. The distribution of the timber/canebrake rattlesnake stretches from the East Coast westward into Texas, and north into New England. In the southern portions of their range, preferred timber rattlesnake den habitat includes moist, wetland areas. The study area represents the western edge of the timber rattlesnake range, and is characterized by conditions that may be preferred for this species. Populations tend to be higher in eastern Texas where greater concentrations of wetlands and humid forests are found. Given the general habitat requirements for the timber rattlesnake, some habitat requirements are found in the study area. The forested area in proximity to Ten Mile Creek could provide suitable habitat for this species, therefore the timber rattlesnake could occur in the study area.

SPECIES OF CONCERN

Black lordithon rove beetle – Once thought to be widespread, but very rare throughout the eastern United States and southeastern Canada, all known specimens of the black lordithon rove beetle (*Lordithon niger*) have been taken from northern hardwood or mixed coniferous-deciduous forests. Little else is known about the species' habitat requirements. Since no mixed coniferous-deciduous or northern hardwood forests occur within the study area, it is not anticipated that this species would be found in the study area.

Henslow's sparrow – The Henslow's Sparrow (*Ammodramus henslowii*) is a rare bird found in the grasslands of the east-central United States. The Henslow's sparrow nests in open fields and undisturbed grasslands along the Great Lakes region and through the central Midwest. The bird was known to winter along the Texas Gulf Coast, but is now believed to be extirpated throughout much of this former range. In their breeding range, they utilize hayfields, pastures, wet meadows, dry salt marsh areas, and old grassy fields. Population declines have been attributed to habitat alteration. The bird is now considered a very rare migrant to the state and is unlikely to be encountered within the study area. No preferred habitat for this species was identified within the study area.

Sprague's pipit – Sprague's pipit (*Anthus spragueii*) is a small passerine bird found in Texas only as a potential migrant from mid-September to early April. This species is strongly tied to native upland prairie and coastal grasslands. It is sensitive to patch size and avoids edges. Since no large patches of native prairie or coastal grasslands exist in the study area it is not anticipated that the Sprague's pipit would occur within the study area.

Western burrowing owl – The western burrowing owl (*Athene cunicularia hypugaea*) is a ground-dwelling owl that prefers open grasslands, especially prairie, plains, and savannas. Due to the lack of open grasslands, the western burrowing owl is not anticipated to occur within the study area.

Cave myotis bat – Preferred cave myotis bat (*Myotis velifer*) habitat consists of rock crevices, old buildings, carports, bridges, and cliff swallow nests. This species hibernates in the limestone caves of the Edwards Plateau and gypsum caves of the panhandle during winter. It is an opportunistic insectivore which roosts in clusters of thousands of individuals. Preferred habitat for this species does not exist within the boundaries of the study area therefore the cave myotis bat is not anticipated to occur within the study area.

Plains spotted skunk – The plains spotted skunk (*Spilogale putorius interrupta*) is a subspecies of the eastern spotted skunk and may be found in open prairie, brushy areas, and cultivated land, and den in a variety of above and below ground areas. The striped skunk (*Mephitis mephitis*) is very common in the study area and the study area may contain preferred habitat for the plains spotted skunk, therefore this species may occur in the study area.

Red Wolf – The red wolf (*Canis lupus*) was formerly known throughout the eastern half of Texas in brushy and forested areas and in coastal prairies. Though the study area contains the preferred habitat for this species, the red wolf is now considered extirpated from Texas and is not anticipated to occur within the study area.

Fawnsfoot – The fawnsfoot (*Truncilla donaciformis*) is a freshwater mussel found in small and large rivers, especially on sand, mud, rocky mud, and sand and gravel. This species is found in the Neches, Trinity, and San Jacinto river basins and historically in the Red, Cypress, and Sabine river basins. In the study area, Ten Mile Creek could potentially provide habitat for this species; therefore the Texas pigtoe has the potential to occur within the study area.

Little spectaclecase – The little spectaclecase (*Villosa lienosa*) is a freshwater mussel found in creeks, rivers, and reservoirs on sandy substrates in slight to moderate current. It is found in east Texas in the Cypress through San Jacinto River basins. Preferred habitat for this species was not identified within the study area, therefore it is not anticipated that the little spectaclecase will occur within the study area.

Texas pigtoe – The Texas pigtoe (*Fusconaia askewi*) is a freshwater mussel found in rivers with mixed mud, sand, and fine gravel in areas protected by fallen trees or other structures in east Texas river basins including the Sabine River, Trinity River, and San Jacinto River. In the study area, Ten Mile Creek could potentially provide habitat for this species; therefore the Texas pigtoe has the potential to occur within the study area.

Wabash pigtoe – The Wabash pigtoe (*Fusconaia flava*) is a freshwater mussel found in creeks and large rivers on mud, sand, and gravel in east Texas river basins and reservoirs or lakes with no flow. No preferred habitat for this species was identified within the study area, therefore it is not anticipated that the Wabash pigtoe would occur within the study area.

Texas garter snake – The Texas garter snake prefers marshy areas and those associated with permanent sources of water. This species occurs in east through central Texas, with a second population stretching from the panhandle of Texas north through Oklahoma and into Kansas. This snake is most abundant in the central Texas portion of its range. Although the snake prefers marshy habitats associated with permanent water bodies, it can be found in many habitats, including suburban areas, within Dallas and Ellis Counties. Within the study area, potential habitat for the species includes riparian/forested areas, similar to the timber/canebrake rattlesnake habitat discussed above. The forested area in proximity to Ten Mile Creek could provide suitable habitat for this species, therefore the Texas garter snake could occur in the study area.

Glen Rose yucca – The Glen Rose yucca (*Yucca necopina*) is known to occur in grasslands on sandy soils, and is also found in limestone bedrock, clayey soil on top of limestone, and gravely limestone alluvium. Due to the disturbed nature of the study area and lack of grasslands, preferred habitat for this species does not exist within the study area, therefore the Glen Rose yucca is not anticipated to occur within the study area.

Warnock's coral-root – Warnock's coral-root (*Hexalectris warnockii*) is known to occur in leaf litter and humus in oak-juniper woodlands in mountain canyons in the Trans Pecos, but at lower



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elevations to the east, often on narrow terraces along creek beds. In the study area, Warnock's coral-root has the potential to occur in proximity to Ten Mile Creek.

SUMMARY

As shown in **Table 1** of this memorandum, Halff has identified eleven species listed as either threatened, endangered, or rare that may be found in the study area based on a preliminary review of publicly available resources. Regarding the white-faced ibis and wood stork, the likelihood of occurrence is conditional on the basis that these species migrate, and their migratory range may happen to overlap water features on the site that may be suitable as a temporary stopover site. As a result, the potential occurrence of these species would be considered incidental.

The plains spotted skunk, alligator snapping turtle, Texas garter snake, timber rattlesnake, Louisiana pigtoe, fawnsfoot, Texas heelsplitter, Texas pigtoe, and Warnock's coral-root have broad habitat characteristics and Halff has commonly reached the same conclusions regarding likelihood of occurrence for these species in similar assessments. Halff recommends that the existing level of review to date is sufficient for determination that these species could occur, but are not likely to occur in the study area.