



WEST DAVIS  
CORRIDOR

# Wetland Assessment Methodology

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Technical Report 8  
in support of the  
Environmental Impact Statement

West Davis Corridor Project

Federal Highway Administration  
Utah Department of Transportation



UDOT Project No. SP-0067(14)0

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## 1.0 Purpose of This Technical Report

The purpose of this technical report is to document the decision-making process that the Utah Department of Transportation (UDOT), the Federal Highway Administration (FHWA), the U.S. Army Corps of Engineers (USACE), and UDOT's consultants followed to determine the best approach to evaluate wetland resources within the West Davis Corridor (WDC) study area. This memorandum explains the methodologies that will be used to analyze wetlands at the Environmental Impact Statement (EIS) level. Other agencies involved in the development of this methodology include the U.S. Fish and Wildlife Service (USFWS) and the Utah Division of Wildlife Resources (UDWR). During the EIS process FHWA and UDOT will also follow Executive Order 11990, Protection of Wetlands.

## 2.0 Project Overview

FHWA, in cooperation with UDOT, is in the process of preparing an EIS on a proposed action to address projected transportation demand in western Davis and Weber Counties, Utah.

Alternatives to be considered include:

- Taking no action (no-build)
- Transportation system management
- Build alternatives for various modes of transportation
- Other alternatives identified during the study process

The West Davis Corridor EIS wetland study area, which is smaller than the overall project study area, covers about 15,646 acres (about 24.5 square miles) on the west side of Interstate 15 (I-15) from Centerville north to Marriott-Slaterville (see Figure 1). As part of the EIS, direct, indirect, and cumulative impacts to wetland resources will be evaluated. Due to the large study area and the amount of wetlands in the study area, it is not cost-effective or time-efficient to conduct a full wetland delineation using the USACE guidelines for all alternatives. We propose to collect existing wetlands information and conduct a field reconnaissance to identify and develop preliminary wetland mapping for the EIS process. Our proposed approach to collecting existing wetland data, inventorying wetlands in the field, and conducting the wetland analysis for the build alternatives is presented in the following sections.

## 3.0 Potential Approaches for Identifying Wetland Resources in the Study Area

The overall WDC project study area covers about 123.5 square miles. A large portion of this study area is currently developed as part of 15 cities and therefore supports extensive commercial and residential development. Because most of the developed area does not

support wetland areas, UDOT originally identified a preliminary wetland survey area within the overall study area that was about 30,000 acres.

After it identified the preliminary wetland survey area, UDOT began to gather more-detailed information. This included land ownership information, National Wetland Inventory (NWI) data, updated aerial photographs, and Regional Transportation Plan (RTP) information. This information prompted UDOT to reconsider the western boundary of the preliminary wetland survey area. Because the NWI data show that a large part of the study area to the west of the RTP alignment supports wetlands, and because a large area of land along the Great Salt Lake shore south of the Antelope Island Causeway is part of an established preserve (that is comprised of both privately owned lands and federally owned mitigation lands), UDOT revised the western boundary of the preliminary wetland survey area. The revised boundary generally coincides with the WDC alignment that is presented in the RTP with some variations farther west on the north side of the Antelope Island causeway. This revised preliminary wetland survey area generally focuses on undeveloped areas east of the RTP alignment and west of developed areas associated with the cities.

The project team considered three options for identifying wetlands in the survey area:

1. Complete a delineation using the USACE wetland delineation guidelines.
2. Complete a reconnaissance-level survey of areas that could support wetlands with some field data collection for verification.
3. Use multispectral imagery to identify potential wetland areas.

UDOT ruled out the first option, a complete delineation, because the cost associated with a delineation of such a large area is not feasible given that project alternatives have not yet been identified. UDOT intends to use wetland location information for alternative screening but believes that it could do so using wetland information that is gathered using more cost-effective methods.

The second option, which would consist of more detailed review of existing information about the survey area (updated aerial photographs, NWI data, and hydric soil data) would be more cost-effective in that detailed soil, vegetation, and hydrologic information would not need to be gathered for every potential wetland area. Using this method, the wetland team would be able to gather enough information to determine potential wetland areas and potential wetland impacts. This method would include field reconnaissance of the entire study area and some ground-verification in areas that are questionable after field review and/or consulting the existing information or in areas for which more information is needed to determine if wetlands exist.

The USACE suggested that UDOT consider the third option, using multispectral imagery, as a means to identify potential wetland areas. This option would require detailed field verification but would not require extensive data collection. The wetland team spoke at length with Christopher Neale at Utah State University about the multispectral imagery approach. According to Mr. Neale, this option would require UDOT to acquire images using specialized aerial photography. Extensive field work would have to be conducted to assign plant

communities to the different colors displayed on the imagery. UDOT has not previously used multispectral imagery to identify wetlands, so, if UDOT chooses to use this method, the project team would need to spend some time learning the process and gaining an understanding of the wetlands in the field. Furthermore, the finished product would still require additional work by the project team to create GIS (geographic information systems) data that could be used for the EIS analyses, but the magnitude of this additional work is unknown. The cost to use this method would probably be similar to that associated with a reconnaissance-level survey and documentation or possibly a bit higher, depending on the amount of work that the team would need to do in order to create a usable product. Because UDOT is not familiar with this approach and the large size of the study area and given the project schedule and budget constraints, UDOT believes that the WDC project would not be a good candidate to test this approach.

After reviewing the three options, UDOT is proposing to use the reconnaissance-level method (item 2 above). UDOT is recommending this method because it is cost-effective but will still provide the information needed to screen and analyze alternatives. Because the western edge of the preliminary wetland survey area abuts an area that supports wetlands, the survey would include areas beyond that western edge if wetlands in the study area extend beyond the boundary. If UDOT finds that it needs to evaluate areas west of the currently-defined boundary, it will meet with the appropriate regulatory agencies to discuss where and how to establish a new boundary. As currently proposed, UDOT will be able to use existing information (such as NWI data and aerial photography) as well as on-the-ground information to estimate indirect impacts within the study area during the environmental analysis phase of the EIS.

## 4.0 Proposed Work Plan – Reconnaissance Methods

### 4.1 Task 1 – Gather Existing Available Information

The first task will be to gather existing information pertinent to existing wetlands, including:

- Color and infrared aerial photographs of the study area at a level that wetlands are recognizable. Photography that is currently available from the Utah Automated Geographic Reference Center (AGRC) includes color 2009 National Agricultural Imagery Program (NAIP) 1-meter color aerial photographs and 2006 NAIP 1-meter infrared photography. The team will also gather historic photographs of the area for comparison.
- All NWI mapping for the study area
- Hydric soils maps from the Natural Resources Conservation Service (NRCS) database.
- Wetland information collected for other UDOT projects on aerial maps.

- The locations of springs in the study area. UDOT will use information available through the AGRC (such as the National Hydrography Dataset ), previously-completed surveys for other UDOT projects, and local professional knowledge about the study area.
- Boundaries and coverage of the Great Salt Lake Shorelands Preserve.
- Boundaries of preserves managed by the Utah Department of Natural Resources (UDNR).

This existing information will be consolidated in GIS and used to help define areas to be reviewed during our field investigations. Historical aerial photography that is collected as part of the EIS process will also be available for reference.

#### 4.2 Task 2 – Conduct Field Reconnaissance To Verify and Update Existing Information

Once the existing information has been gathered and processed onto the study area maps, the team will conduct a field reconnaissance to determine the accuracy of the existing data and to identify potential wetland areas that do not appear in the existing information dataset (e.g., wetlands that are not shown in the NWI). The field reconnaissance is currently scheduled for the spring of 2010. The preliminary mapping will be revised based on observations made during the field investigations. The team will use an approved “rapid assessment” checklist (latest version attached to this memorandum) during the field investigations and focus on wetland quality, hydrology, plant communities, general functional values, and, in some cases, soil conditions.

To verify that the information gathered using the checklist is consistent with UDOT’s standard wetland functional assessment methodology (UDOT 2006), the team will perform a full functional assessment using the 2006 method on about 5% to 10% of the total wetlands evaluated using the rapid assessment checklist. The team will perform the sample standard assessments after completion of the rapid assessments, focusing on representative samples of wetland types and wetland quality throughout the study area. The total number of sites evaluated using the standard methodology will be determined once the team knows the general number of wetlands in the study area. Because the standard functional assessment methodology includes a wildlife component but the wetland checklist does not address wildlife habitat, the team will not complete the wildlife assessment portion of the standard functional assessment during the verification process. Wildlife habitat will be evaluated separately using the team’s proposed wildlife habitat evaluation methodology; see Technical Report 9, Wildlife Assessment Methodology–Existing Conditions (HDR 2010).

The wetland boundaries will be mapped using a GeoExplorer GPS (global positioning system) unit, which will allow us to transfer information about the wetland polygons to the maps and to compute acreages of wetland. Wetland types will be documented (for example, palustrine forested, palustrine scrub-shrub, palustrine emergent marsh, palustrine wet meadow, playa, riverine, etc.). We will use the checklist to determine the quality of the wetlands based on obvious hydrology, plant community composition, and setting in the

landscape. During the field reconnaissance, we will invite interested agencies to observe the wetland/stream verification process and review wetlands and other waters of the U.S. in the field so that they can become more familiar with the resources. Field crews will also review areas within the study area for the presence of streams, sloughs, ditches, canals, and other waterways. Crews will also review areas that are outside of the wetland study area but in the overall study area for the presence of streams, sloughs, ditches, canals, and other waterways using aerial photography and ground reconnaissance.

As part of the mapping exercise and field investigations, wetlands that no longer exist due to development, other changes in land use, or changes in hydrologic support will be removed from the maps. UDOT will use the data to make a direct comparison of “before” and “after” during preparation of the EIS as well as for mapping of existing wetland resources.

The results of this effort will include:

- A report summarizing the methods used during and findings of the reconnaissance-level survey; the report will include summary information about the verification process using the 2006 wetland functional assessment methodology.
- Maps showing the wetland polygons, streams, springs, canals, and ditches
- A database that includes all information from the rapid assessment checklist for each area reviewed as part of the reconnaissance
- Table of acreages of wetlands (by type), springs, streams, canals, and ditches

### 4.3 Task 3 – Screen a Full Range of Alternatives

UDOT will use the wetland data collected and the resulting maps developed in Tasks 1 and 2 to screen the full range of alternatives and identify those alternatives that would have the greatest wetland impacts based on the aerial extent and quality of wetlands. Wetlands will be one of many criteria used to screen alternatives. Screening will consider the total acres of direct wetland impacts within the right-of-way (ROW), the types and quality of wetlands that would be affected, and how each alternative could affect general wetland functions. The ROW will be used for screening since cut and fill lines will not have been developed at this point in the process.

The results of this effort will estimate the direct wetland impacts within the ROW associated with each alternative considered during screening. Indirect and cumulative impacts would be considered during the detailed analyses of alternatives carried for further study.

#### 4.4 Task 4 – Conduct a Wetland Impact Analysis for the EIS Alternatives Studied in Detail

After the alternatives have gone through initial screening, we will use the following methods to estimate wetland impacts for all remaining alternatives studied in detail in the EIS:

- For wetlands within the actual right-of-way (ROW), the amount of wetlands by type (for example, forested, scrub shrub, emergent marsh, wet meadow, or playa) that would be affected (filled) will be calculated by overlaying the proposed cut and fill lines for each alternative on the wetland maps and performing a GIS area calculation. This will be considered a direct impact as a result of placing fill in a wetland. For the purpose of the wetland impact analysis, we will assume that all wetlands within the cut and fill lines for each alternative will be directly affected. Because UDOT will collect information about wetland quality, function, and value, it will also use these factors to compare alternatives (for example, comparing impacts to wetlands based on the low, medium, or high quality rating by wetland type). By using this method, the potential impacts can be consistently evaluated.
- For wetlands lying outside the cut and fill lines, but within 300 feet from the edge of the cut and fill lines, we will evaluate hydrology to determine if any of these wetlands could be potentially indirectly impacted. If part of a wetland that is within 300 feet extends beyond 300 feet, the team will evaluate the entire wetland, regardless of distance from the edge of the impact evaluation area.
- For wetlands lying outside the cut and fill lines, we will assume that the wetlands would not be affected unless the hydrology supporting those wetlands would be altered by the project. In cases where hydrology would be altered in these areas, indirect impacts will be calculated if the hydrology cannot be sustained with the project design.
- For other waters of the U.S., UDOT will estimate the amount of direct impact (either in linear feet or in acres, depending upon the type of feature) by overlaying the proposed cut and fill lines for each alternative and performing a GIS area calculation. UDOT will evaluate indirect impacts to features that pass through but extend beyond the limits of cut and fill on a case-by-case basis depending on the type of feature (e.g., a perennial stream would be evaluated differently than a potentially jurisdictional agricultural drainage ditch), proximity to other features (such as wetlands), and condition (such as natural versus channelized).

The results of this effort will include:

- Acreage of direct impacts resulting from the discharge of fill into wetlands and other waters of the U.S. within the cut and fill lines for each alternative.
- Acreage of wetlands within 300 feet from the edge of the cut and fill lines that potentially could be indirectly affected by loss of hydrology taking into consideration the project design.

- An acreage estimate of wetlands and other waters of the U.S. indirectly affected outside the ROW where supporting hydrology would be altered.

The results will be used to compare wetland impacts among the alternatives evaluated in detail in the EIS. Cumulative impact analyses will use information about the wetland features as well as information about historic and expected future activity in the study area. This process will help the NEPA lead and regulatory agencies identify the least environmentally damaging practicable alternative.

#### 4.5 Task 5 – Define Mitigation Opportunities for Unavoidable Impacts for the EIS

Opportunities for mitigation to compensate for unavoidable impacts to wetlands and waters of the U.S. will be identified and investigated for the EIS. We will investigate potential mitigation credits from existing mitigation sites to determine if there are any credits available that could apply to the project.

This effort will result in a technical memorandum listing opportunities for compensatory mitigation.

#### 4.6 Task 6 – Perform a Wetland Delineation for the Preferred Alternative

A preferred alternative will be identified in the Final EIS. At this time, there is no funding available to construct the WDC project if a build alternative is selected. Therefore, UDOT might delay submitting a Section 404 permit until funding for construction is identified. The wetland delineation for this project could occur after a Record of Decision (ROD) is issued when construction funding is identified.

The wetland delineation will be conducted in accordance with the 1987 *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) and the *Final Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (Environmental Laboratory 2008). These methods require evidence of three parameters—a dominance of hydrophytic vegetation, hydric soils, and wetland hydrology—to be simultaneously present for a jurisdictional wetland determination to be made.

The delineation will include identifying, delineating, and mapping the boundaries of wetland areas and the ordinary high-water mark (OHWM) of streams, ditches, and canals in the study area. During the permitting process, the quantity of fill material to be placed below the OHWM and within the wetland boundaries will be calculated in order to complete the Section 404 Permit application.

Wetland boundaries will be recorded with a handheld Trimble GeoExplorer XT GPS. Wetland boundaries will be mapped using the ArcPad 7.0 computer mapping program or AutoCAD.



As part of the wetland delineation fieldwork, all streams, canals, and ditches will be investigated to determine their connection to the Great Salt Lake or other waters of the U.S.

A wetland delineation report conforming to the USACE, Sacramento's District's "Minimum Standards for Wetland Delineations" will be prepared and submitted to the USACE. The following information will be documented in the delineation report to meet the Sacramento District's standards:

- A general narrative describing the wetlands
- The total acreage of the project site
- Existing field conditions such as season and flood/drought conditions
- Description of hydrology (surface and subsurface, including potential irrigation influence and drainage gradients)
- Site location map (Section, Township, Range)
- Directions to the project site
- Contact information for the applicant and property owner(s)
- Description of plant communities and habitat types present on the site
- A plant list of the scientific name, common name, and wetland indicator status of all plants
- Description of soils and list of hydric soil inclusions on the site
- Documentation of observed and/or documented examples of an interstate or foreign commerce connection
- Delineation maps at a scale of 1 inch to 100 feet or 200 feet. The maps will display the following information:
  - Project study area boundary
  - All features that meet the criteria for wetlands or waters of the U.S.
  - OHWM of potentially affected streams
  - Colored or stippled coding of different wetland types present on the site (for example, forested, scrub-shrub, emergent, playa, etc.)
  - Data point locations
  - Acreage of each wetland area
- Data sheets
- One set of paired data points for each wetland feature or complex



## 5.0 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.
- 2008 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.



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Figure 1. Wetland Study Area



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**UDOT - West Davis Corridor EIS  
Wetland Functional Quality Evaluation Checklist**

Check one:  SLOPE or  DEPRESSIONAL

Evaluator Name(s):		Date:	
UTM Location	North:	East:	
Street Address:		County:	
Legal	Section:	Township:	Range:
Approximate wetland size (in acres):			
Wetland above or below 4217 feet elevation?		<input type="checkbox"/> Above <input type="checkbox"/> Below	
<b>Wetland type</b>		<b>Dominant species (fill in)</b>	
<input type="checkbox"/> Forested <input type="checkbox"/> Scrub shrub <input type="checkbox"/> Emergent marsh <input type="checkbox"/> Wet meadow <input type="checkbox"/> Playa <input type="checkbox"/> Riparian <input type="checkbox"/> Open water			
<b>Soil type</b>	<b>Depth to water table</b>	<b>Subclass – surface water</b>	<b>Hydrology</b>
<input type="checkbox"/> Organic <input type="checkbox"/> Mineral <input type="checkbox"/> Hydric	<input type="checkbox"/> < 20 inches <input type="checkbox"/> ≥ 20 inches <input type="checkbox"/> Standing Water	<input type="checkbox"/> Permanent <input type="checkbox"/> Semi-permanent: 6-12 mo/all yr <input type="checkbox"/> Seasonal: 3-6 mo/most yrs <input type="checkbox"/> Ephemeral: < 3 mo/most yrs	<input type="checkbox"/> Groundwater <input type="checkbox"/> Surface water <input type="checkbox"/> Springs <input type="checkbox"/> Lake
<b>Prominent conditions at the perimeter of wetland</b>		<b>Disturbance within wetland boundary</b>	
<input type="checkbox"/> <b>Predominately natural, not grazed, hayed, landscaped, no human induced trails.</b> <input type="checkbox"/> <b>Not cultivated, moderately grazed or hayed, minor clearing or hydrological alteration, few ditches, canals, roads, buildings.</b> <input type="checkbox"/> <b>Cultivated, heavily grazed or landscaped, substantial grading, clearing, hydrological alteration, numerous ditches, canals, high road or building density.</b> <input type="checkbox"/> <b>0 – 100 feet</b> <input type="checkbox"/> <b>100 – 300 feet</b> <input type="checkbox"/> <b>300+ feet</b>		<input type="checkbox"/> <b>Predominately natural, not grazed, hayed, landscaped, no human induced trails.</b> <input type="checkbox"/> <b>Not cultivated, moderately grazed or hayed, minor clearing or hydrological alteration, few ditches, canals, roads, buildings.</b> <input type="checkbox"/> <b>Cultivated, heavily grazed or landscaped, substantial grading, clearing, hydrological alteration, numerous ditches, canals, high road or building density.</b>	
Percent (%) ground cover (within wetland) dominated by native desirable wetland vegetation. ( <i>Undesirable plants include Region 8 FACU and Upland species, non-native OBL, FACW, or FAC species or invasive hydrophytes such as Phragmites</i> )			
<input type="checkbox"/> <b>High: ≥ 80%</b> <input type="checkbox"/> <b>Moderate: 79-60%</b> <input type="checkbox"/> <b>Low: &lt; 60%</b>			

