Delineation of Waters of the U.S.

in support of the
Dixie Drive Interchange
Environmental Assessment

Dixie Drive Interchange Project

Utah Department of Transportation

UDOT Project No. SP-15(71)6

Prepared by
HDR Engineering, Inc.
3995 South 700 East, Suite 100
Salt Lake City, UT 84107

June 26, 2008

Contents

1.0 INTRODUCTION 3

1.1 Directions to the Study Area 3

1.2 Contact Information for the Applicant and Owner 3

1.3 Contact Information for Waters of the U.S. Delineation Consultant 4

1.4 Wetland Delineation Methodology 4

1.5 Existing Field Conditions 5

1.5.1 General Hydrology 5
1.5.2 General Plant Community Types 6

1.6 Wetland Jurisdiction 7

2.0 RESULTS 8

2.1 Site-Specific Investigation 8

2.1.1 Vegetation 8
2.1.2 Soils 9
2.1.3 Hydrology 9

2.2 Wetland Determination 9

2.2.1 Delineated Wetlands 9
2.2.2 Jurisdictional Wetlands 11
2.2.3 Open Water 12
2.2.4 Riparian Habitat 12

3.0 SUMMARY 14

3.1 Data Forms 14

3.2 Additional Information 14

4.0 REFERENCES 15

APPENDICES

Appendix A – Wetland Delineation Maps

Appendix B – Site Data Forms

Appendix C – Wetland Photographs

Appendix D – List of Plant Species Observed

Tables

Table 2-1. Wetland Indicator Status System 8
Table 2-2. Wetland Polygon Summary 10

This page is intentionally blank.

1.0 Introduction

HDR Engineering, Inc. (HDR) has prepared this wetland delineation report in support of the Dixie Drive Interchange project proposed in Washington County, Utah. The wetlands have been delineated because the Utah Department of Transportation (UDOT) is currently studying the possibility to construct a new interchange in an area that supports wetlands and other waters of the U.S. that are subject to regulation under the Clean Water Act. The purpose of this wetland delineation report is to describe and map wetlands and waters of the U.S. in the delineation study area. The Federal Highway Administration in cooperation with UDOT is preparing an environmental assessment (EA) to evaluate the potential impacts from the proposed project.

1.1 Directions to the Study Area

The central and western parts of the delineation study area are accessible from Dixie Drive, while the eastern part is accessible from Convention Center Drive. Many areas surrounding the Santa Clara River can be accessed by golf cart roads and a pedestrian path that are part of the Southgate Golf Course. The section of the study area surrounding the Virgin River is accessible from the north and south along a pedestrian path, one end of which begins at the southern end of Convention Center Drive. See Figure 1 in Appendix A.

1.2 Contact Information for the Applicant and Owner

The applicant and owner for this project are the same agency:

Utah Department of Transportation Region 4
1345 South 350 West
Richfield, UT 84701

Attention: Kim Manwill, Project Manager
kmanwill@utah.gov
(435) 893-4734

1.3 Contact Information for Waters of the U.S. Delineation Consultant

The wetland delineation was performed by:

HDR Engineering, Inc.
3995 South 700 East, Suite 100
Salt Lake City, UT 84107

Wetland Biologists: Trent Toler and Becky Holloway
trent.toler@hdrinc.com

1.4 Wetland Delineation Methodology

The preliminary wetland delineation was conducted in accordance with the 1987 *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) and the *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (Environmental Laboratory 2006). These methods require evidence of three parameters: a dominance of hydrophytic vegetation, hydric soils, and wetland hydrology must be simultaneously present for a jurisdictional wetland determination.

HDR personnel, Trent Toler and Becky Holloway, conducted field visits from December 18 to 20, 2007 (both personnel), on January 22 and 23, 2008 (both personnel), and on May 20 and 21, 2008 (Trent Toler only). On-site evaluation of vegetation, soils, and hydrology was performed in potential wetland areas in the delineation study area.

Data points were paired for the purpose of accurately delineating wetland/upland boundaries. The wetland survey team first identified soils in the field through soil pit excavation, then used topography, vegetative patterns, and hydrology as a guide to delineate wetland boundaries. These boundaries were then documented using a handheld Trimble GeoExplorer XT global positioning system (GPS), and were mapped using ArcView 9.2 geographic information system (GIS) software. All potential wetland areas in the study area were accessible by field personnel.

Preliminary Research

The wetland survey team reviewed existing information to develop background knowledge of the physical features in the study area and to identify the potential for wetlands in the study area. The team obtained information related to topography, drainage, water features, and any documented wetlands from the sources below and recent delineations within or close to the study area:

- Aerial maps of the project area

- National Wetland Inventory maps (NWI), U.S. Department of the Interior, U.S. Fish and Wildlife Service (USFWS); however, the area has not been mapped by the NWI
- Natural Resources Conservation Service (NRCS) Web Soil Survey of Washington County Area, Utah

1.5 Existing Field Conditions

The wetland field reconnaissance was conducted during three fair-weather periods from December 18 to 20, 2007, on January 22 and 23, 2008, and on May 20 and 21, 2008. During these three periods, temperatures ranged from the low 40s to the low 100s (May 21). Due to the low elevation and more southerly latitude of the study area, many trees and shrubs still had leaves. For the December and January field visits, many of the herbaceous plants were still identifiable based on plant growth and remaining reproductive parts or seed heads. During the May field visit, the trees and shrubs were blooming or fruiting, though most of the herbaceous vegetation was in the spring growth period. However, recent flooding had damaged or laid down the vegetation in some of the potential wetland areas along the Santa Clara River.

The floodplain of the Santa Clara River within the city of St. George and adjacent cities has gone through extensive changes over the years due to development. The movement of the river within its floodplain has been restricted in most places to about 60 to 100 feet in width between the armored banks. However, during high flood events, the Santa Clara has been know to over flow its armored banks and sometimes damage the surrounding developments, such as the Southgate Golf Course. The bank armoring and other related structures along this reach of the Santa Clara River within the project area have also limited the extent of the wetlands within this constrained floodplain. This has probably increased flow velocities within this reduced floodplain, causing a high level of disturbance in the emergent marsh wetland communities.

1.5.1 General Hydrology

All of the wetlands in the study area are associated with the Santa Clara River and Virgin River floodplains. The Santa Clara River is influenced by the Baker and Gunlock dams; however, these structures and their corresponding reservoirs are kept full whenever possible and are not intended as flood control but as water-storage facilities (Natural Channel Design 2005). Therefore, flooding is still common along the Santa Clara River. The most recent major flood event occurred in January 2005, when the various reaches of the entire river

experienced either large (20- to 50-year event) or extreme (greater than 50-year event) flows.

The Santa Clara River influences groundwater levels in the restricted floodplain but has limited influence in the adjacent upland areas. The adjacent uplands, many of which are golf courses, drain toward the river. Some of the riparian edges of the floodplain above the river's groundwater influence could be influenced by irrigation from the golf course.

1.5.2 General Plant Community Types

The study area contains five primary plant communities: (disturbed) emergent marsh, scrub-shrub wetland, open water, upland riparian, and upland landscaped. Appendix D, List of Plant Species Observed, lists the plant species that were observed in the study area, including scientific name, common name, Regional Wetland Indicator Region 8 (Intermountain) status, and native or introduced status.

Wetland Communities

Disturbed emergent marsh and scrub-shrub wetland are the primary wetland types in the study area. The emergent marsh community along the Santa Clara River in the delineation study area commonly includes narrow-leaf cattail (*Typha angustifolia*), bulrushes (*Scirpus* spp.), rushes (*Juncus* spp.), common reed (*Phragmites australis*), coyote willow (*Salix exigua*), salt-cedar (*Tamarix ramosissima*), arrowweed (*Pluchea sericea*), redtop (*Agrostis stolonifera*), Bermuda grass (*Cynodon dactylon*), and sweet clover (*Melilotus* spp.). The scrub-shrub wetland community includes only a subset of those species, such as salt-cedar, coyote willow, arrowweed, and common reed.

The open-water areas in the study area, such as the channel of the Santa Clara River or the constructed water features (ponds) of the golf course, did not have any complex aquatic plant communities. Algae coated some rocks and other hard substrates in both the river channel and the ponds.

Upland Communities

Much of the Santa Clara River banks are currently developed and are being used as a golf course. In most locations, the upland areas are abruptly separated from the riverine areas by a steep, armored bank of large rocks. However, in some areas, armoring was not put in place, and the bank consists of a near-vertical and highly unstable, eroded bank about 4 to 7 feet high. In areas where some of the native, riparian vegetation remains, the observed plant species include cottonwoods (*Populus* spp.), salt-cedar, willows (*Salix* spp.), big saltbush

(*Atriplex lentiformis*), Russian thistle (*Salsola iberica*), sweet clover, and Bermuda grass. In the areas where riparian vegetation grows, the banks are at a lower angle and are more stable than where the golf course borders the floodplain.

The remaining upland areas adjacent to the Santa Clara River were within the landscaped property of the Southgate Golf Course. The plant communities in golf course areas were dominated by various planted mixes of closely cropped grasses along with planted cottonwoods and other introduced species such as Bermuda grass and desert ornamentals.

The upland surrounding the Virgin River is similar to some of the upland areas surrounding the Santa Clara River. There is some armoring along the Virgin River, though it is higher up on the banks to protect the bridge abutments and other structures. In these areas, the vegetation is composed mostly of salt-cedar, big saltbush, and Russian thistle with a smaller component of willows than what was found along the Santa Clara River section of the study area. The terrain on the north side of the Virgin River rises quite sharply above the banks, and the plant community shifts very quickly to a fully arid upland community as the slope approaches the cliffs overlooking the river.

1.6 Wetland Jurisdiction

Wetlands are defined by the U.S. Army Corps of Engineers (USACE) as areas where hydrophytic vegetation (plants that are adapted to wet conditions), hydric soils, and wetland hydrology are simultaneously present.

USACE considers a wetland to be jurisdictional if it is characterized by the three parameters of hydric soils, hydrophytic vegetation, and wetland hydrology and if it is adjacent or otherwise connected to waters of the United States as identified in the Clean Water Act. Waters of the U.S. include waters such as lakes, rivers, streams, or wetlands that are or could be used for interstate or foreign commerce that could be used by interstate or foreign travelers for recreation or other purposes, or that support fish populations that are or could be sold or traded across state or foreign boundaries.

2.0 Results

2.1 Site-Specific Investigation

Field investigations were conducted for the presence and extent of jurisdictional wetlands in the study area between December 18, 2007, and May 21, 2008. The entire 179-acre delineation study area was reviewed for wetlands. The vegetation, soils, and hydrology of the site were examined according to the USACE *Wetlands Delineation Manual* (Environmental Laboratory 1987) and the *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (Environmental Laboratory 2006). A total of four data points were recorded.

2.1.1 Vegetation

Vegetation was documented in the general area surrounding each data point. Each wetland polygon area was scanned, and plant species were identified. Plant communities were generally similar within their land types (emergent marsh, riparian, etc.), so data points were placed at logical points along the river system to capture any potential small, localized differences in plant communities and other wetland characteristics. Vegetation was considered hydrophytic when over 50% of the dominant species had an indicator status of facultative (FAC), facultative wetland (FACW), or obligate (OBL). Table 2-1 describes the indicator status assigned to plant species for the purpose of delineating wetlands.

Table 2-1. Wetland Indicator Status System

Indicator Status	Indicator Symbol	Definition
Obligate	OBL	Plants almost always occur under natural conditions in wetlands (estimated probability >99%) but might occur rarely in non-wetlands (estimated probability <1%).
Facultative wetland	FACW	Plants usually occur in wetlands (estimated probability 67% to 99%) but are occasionally found in non-wetlands (estimated probability 1% to 33%).
Facultative	FAC	Plants are equally likely to occur in wetlands or non-wetlands (estimated probability 34% to 66%).
Facultative upland	FACU	Plants usually occur in non-wetlands (estimated probability 67% to 99%) but are occasionally found in wetlands (estimated probability >99%) and in non-wetlands under natural conditions in the region.
Upland	UPL	Plants occur almost always in non-wetlands under natural conditions in the region (estimated probability >99%).

Table 2-1. Wetland Indicator Status System

Indicator Status	Indicator Symbol	Definition
No indicator status	NI	Plants for which sufficient data are not available to estimate the probability of occurrence in wetlands.
Not listed	NL	Plants that are not listed on the Region 8 Plant Indicator Status List.

Source: Environmental Laboratory 1987

2.1.2 Soils

In accordance with USACE methodology, soil samples were taken at all sampling points and were examined for indicators of hydric conditions. Hydric soils are soils that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions that favor the growth of hydrophytic vegetation. Hydric soil indicators can include depletions below a dark soil surface, depleted matrix, redox concentrations, and sandy redox. In this riverine system in southern Utah, other indicators can be common, such as red parent material and problematic soils associated with alluvial systems.

According to the NRCS soil survey (NRCS, no date), all the soils containing wetlands are listed as fluvaquents and torrifluvents (sandy) and are also listed as hydric. Otherwise, the adjacent upland areas in the study area are the Tobler fine sandy loam, Tobler silty clay loam, or St. George silty clay loam (shallow water table), none of which are listed as hydric soils.

2.1.3 Hydrology

Data-point locations were located within the study area, and wetland hydrology was evaluated at each data-point location. Evaluation of hydrology included observation of surface water, soil saturation, groundwater depth, soil cracking, water marks, drift deposits, and sediment deposits. All of the delineated wetlands were above the ordinary high-water mark (OHWM) of both the Santa Clara and Virgin Rivers.

2.2 Wetland Determination

2.2.1 Delineated Wetlands

Figures 2, 3, 4, and 5 in Appendix A present the wetland delineation maps that were prepared for the study area. Table 2-2 below presents general information

about each wetland, including size, hydrogeomorphic classification, and Cowardin classification. NWI mapping was not available for this area.

All of the wetlands are associated with either the Santa Clara or Virgin Rivers, which flow into the Colorado River in Nevada, a traditional navigable water. The wetland survey team did not observe any examples of interstate or foreign commerce associated with the wetlands or any of the other waters of the U.S. in the study area. However, there are recreational uses of the adjacent uplands including golfing and dispersed recreation (such as walking, biking, bird-watching).

No wetlands were delineated in the study area below the OHWM of either the Santa Clara or Virgin Rivers. The only other water of the U.S. within the project area not associated with either of the two rivers is the constructed golf course ponds. The golf course ponds were delineated from the most recent available aerial images. The largest of the golf course ponds, shown in Figure 3 (Santa Clara River Middle), has an overflow pipe that drains into the Santa Clara River. However, the other ponds did not appear to have any obvious connections to the river but perhaps drain into the local storm drain system when overflowing.

Table 2-2. Wetland Polygon Summary

Wetland ID	Size (acres)	Classification	
		Hydrogeomorphic	Cowardin[a]
A	0.16	Riverine	SS
B	0.1	Riverine	EM
C	9.9	Riverine	Open water
D	3.4	Riverine	Open water
E	0.9	Depressional	Open water
F	3.2	Depressional	Open water
G	0.4	Depressional	Open water
H	0.6	Depressional	Open water
I	0.7	Depressional	Open water
J	0.2	Depressional	Open water
Ditch 1	0.06	(Ditch)	Open water
Ditch 2	0.03	(Ditch)	Open water

[a] Definitions:

SS (scrub-shrub) – on the banks of a river system

EM (emergent marsh) – in a river system but significantly disturbed.

Open water – includes both river channel and constructed ponds and ditches.

2.2.2 Jurisdictional Wetlands

The wetland survey team evaluated and mapped two wetlands totaling 0.26 acre as well as 19.4 acres that included open-water ponds, river channels, and two ditches. These wetlands are described in the following paragraphs, which are arranged into two sections according to the associated water of the U.S.

Wetland A (Virgin River). Wetland A is a scrub-shrub wetland in the eastern section of the study area adjacent to the Virgin River. The wetland is on the western bank of a previous river channel (now an oxbow) and covers a total of about 0.16 acre in the delineation study area (see Figure 4 in Appendix A). Hydrology is supplied by the Virgin River, as the wetland is located abutting a previous channel of the river. The main channel of the Virgin River has since shifted to the east. However, water still flows through this oxbow, and the wetland is within the historic floodplain and is probably supported in part through groundwater.

The soil is mapped as fluvaquents and torrifluvents (sandy) and is classified as hydric. Redox concentrations greater than 2% were observed starting at 2 inches below the surface, and supported hydrophytic vegetation. However, the soil also displayed a reddish color (7.5 YR 4/4). Therefore, given the color of the soil matrix and the redox concentrations, the soil in this wetland fits the description of problematic soils in the *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (Environmental Laboratory 2006) within the situation of red parent material (TF2). Due to late May through June being the dry time of year for the St. George area, hydrology indicators were problematic and failed to pass for wetland hydrology not only because of the time of year but also from willow cotton and other vegetative material obscuring secondary indicators that might be seen on or around the soil surface.

Vegetation in Wetland A consists primarily of coyote willow and arrowweed in the sapling/shrub stratum and common reed in the herb stratum.

Wetland B (Santa Clara River). Wetland B is an emergent marsh wetland on the inside (right side facing downstream) of the Santa Clara River channel in the central part of the study area. This wetland is on the right bank of the Santa Clara River just above the OHWM and covers a total of about 0.1 acre in the delineation study area (see Figure 3 in Appendix A). Hydrology is supplied by the Santa Clara River, as this wetland is just above the OHWM (wetland continues below OHWM). However, the river's floodplain was previously wider; it has been restricted by manipulated and rock-armored banks, which have significantly disturbed and degraded the original riverine wetlands.

The soils are mapped as fluvaquents and torrifluvents (sandy) and are classified as hydric. The soils generally did not display any specific characteristics of a

hydric soil other than containing sufficient hydrology and supporting hydrophytic vegetation. The lack of any strong hydric soil indicators is most likely due to the alluvial nature of the soils in an active river floodplain. Therefore, the soils in these wetlands are listed as problematic soils in the *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (Environmental Laboratory 2006) within the situation of vegetated sand and gravel bars within floodplains.

Vegetation in Wetland B consists generally of coyote willow (some of which has been planted) and salt-cedar with a lesser component of narrow-leaf cottonwood (*Populus fremontii*) in the sapling/shrub stratum and rushes, redtop, Bermuda grass, and a mixture of other obligate, facultative, and facultative upland species in the herb stratum.

2.2.3 Open Water

Open water covers about 19.4 acres in the study area. Open water consists of the entire channel areas (the area below the OHWM that includes low-flow channels, alluvial sand and gravel bars) of both the Santa Clara and Virgin Rivers, two ditches, the golf course ponds, and a private pond in the upland areas adjacent to the Santa Clara River. The flowing river channels are dynamic and their acreages can sometimes change seasonally or even weekly (though to a lesser degree) depending on the time of year and current conditions and whether the banks are stabilized by rocks or other types of bank armoring. However, the open-water ponds in the Southgate Golf Course are maintained, and therefore the depths fluctuate very little as long as the rainfall overflow drains are not blocked.

Ditch 1 is a stormwater drain that originates in the developed area to the north (downtown St. George) and emerges from a 6-foot culvert next to Hilton Drive in the northern arm of the study area, where it flows into the Santa Clara River (see Figure 4 in Appendix A).

Ditch 2 is an irrigation ditch that originates to the northwest, outside the project area, from a pipe to a short section of concrete-lined ditch and then continues in a native soil ditch where irrigation water is then dispersed into an alfalfa field. No apparent outlet to the Santa Clara River was observed; all water delivered to the field either is absorbed into the ground or evaporates (see Figure 2 in Appendix A).

2.2.4 Riparian Habitat

Riparian habitat covers about 3.7 acres of the study area. Although riparian habitat is associated with both the Santa Clara and Virgin Rivers, riparian areas are currently in upland zones. These areas do not meet the federal criteria for

wetlands because they lack the soils and hydrology to be considered a wetland. The riparian areas along the Santa Clara River might be sustained by golf course irrigation even though the natural hydrology is no longer present. The riparian plant community is primarily composed of cottonwoods and salt-cedar with a small component of willow in both the tree and sapling/shrub strata and is dominated by Bermuda grass, planted golf course grass mixes, and other weeds in the herb stratum.

3.0 Summary

The wetland survey team identified and delineated 0.1 acre of disturbed emergent marsh wetland; 0.16 acre of scrub-shrub wetland; 19.4 acres of open water associated with the Santa Clara and Virgin River channels and alluvial sand and gravel bars, two ditches, and constructed ponds; and 3.7 acres of riparian habitat in the uplands in the study area.

Delineated wetlands include the following types and acreages:

- Disturbed emergent marsh wetland – 0.1 acre
- Scrub-shrub wetland – 0.16 acre
- Riparian – 3.7 acres
- Open water – 19.4 acres

3.1 Data Forms

Data forms for routine wetland determination have been completely filled out for the areas that had potential wetland characteristics. The data forms are included in Appendix B, Site Data Forms, of this report.

3.2 Additional Information

The following supporting information is included in the appendices to this delineation report:

- Appendix A – Wetland Delineation Maps
- Appendix B – Site Data Forms
- Appendix C – Wetland Photographs
- Appendix D – List of Plant Species Observed

4.0 References

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe

1979 Classification of Wetlands and Deepwater Habitats of the United States. Office of Biological Services, U.S. Department of the Interior, FWS/OBS-79/31.

Environmental Laboratory

1987 Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1. U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

2006 Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region. ERDC/ Technical Report-06-16. U.S Army Engineer Research and Development Center, Vicksburg, MS.

Natural Channel Design

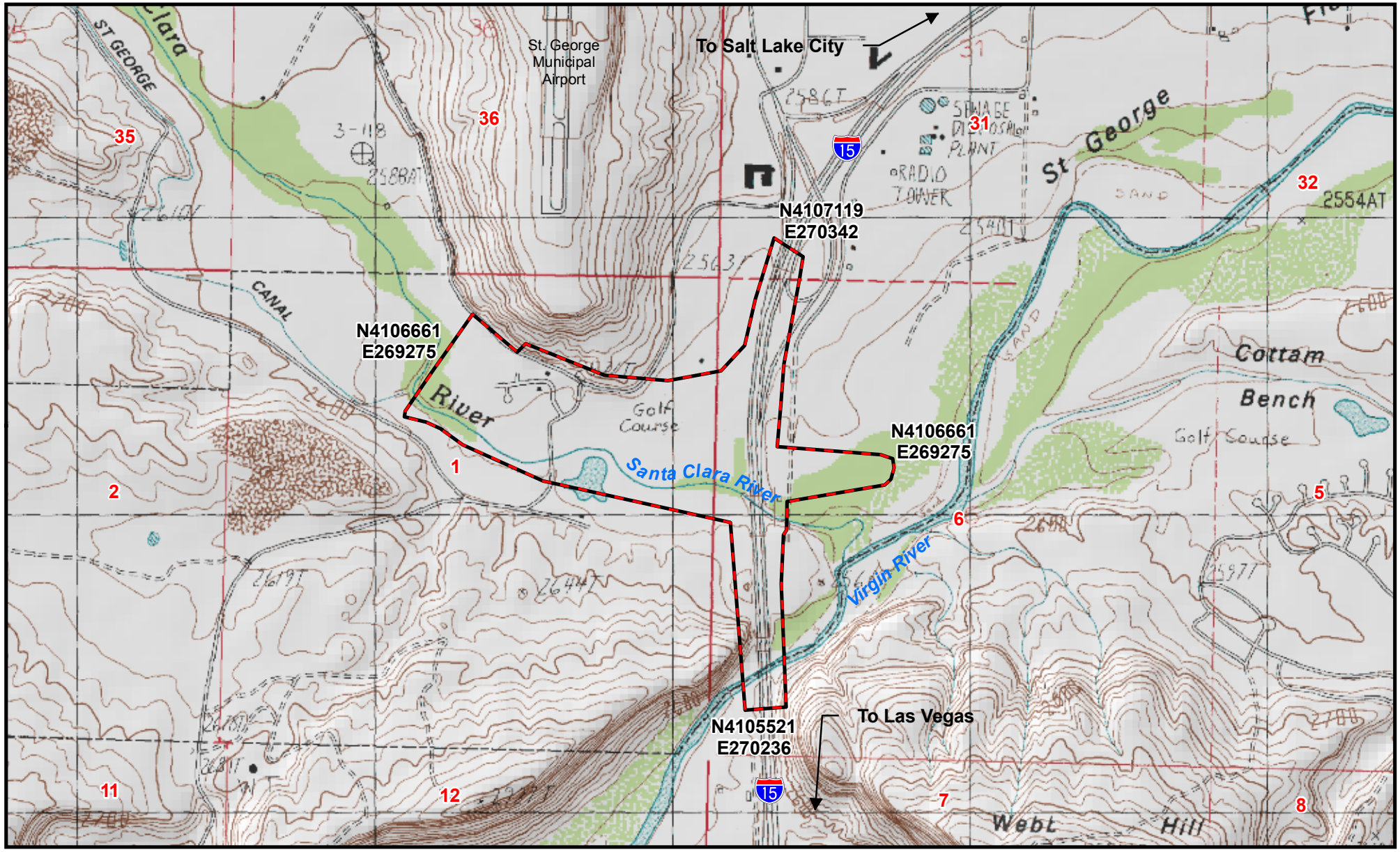
2005 Master Plan: A Road Map for Reconstruction, Management, and Long-Term Maintenance, Santa Clara River, Washington County, UT. September 2005.

[NRCS] Natural Resources Conservation Service

No date Web Soil Survey 2.0. websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx. Accessed February 13, 2008.

APPENDIX A

Wetland Delineation Maps



Legend

Delineation Study Area

Project Location

0 0.125 0.25 Miles

Base map composed from 7.5 minute quadrangles.
Coordinates are in NAD 1983 UTM Zone 12 North

Dixie Drive Interchange

Saint George, UT

Delineation of Waters of the U.S.

Figure 1 - Study Area

S-I15-1(77)6
Investigators: HDR Engineering Inc.
January 2008

HDR Engineering, Inc.
Salt Lake City, Utah

Friday, February 22, 2008 4:36:03 PM
O:\projects\UDOT\73453_DixieDr\map_docs\mxd\map_aL_Dixie_WetlandDelinTopo.mxd

Legend

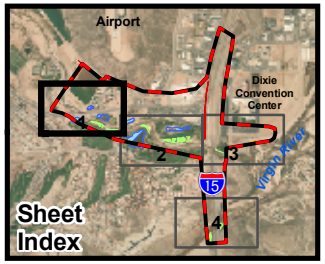
- Sample Points
- Drain Pipe
- OHWM
- Ditch
- Study Area Boundary
- Emergent Marsh
- Scrub-Shrub
- Riparian
- Open Water

T43S, R16W, Section 1

Latitude/Longitude (Center of Sheet)

37.0758 -113.5956

0 100 200 Feet



Dixie Drive Interchange

Saint George, UT

Delineation of Waters of the U.S.

Figure 2 - Santa Clara River West

S-I15-1(77)6
Investigators: HDR Engineering Inc.
January 2008

HDR Engineering, Inc.
Salt Lake City, Utah

Monday, February 25, 2008 9:51:53 AM
O:\projects\UDOT\73453_DixieDr\map_docs\mxd\map_aP_Dixie_WetlandDelinSeries.mxd

Legend

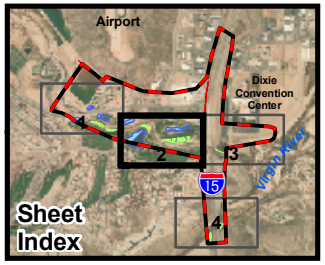
- Sample Points
- Drain Pipe
- OHWM
- Ditch
- Study Area Boundary
- Emergent Marsh
- Scrub-Shrub
- Riparian
- Open Water

T43S, R16W, Section 1
T43S, R15W, Section 6

Latitude/Longitude (Center of Sheet)

37.0748 -113.589

0 100 200 Feet



Dixie Drive Interchange

Saint George, UT

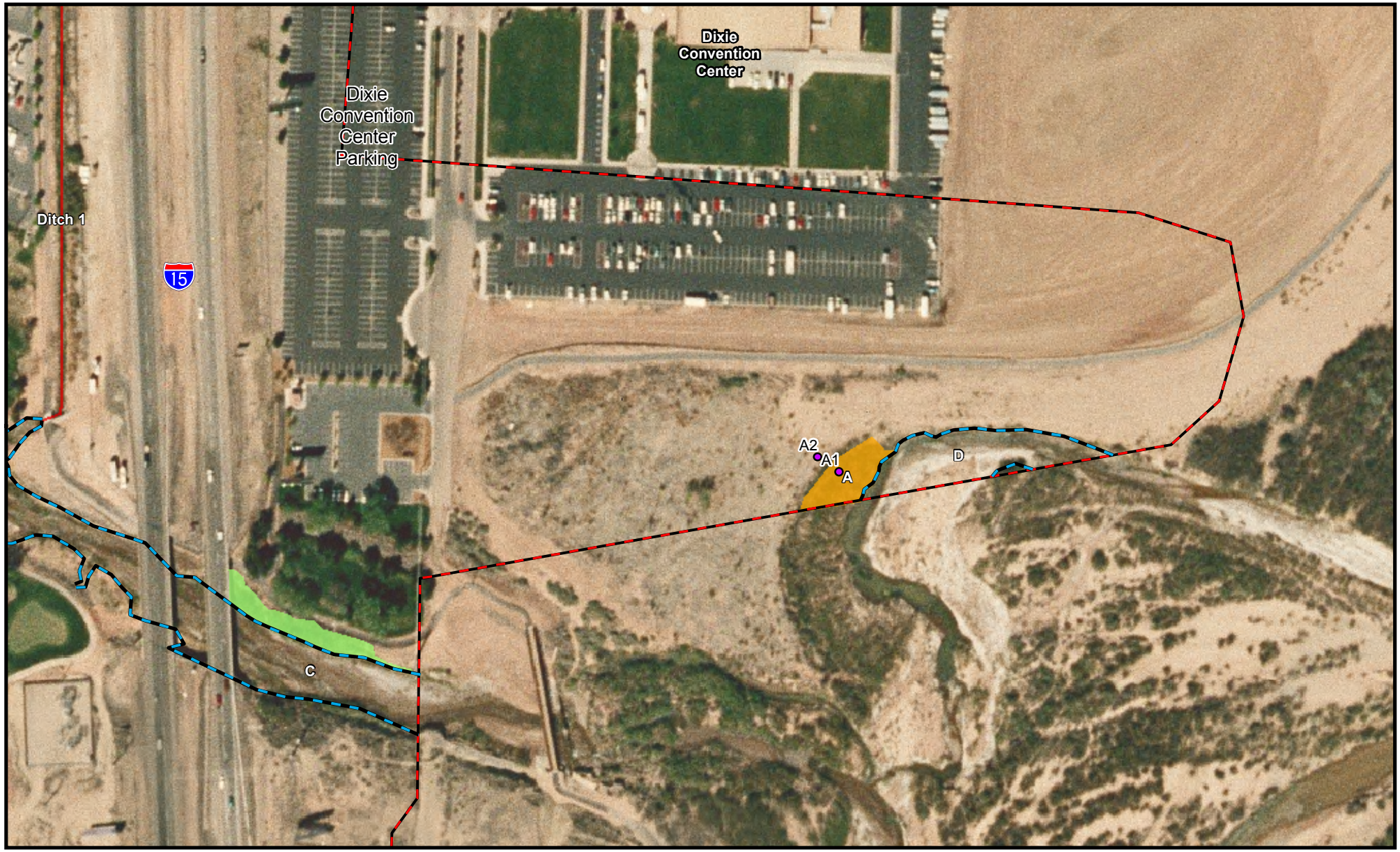
Delineation of Waters of the U.S.

Figure 3 - Santa Clara River Middle

S-I15-1(77)6
Investigators: HDR Engineering Inc.
January 2008

HDR Engineering, Inc.
Salt Lake City, Utah

Monday, February 25, 2008 9:51:53 AM
O:\projects\UDOT\73453_DixieDr\map_docs\mxd\map_aP_Dixie_WetlandDelinSeries.mxd



Legend

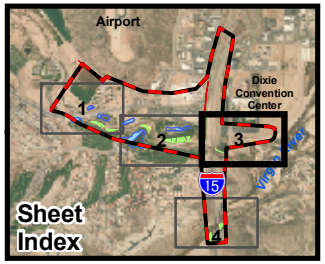
- Sample Points
- Drain Pipe
- OHWM
- Ditch
- Study Area Boundary
- Emergent Marsh
- Scrub-Shrub
- Riparian
- Open Water

T43S, R15W, Section 6

Latitude/Longitude (Center of Sheet)

37.075 -113.5823

0 100 200 Feet



Dixie Drive Interchange

Saint George, UT

Delineation of Waters of the U.S.

Figure 4 - Santa Clara River East

S-I15-1(77)6
Investigators: HDR Engineering Inc.
January 2008

HDR Engineering, Inc.
Salt Lake City, Utah

Monday, February 25, 2008 9:51:53 AM
O:\projects\UDOT\73453_DixieDr\map_docs\mxd\map_aP_Dixie_WetlandDelinSeries.mxd

Legend

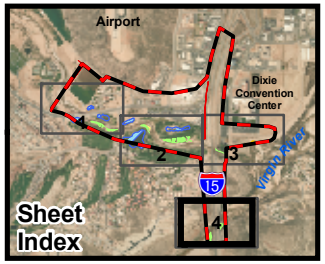
- Sample Points
- Drain Pipe
- OHWM
- Ditch
- Study Area Boundary
- Emergent Marsh
- Scrub-Shrub
- Riparian
- Open Water

T43S, R16W, Section 1
T43S, R15W, Section 6

Latitude/Longitude (Center of Sheet)

37.0695 -113.5843

0 100 200 Feet



Dixie Drive Interchange

Saint George, UT

Delineation of Waters of the U.S.

Figure 5 - Virgin River

S-I15-1(77)6
Investigators: HDR Engineering Inc.
January 2008

HDR Engineering, Inc.
Salt Lake City, Utah

Monday, February 25, 2008 9:51:53 AM
O:\projects\UDOT\73453_DixieDr\map_docs\mxd\map_aP_Dixie_WetlandDelinSeries.mxd

APPENDIX B

Site Data Forms

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Dixie Drive Interchange Project City/County: St. George/Washington Co. Sampling Date: 5/20/2008

Applicant/Owner: UDOT State: Utah Sampling Point: A1

Investigator(s): T. Toler Section, Township, Range: 3, T43, R15

Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): none Slope (%): <1

Subregion (LRR): LRR D Lat: 37 4' 29" N Long: 113 34' 54"W Datum: _____

Soil Map Unit Name: Fluvaquents and torrifluvents, sandy NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil X, or Hydrology X naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No _____	**Is the Sampled Area within a Wetland?** **Yes X** **No _____**
Hydric Soil Present?	Yes X	No _____	
Wetland Hydrology Present?	Yes _____	No X	

Remarks:

Outer bank, scrub-shrub wetland, near the Virgin River-Santa Clara River confluence oxbow area. Wetland abutting previous Virgin River channel, now diverted east but still flowing through this older channel. Dry season and soil surface conditions make proper hydrology assessment problematic, but both the soils and vegetation clearly indicate a wetland.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:			
Sapling/Shrub Stratum			
1. Salix exigua	70	✓	OBL
2. Pluchea sericea	25	✓	FACW
3.			
4.			
5.			
Total Cover:	95		
Herb Stratum			
1. Phragmites australis	5	✓	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	5		
Woody Vine Stratum			
1.			
2.			
Total Cover:			

% Bare Ground in Herb Stratum 95 % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = 0
FACW species _____	x 2 = 0
FAC species _____	x 3 = 0
FACU species _____	x 4 = 0
UPL species _____	x 5 = 0
Column Totals: 0 (A)	0 (B)

Prevalence Index = B/A = 0.0

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes X** **No _____**

Remarks:

Willow bank, with only a few Tamarix ramosissima on the fringe of the bank (not really in the wetland). Small pockets of common reed were also observed in amongst the coyote willow and arrowweed. Vegetation too dense for shorter herbaceous species.

SOIL

Sampling Point: A1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-2	7.5YR 4/4	70					silty clay loam	primary matrix
0-2	7.5YR 2.5/1	30						bands of organic-rich deposits
2-22	7.5YR 4/4	95-97	5YR 4/6-2.5YR 3/6	3-5	C	PL	clay loam	redox in horizontal fracture plane

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- X Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes X No ___

Remarks:

Redox mostly in horizontal ped surfaces / fracture planes, but more in root channels in first 2"-5". In the first 2", thin bands (1-5 mm) of dark organic deposits were observed within the more abundant red parent material matrix. A few salt concretions were observed below 5" (<2%). Redox hue and value changed deeper in the profile; to 2.5YR 3/6 below 15".

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): 10

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No ground water observed to 22" at this time, but soils saturated to within 10" of soil surface; Saturation (A3) fails though water table may have just dropped. Some secondary riverine indicators may also have been present, but the ground surface was recently obscured by willow "cotton" and other plant material making assessment not possible at this time. For this survey area, late May through June is the driest season, and therefore it is not surprising to find such a low water table given the site's proximity to flowing channel.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Dixie Drive Interchange Project City/County: St. George/Washington Co. Sampling Date: 5/20/2008

Applicant/Owner: UDOT State: Utah Sampling Point: A2

Investigator(s): T. Toler Section, Township, Range: 3, T43, R15

Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): none Slope (%): <1

Subregion (LRR): LRR D Lat: 37 4' 30" N Long: 113 34' 54"W Datum: _____

Soil Map Unit Name: Fluvaquents and torrifluvents, sandy NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation X, Soil X, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No X

Are Vegetation _____, Soil X, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No X	**Is the Sampled Area within a Wetland?** Yes _____ No X
Hydric Soil Present?	Yes _____	No X	
Wetland Hydrology Present?	Yes X	No _____	

Remarks:

Raised terrace has been disturbed and cleared by recent flood damage and construction activities. No hydrologic support observed, no hydric soil indicators, and herbaceous stratum does not indicate a wetland.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:			
Sapling/Shrub Stratum			
1. Tamarix ramosissima	40	✓	FACW
2.			
3.			
4.			
5.			
Total Cover:	40		
Herb Stratum			
1. Kochia scoparia	30	✓	FACU
2. Salsola iberica	5		FACU
3. Sysmbrium altissimum	3		FACU
4. Atriplex heterosperma	1		NL
5.			
6.			
7.			
8.			
Total Cover:	39		
Woody Vine Stratum			
1.			
2.			
Total Cover:			

% Bare Ground in Herb Stratum 61 % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species	40	x 2 =	80
FAC species		x 3 =	0
FACU species	38	x 4 =	152
UPL species	1	x 5 =	5
Column Totals:	79 (A)		237 (B)

Prevalence Index = B/A = 3.0

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

X Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes X No _____

Remarks:

Site very disturbed from floods and recent construction of nearby road and bike trail - site dominated by weedy and invasive species. Tamarisk is the only FACW species, but it is deep rooted and its status is not representative of the herbaceous layer (FACU). Prevalence test is very borderline, but due to some clearing and the early growth observed in this part of the season, herbaceous stratum cover by weedy annuals is much reduced from what would be found during the peak of the season.

SOIL

Sampling Point: A2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-2	7.5YR 4/3	100					silt loam	woody debris on surface
2-12	7.5YR 4/4	99					silt loam	salt concentrations below 9" (<2%)
12-20	5 YR 3/4	95					silt loam	salt concentrations (5%)

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) (**LRR C**)
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✕

Remarks:

No redox observed, but only salt concentrations faintly begin at 9", but are more prevalent below 12".

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine**)
___ Drift Deposits (B3) (**Nonriverine**)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine**)
___ Drift Deposits (B3) (**Riverine**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✕ Depth (inches): _____

Water Table Present? Yes _____ No ✕ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✕ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✕

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No ground water or saturated soils observed to 22" at this time. Soil surface at least 3 to 4 ft. above river level.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Dixie Drive Interchange Project City/County: St. George, Washington Co. Sampling Date: Jan 23, 2008

Applicant/Owner: UDOT State: Utah Sampling Point: B1

Investigator(s): T. Toler and B. Holloway Section, Township, Range: T43 R16 Sect 1

Landform (hillslope, terrace, etc.): Santa Clara River floodplain Local relief (concave, convex, none): concave Slope (%): <2

Subregion (LRR): LRR D Lat: 37 4' 33" N Long: 113 35' 24"W Datum: _____

Soil Map Unit Name: Fluvaquents and torrifluvents, sandy NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation X, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No X

Are Vegetation _____, Soil X, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No _____	**Is the Sampled Area within a Wetland?** **Yes X** **No _____**
Hydric Soil Present?	Yes X	No _____	
Wetland Hydrology Present?	Yes X	No _____	

Remarks:

Alluvial bank wetland (vegetated sand and gravel bars within floodplain), soils not clear (problematic) but hydrology and vegetation clearly indicate a wetland. Data form describes area above and below OHWM. Area recently flooded, much of the vegetation laid down.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:			
Sapling/Shrub Stratum			
1. Salix exigua	10	✓	OBL
2. Populus fremontii	2		FACW
3.			
4.			
5.			
Total Cover:	12		
Herb Stratum			
1. Juncus sp.	5	✓	OBL
2. Typha angustifolia	8	✓	OBL
3. Agrostis stolonifera	3		FACW
4. Cynodon dactylon	1		FAC
5. Melilotus sp.	2		FACU
6.			
7.			
8.			
Total Cover:	19		
Woody Vine Stratum			
1.			
2.			
Total Cover:			

% Bare Ground in Herb Stratum 81 % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 = 0
FACW species		x 2 = 0
FAC species		x 3 = 0
FACU species		x 4 = 0
UPL species		x 5 = 0
Column Totals:	0 (A)	0 (B)

Prevalence Index = B/A = 0.0

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes X** **No _____**

Remarks:

Site affected recent floods, species present but cover and species composition may not be typical for this site. Willows have also been replanted in this wetland. Point includes area above and below OHWM.

SOIL

Sampling Point: B1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-2	7.5YR 4/6	100					Sa Cl Lo	sandy clay loam
2-7	7.5YR 4/4	100					Sa Lo Sa	sandy loamy sand
7-20	7.5YR 3/4	100					sand	coarse sand w/ gravel

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- X Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ___

Remarks:

Sandy and coarse sand in an alluvial deposition area of floodplain, pit below OHWM. Problematic soil of vegetated sand and gravel bars within floodplain.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- X Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- X Sediment Deposits (B2) (**Riverine**)
- X Drift Deposits (B3) (**Riverine**)
- X Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): _____

Water Table Present? Yes X No ___ Depth (inches): 13"

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): 7"

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Clear indications of recent and repeated high water at site. Soil saturated to 7", ground water level just below cut-off for High Water Table (A2) indicator.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Dixie Drive Interchange Project City/County: St. George, Washington Co. Sampling Date: Jan 23, 2008

Applicant/Owner: UDOT State: Utah Sampling Point: B2

Investigator(s): T. Toler and B. Holloway Section, Township, Range: T43 R16 Sect 1

Landform (hillslope, terrace, etc.): river terrace Local relief (concave, convex, none): none Slope (%): <2

Subregion (LRR): LRR D Lat: 37 4' 32" N Long: 113 35' 25"W Datum: _____

Soil Map Unit Name: Fluvaquents and torrifluvents, sandy NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation X, Soil _____, or Hydrology X significantly disturbed? Are "Normal Circumstances" present? Yes _____ No X

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No X
Hydric Soil Present?	Yes _____	No X	
Wetland Hydrology Present?	Yes _____	No X	

Remarks:

Upland riparian area above wetland bank and between wetland and golf course. Some vegetation clearing has occurred in the past in this area, natural conditions do not exist any longer at site.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. Populus angustifolia	5	✓	FAC
2.			
3.			
4.			
Total Cover:	5		
Sapling/Shrub Stratum			
1. Tamarix ramosissima	5	✓	FACW
2. Salix exigua	10	✓	OBL
3. Salix gooddingii	3		FACW
4.			
5.			
Total Cover:	18		
Herb Stratum			
1. Cynodon dactylon	30	✓	FAC
2. Panicum antidote	5		NL
3. Distichlis spicata	3		FAC
4. Salsola iberica	5		FACU
5.			
6.			
7.			
8.			
Total Cover:	43		
Woody Vine Stratum			
1.			
2.			
Total Cover:			

% Bare Ground in Herb Stratum 57 % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 = 0
FACW species		x 2 = 0
FAC species		x 3 = 0
FACU species		x 4 = 0
UPL species		x 5 = 0
Column Totals:	0 (A)	0 (B)

Prevalence Index = B/A = 0.0

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes X No _____

Remarks:

Riparian trees (some may be planted) and Bermuda grass (non-native invasive species) are dominant. The site may receive irrigation runoff from golf course.

SOIL

Sampling Point: B2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	7.5YR 3/4	100					sand	with some gravel
4-20	7.5YR 4/6	100					sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✕

Remarks:

Top soil layer may have had deposition from above average 2005 flood event. Red sandy soil next to golf course.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✕ Depth (inches): _____

Water Table Present? Yes _____ No ✕ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✕ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✕

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Sand only slightly damp, area may receive occasional irrigation runoff from golf course.

APPENDIX C

Wetland Photographs

Data Point A1

A1 Overview

Data Point A2

A2 Overview

Data Point B1

B1 Overview

Data Point B2

B2 Overview

APPENDIX D

List of Plant Species Observed

Dixie Drive Interchange Project, Washington County

List of Plant Species Observed in the Delineation Study Area (December 2007, January 2008, and May 2008)

Scientific Name[a]	Common Name[a]	Family Name	Region 8 Indicator Status[b]	Comments
Trees, Saplings, and Shrubs (Tree and Sapling/Shrub Strata)				
Atriplex lentiformis	Big saltbush	Chenopodiaceae	FAC	Native perennial shrub
Pluchea sericea	Arrowweed	Asteraceae	FACW	Native perennial shrub
Populus angustifolia	Narrow-leaf cottonwood	Salicaceae	FAC	Native riparian tree
Populus fremontii	Fremont cottonwood	Salicaceae	FACW	Native riparian tree
Salix exigua	Coyote willow	Salicaceae	OBL	Native riparian shrub
Salix gooddingii	Black willow	Salicaceae	FACW	Native riparian tree
Tamarix ramosissima	Salt-cedar	Tamaricaceae	FACW	Introduced, invasive riparian shrub/tree
Grasses and Forbs (Herbaceous Stratum)				
Agrostis stolonifera	Redtop	Poaceae	FACW	Introduced perennial grass
Cynodon dactylon	Bermuda grass	Poaceae	FAC	Introduced invasive grass
Distichlis spicata	Saltgrass	Poaceae	FAC	Native perennial grass
Juncus spp.	Rush	Juncaceae	FAC-FACW	Native perennial grasslike
Melilotus officinalis	Yellow sweet clover	Fabaceae	FACU	Introduced weed
Panicum antidotale	Blue panicgrass	Poaceae	NL	Introduced perennial grass
Phragmites australis	Common reed	Poaceae	FACW	Native perennial grass
Salsola iberica	Russian thistle	Chenopodiaceae	FACU	Introduced annual forb
Scirpus pungens	Common threesquare	Cyperaceae	OBL	Native perennial grasslike
Sisymbrium altissimum	Tall tumble mustard	Brassicaceae	FACU	Introduced perennial herb
Typha angustifolia	Narrow-leaf cattail	Typhaceae	OBL	Introduced perennial herb
Xanthium strumarium	Rough cockle-bur	Asteraceae	FAC	Native annual weed

Dixie Drive Interchange Project, Washington County

List of Plant Species Observed in the Delineation Study Area (December 2007, January 2008, and May 2008)

Scientific Name[a]	Common Name[a]	Family Name	Region 8 Indicator Status[b]	Comments

[a] Names follow Welsh et al. 1993.

[b] Region 8 Indicator Categories

OBL - Plants almost always occur under natural conditions in wetlands (estimated probability >99%), but might occur rarely in non-wetlands (estimated probability <1%).

FACW - Plants usually occur in wetlands (estimated probability 67% to 99%), but are occasionally found in non-wetlands (estimated probability 1% to 33%).

FAC - Plants are equally likely to occur in wetlands or non-wetlands (estimated probability 34% to 66%).

FACU - Plants usually occur in non-wetlands (estimated probability 67% to 99%), but are occasionally found in wetlands (estimated probability >99%) and in non-wetlands under natural conditions in the region.

UPL - Plants occur almost always in non-wetlands under natural conditions in the region (estimated probability >99%).

NI - Plants for which sufficient data are not available to estimate the probability of occurrence in wetlands.

NL - Plants that are not listed on the Region 8 Plant Indicator Status List.