SECTION 1
INTRODUCTION

1.0 Introduction

The Natural Resources Conservation Service (NRCS), with the North Utah County Water Conservancy District as the project sponsor, is proposing to partially fund through the Small Watershed Program (PL83-566) the rehabilitation of the Dry Creek Debris Basin in Utah County, Utah. The National Environmental Policy Act (NEPA) and the Council on Environmental Quality’s regulations at 40 CFR Parts 1500-1508 require an evaluation of potential environmental impacts associated with federal projects and actions. The environmental impacts will be documented in the form of an Environmental Assessment (EA). The EA will comprise of the following elements:

- Alternatives analysis of potential options for structure rehabilitation;
- Detailed analysis of resources that may be affected for each of the alternatives that may satisfy the purpose and need for the project;
- Identification of potential mitigation measures to reduce or eliminate potential impacts; and
- A plan of public participation and government agency coordination throughout development of the EA.

The participation of the public is a vital component of the project so that those who are interested in or potentially affected by proposed alternatives have an opportunity to share their concerns and provide input regarding the EA during the initial stages of the process. This Scoping Report outlines the comments received from the agencies and general public during the scoping process.

1.1 Project Purpose and Need

The Dry Creek Debris Basin was originally designed to capture and retain sediment and water during precipitation events. Without the debris basin damage would be caused to municipal infrastructure and personal property. Steep slopes, erosive soils on hillsides upslope from project area, high summer and fall precipitation events, and houses and associated infrastructure at lower elevations are the factors that combine to necessitate the construction of a debris basin in this location.

1.2 Scoping Goals and Objectives

The main goal of public participation is to involve a diverse group of public and government agency participants to solicit input and provide timely information throughout the NEPA review process regarding their concerns for the project and the proposed alternatives. The main goals are to 1) establish ongoing communication with stakeholders, agencies and the general public, 2) educate the public about the environmental review process and each party’s role, 3) evaluate the effectiveness of public participation activities on a continual basis and utilize the most effective techniques throughout the NEPA process, and 4) document all public and government agency input.
SECTION 2
SCOPING PROCESS SUMMARY

2.0 Scoping Overview

Scoping questions, comments and concerns were requested from the public and government agencies during the preliminary scoping period via written submittal of comments. The following summarizes the scoping process and efforts made to engage the public and government agencies.

2.1 Scoping Terms

The following terms were used during the scoping process to identify specific actions:

- **Comment**: A distinct statement or question about a topic or issue relating to the project.
- **Comment Category**: A topic to which a comment is addressed.
- **Comment Document**: A written version of comment(s) submitted by a commenter. One comment document may contain multiple comments.
- **Commenter**: An individual, organization or agency providing one or more comments.

2.2 Scoping Schedule

The following dates outline the milestones for the scoping process:

- September 6, 2013: Scoping Notice Mailed
- September 9, 2013: Scoping Period Opened and Posted to Website
- September 9, 2013: Poster Display Boards Placed at Site
- September 9, 2013: Public Notice Published in The Provo Daily Herald Newspaper
- September 16, 2013: Public Notice Published in The Provo Daily Herald Newspaper
- September 23, 2013: Scoping Meeting
- October 8, 2013: Scoping Period Closed
- October 27, 2013: Scoping Public Comment Period Re-opened Due to Partial Government Shutdown, Posted to Website, and Published in The Provo Daily Herald
- November 16, 2013: Scoping Public Comment Period End

Agency and stakeholder participation, along with public involvement, are key components that lead the NEPA process. Project information was made available to the public during the first scoping period from September 9, 2013 to October 8, 2013. Due to the partial government shutdown and consequent inability of agency personnel to participate in the scoping process, a public scoping re-opening was advertised and issued for the period of October 27, 2013 through November 16, 2013.

2.3 Scoping Notice

A scoping notice was prepared and sent to interested parties and regulatory agencies on September 9, 2013. The list of recipients was prepared by McMillen with input and direction from the NRCS and the North Utah County Water Conservancy District. The scoping notice gave a description of the project, location and overview, purpose and need, identified preliminary scoping issues, and requested public participation. The scoping notice also identified the location of public meetings, contact information to submit written comments, and the scoping period.
closure date. A copy of the scoping notice is attached in Appendix A. The scoping notice was also posted on the NRCS website.

Two public notices were published in The Provo Daily Herald newspaper announcing the project and public meeting. Copies of the newspaper scoping notices are attached in Appendix B.

2.4 Scoping Meeting

The primary purpose of the scoping meeting was to gather input and feedback on the project’s purpose and need statement, potential alternatives for consideration, environmental issues to be addressed in the EA, methodologies to be used to evaluate impacts, and the overall public participation process. To gather as broad an audience as possible, a combined government agency and general public scoping meeting was held September 23, 2013 from 6:00 PM to 9:00 PM (MST) at Highland City Hall in Highland, Utah. The scoping meeting presentation can be found in Appendix D.

There were 2 non-project personnel attendees at the public meeting. Participants were invited to submit comments in writing either at the meeting or subsequently by mail, fax, or e-mail during the scoping comment period. Attendance at the meeting was counted using the sign-in sheet located in Appendix C. Comment cards handed out at the meeting also provided a blank space to submit written comments.

2.5 Scoping Mailing List

The mailing list was prepared by McMillen with input and direction from the NRCS and the North Utah County Water Conservancy District to inform the general public and government agencies about the scoping process for the project. A total of 77 mailings were sent to government agencies and the public.
SECTION 3  
SCOPING COMMENTS

3.0 Scoping Meeting

The combined agency/public scoping meeting was conducted on September 23, 2013 from 6:00PM to 9:00PM (MST). There were 2 non-project personnel attendees at this meeting and there were zero (0) written comments submitted.

The following project personnel were in attendance for the public meeting:

<table>
<thead>
<tr>
<th>Name</th>
<th>Organization</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Norm Evenstad</td>
<td>NRCS</td>
<td>Water Resource Coordinator</td>
</tr>
<tr>
<td>Ana Vargo</td>
<td>NRCS</td>
<td>NRCS State Geologist</td>
</tr>
<tr>
<td>Dan Axness</td>
<td>McMillen, LLC</td>
<td>Project Manager</td>
</tr>
<tr>
<td>Greg Allington</td>
<td>McMillen, LLC</td>
<td>NEPA Specialist</td>
</tr>
<tr>
<td>Kevin Jensen</td>
<td>McMillen, LLC</td>
<td>EIT</td>
</tr>
</tbody>
</table>

3.1 Written Comments

The scoping period officially opened on September 9, 2013 and ended on October 8, 2013. Written comments could have been submitted via mail, e-mail, facsimile, or comment card.

There were zero (0) written scoping comments received from commenters via comment document during the scoping period for the Dry Creek Debris Basin Rehabilitation project.
APPENDIX A

SCOPING NOTICE
Dear Interested Parties:

The Natural Resources Conservation Service (NRCS), in cooperation with the North Utah County Water Conservancy District as the project sponsor, are proposing to address rehabilitating the Dry Creek Debris Basin in Utah County, Utah, due to the need to upgrade the structure to meet current dam safety and engineering performance criteria as well as the dam’s high hazard class rating. The structure’s primary purposes are flood control and sediment retention. The proposed project is located within the cities of Lehi and Highland, Utah. You are invited to attend a public meeting where a wide range of resource concerns and conceptual alternatives addressing damage rehabilitation to the Dry Creek Debris Basin will be presented and discussed.

Scoping Period
Open: Monday, September 9, 2013
Close: Tuesday, October 8, 2013

Scoping Meeting
When: Monday, September 23, 2013
Time: Formal Presentation: 6 p.m. – 6:45 p.m.
Informal Open House: 6:45 p.m. – 9 p.m.
Where: 5400 W. Civic Center Drive
Highland, UT  84003

More project specific information is available by contacting Greg Allington (McMillen, LLC) with the project team by phone at 208-342-4214 or email at drycreek@mcmillen-llc.com

Environmental Assessment Introduction

The NRCS is proposing to partially fund, through the Small Watershed Program (PL83-566), a project to address rehabilitation of the Dry Creek Debris Basin, which will increase public safety downstream from the dam and improve overall functionality of the facility. The National Environmental Policy Act (NEPA) and the Council on Environmental Quality’s regulations at 40 CFR Parts 1500-1508 require an evaluation of potential environmental impacts associated with federal projects and actions. The project will require an environmental analysis and the environmental impacts will be documented in the form of an Environmental Assessment (EA) for the project.

Project Purpose and Need

In accordance with the rehabilitation provisions of the NRCS’s Small Watershed Program, the area is eligible for rehabilitation funding due to the need to ensure public safety downstream from the dam. The purpose of the project is to rehabilitate the dam to meet current NRCS and Utah State Dam Safety regulations and current engineering standards.
The need for the project is to extend the life of the dam to continue to provide economic benefits through the reduction of flood damage potential and sediment accumulation.

**Public Participation**

The participation of the public is a vital component of the projects providing those who are interested in or potentially affected by the proposed projects an opportunity to share their comments, ideas, and concerns regarding actions during the initial scoping stage of the NEPA process. You are encouraged to attend the public meeting and express your comments, ideas, and concerns. You may also submit your comments via letter, email or fax anytime during the public comment period. To be considered and become part of the public record for the projects, **comments must be received by close-of-business on October 8, 2013**.

Please mail your written comments to:

Dry Creek Dam Rehabilitation Project  
c/o McMillen, LLC – Greg Allington  
1401 Shoreline Drive  
Boise, ID 83702

You may also submit comments by email, phone or fax to McMillen:

- **Email**: drycreek@mcmillen-llc.com  
- **Phone**: 208-342-4214  
- **Fax**: 208-342-4216

**After receiving comments by close-of-business on October 8, 2013**, the NRCS will begin reviewing the comments and developing conceptual alternatives for analysis in the Plan-EA. Preliminary resource concerns identified during this initial project scoping process will also be addressed in the Plan-EA.

To check on the status of the project and download project-related documents during the course of the NEPA analysis, you may visit the project website at [http://www.nrcs.usda.gov/wps/portal/nrcs/main/ut/programs/planning/wr/](http://www.nrcs.usda.gov/wps/portal/nrcs/main/ut/programs/planning/wr/) or search for NRCS Utah Small Watershed Program and select the appropriate project.

The project team values your feedback and encourages you to attend the public meeting on September 23, 2013.

Sincerely,

Bronson Smart  
NRCS  State Engineer

cc: Norm Evenstad – NRCS  
    Lorin Powell – City of Lehi, Utah  
    Matt Shipp – City of Highland, UT  
    Dan Axness – McMillen, LLC  
    Greg Allington – McMillen, LLC
APPENDIX B

NEWSPAPER SCOPING NOTICES
NRCS PUBLIC OPEN HOUSE

The Natural Resources Conservation Service (NRCS), in cooperation with North Utah County Water Conservancy District as the project sponsor, are proposing to address rehabilitating the Dry Creek Debris Basin to meet current dam safety and engineering performance criteria for high hazard class rated dams under the Small Watershed Protection Program (PL 83-566). The proposed project is located within the cities of Lehi and Highland, Utah. The National Environmental Policy Act (NEPA) and the Council on Environmental Quality’s regulations at 40 CFR Parts 1500-1508 require an evaluation of potential environmental impacts associated with federal projects and actions with input from the public.

You are invited to attend a public scoping meeting where a wide range of conceptual alternatives addressing rehabilitation to the Dry Creek Debris Basin will be presented and discussed at the meeting.

When: September 23, 2013 - Monday
Time: 6:00 PM to 8:00 PM
Where: Highland City Hall
5400 W Civic Center Drive
Highland, Utah 84003

Interested parties may voice their comments, ideas, and concerns to the project sponsors during this meeting. Comments may also be submitted via the following methods prior to the end of the scoping period on October 8, 2013:

Mail: Dry Creek Debris Basin Rehabilitation Project
e/o McMullen, LLC
1401 Shoreline Drive
Boise, Idaho 83702

Email: drycreek@mcullen-llc.com
Fax: (208) 342-4216
Phone: (208) 342-4214 ext. 318

Last fall, for example, a Canadian beef-processing plant using the inspection system had to recall 8.8 million pounds of beef and beef products tainted with E. coli — about 2.5 million pounds of which were that to propose rules for expanding the inspection system nationwide.

Dozens of chicken plants have also been enrolled in a similar pilot program. The USDA plans to finalize regula-

contaminated meat is coming back on the shelves and consumers are left wondering if the meat is safe.

The new meat inspection program dates to 1997, when the USDA announced it would allow five large hog plants to enroll in the Hazard Analysis and Critical Control Point-based Inspection Mod Project, commonly referred to as HIMP. The plants would be able to accelerate their processing lines and use more employees, instead of some USDA inspectors, to check the meat was safe.

The kickoff of HIMP in the late 1990s was welcomed as a victory by the meat industry which had pushed for decades for the changes. Meat companies anticipated they would increase profits by moving more carcasses through the slaughterhouses each day while reducing government oversight.

The government, for its part, expected to save millions of dollars annually by reducing its inspection force, and projected that consumers would see lower prices.

The USDA promised at the time to study the performance of the new inspection procedures adopted by the hog plants in the pilot program.

BANANAGRAMS!

Use the 15 tiles in this bunch to create words that fit into the grids below. The BANANA BITES provide hints. Reuse the tiles for each grid.

BANANA BITE: One word is a kind of vehicle.

BANANA BITE: One word is a body of water.
The Natural Resources Conservation Service (NRCS), in cooperation with North Utah County Water Conservancy District as the project sponsor, are proposing to address rehabilitating the Dry Creek Debris Basin to meet current dam safety and engineering performance criteria for high hazard class rated dams under the Small Watershed Protection Program (PL 83-566). The proposed project is located within the cities of Lehi and Highland, Utah. The National Environmental Policy Act (NEPA) and the Council on Environmental Quality’s regulations at 40 CFR Parts 1500-1508 require an evaluation of potential environmental impacts associated with federal projects and actions with input from the public.

You are invited to attend a public scoping meeting where a wide range of conceptual alternatives addressing rehabilitation to the Dry Creek Debris Basin will be presented and discussed at the meeting.

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Where: Highland City Hall
5400 W Civic Center Drive
Highland, Utah 84003

Interested parties may voice their comments, ideas, and concerns to the project sponsor during this meeting. Comments may also be submitted via the following methods prior to the end of the scoping period on October 8, 2013:

Mail: Dry Creek Debris Basin Rehabilitation Project c/o McMillen, LLC
1401 Shoreline Drive
Boise, Idaho 83702
Email: drycreek@mcmillen-llc.com
Fax: (208) 342-4216
Phone: (208) 342-4214 ext. 318

With great sadness, the Herald Extra and Cynthia Wesley Morris, both 14, and Denise McNair, 11. "God spared me to live and tell just what happened on that day," said Rudolph, who testified against the Klansmen convicted years later in the bombing case.

Grand jury foreperson, in his home, and that's what I'm here for, is the way I see things. I don't think you can make him do that. He's been there since he was a little boy. He's not going to say this is a good thing. He's going to say, 'I'm not going to do it, and I'm going to hold my chin up.' That's the way I see things. I don't know what's going to happen. But I think he's going to do what he has to do. He's going to hold his chin up and say, 'I'm not going to do it.'

The church was full, with the only surviving mother of one
it easier to get outsidefinancing for projects, he said. "This has been a long, tough and challenging initiative for the Navajo Nation," Shelly said. The Navajos have been working on compact revisions for years, but the effort was delayed in the final days of the last legislative session. The current compact will expire in 2015.

The Navajo Nation wasWASHINGTON had a total of $64 million in net win money, a figure that would have been lower under the proposed adjustment. The proposed compact would expire in 2037, and the tribe would not participate in online gambling ventures unless the state authorized Internet gambling.

The legislative committee raised concerns in a report about potential strategies to limit the impact of online gambling. Shelly said the committee was not convinced that the proposed compact clearly identifies how the funds would be distributed to the tribes.

The Air Force is drawing from its ranks of experienced fighter pilots for the current wave of F-35 pilots. Ebner said that strategy will allow the Air Force to build its cadre of F-35 pilots fairly quickly. "They're coming from an F-15, an F-16, perhaps an A-10," Ebner told The Arizona Republic.

The Air Force is drawing from its ranks of experienced fighter pilots for the current wave of F-35 pilots. Ebner said that strategy will allow the Air Force to build its cadre of F-35 pilots fairly quickly. "They're coming from an F-15, an F-16, perhaps an A-10," Ebner told The Arizona Republic.

Overall, Luke will serve as the permanent training base for 144 of the jet planes that defense analysts say will be crucial to U.S. military operations for the next 40 years. The planes can reach Mach 1.6, or about 1,200 mph, and Ebner said they are remarkably easy to handle. By 2015, the newly certified instructors will begin training pilots who will be deployed to combat units around the world.

Almost 40 years ago, the B-52 Stratofortress mounted an unorthodox attack on North Vietnam. It was a long-range, high-altitude mission that underscored the plane's capacity to act as a "flagship" for American military operations in the region.

From 1943 to 1982, the bomber produced 19,898 aircraft who brought down enemy airplanes. The Top Dogs destroy in the air and mortar on the ground, recinnn. The Air Force of the B-52寒冷 four times in World War II. Each time invadated the squadrons for the next generation of the B-52, which was designed to replace the B-52A.

If you ever worked at the Geneva Steel mill before 1983, you may have been exposed to asbestos - but you may not know it. You could be entitled to cash settlements.

If you worked at the Geneva Steel mill before 1983, and have been diagnosed with LUNG or colon cancer - if you are a smoker - or know someone who died of LUNG or colon cancer, call 1-800-291-0055.

The Law Offices of G. Patterson Keah One Independence Plaza, Birmingham, AL www.mesohelp.com

No representation is made that the quality of legal services to be performed is greater than the quality of legal services performed by other lawyers.
APPENDIX C

SCANNED SIGN-IN SHEET
<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Organization</th>
<th>Phone Number</th>
<th>Email Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kevin Jensen</td>
<td>McMullen</td>
<td>208-392-4214</td>
<td><a href="mailto:kevin.jensen@mcmullen-llc.com">kevin.jensen@mcmullen-llc.com</a></td>
</tr>
<tr>
<td>2</td>
<td>G. Alligata</td>
<td></td>
<td></td>
<td><a href="mailto:greg.alligata@mcmullen-llc.com">greg.alligata@mcmullen-llc.com</a></td>
</tr>
<tr>
<td>3</td>
<td>Don Arness</td>
<td></td>
<td></td>
<td><a href="mailto:don.arness@mcmullen-llc.com">don.arness@mcmullen-llc.com</a></td>
</tr>
<tr>
<td>4</td>
<td>Justin Rowley</td>
<td>Utah Association of Conservation Districts</td>
<td>940-5879</td>
<td><a href="mailto:drwiley@uaccd.org">drwiley@uaccd.org</a></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>6</td>
<td>Ana Vargas</td>
<td></td>
<td>631-887-3487</td>
<td>cell <a href="mailto:answers@fs.usda.gov">answers@fs.usda.gov</a></td>
</tr>
<tr>
<td>7</td>
<td>Norm Evenstad</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>
APPENDIX D

SCOPING MEETING PRESENTATION
NRCS Dry Creek Debris Basin Rehabilitation Supplemental Watershed Plan and Environmental Assessment

Public Scoping Meeting
September 23, 2013
Project Team

Natural Resources Conservation Service (NRCS)
Lead Funding Agency

North Utah County Water Conservancy District (NUCWCD)
Project Sponsor

McMillen, LLC
NEPA Project Manager/Concept Design
Project Review

Dan Axness – McMillen, LLC
– Concept Design Project Manager
Dry Creek
Debris Basin History

- Completed in 1964
- Classified as a Class “C” High Hazard Dams
- Originally Designed as a Debris Basin
  - Flood Retention
  - Sediment Retention
- 50-year life
Project Vicinity Map
Project Purpose and Need

- Meet Utah Dam Safety Regulations and NRCS Engineering Standards
- Extend the Life of the Dam
- Increase Reservoir Storage Capacity
Dry Creek Debris Basin Project Map

Project Concerns

- Spillway Capacity
- Sediment in Reservoir
- Dam Stability
- Recreation
Photos

Debris Basin Pool Area

Debris Basin Dam and Pool Area
Photos

Emergency (Auxiliary) Spillway

Principal Spillway With Trash Rack
Measuring Device & Water Intake

Area Below Debris Basin
Conceptual Project Alternatives

• No Action
• Dam Decommissioning
• Dam Rehabilitation
  – Spillway Replacement
  – Raised Spillway
• Sediment Removal
• Recreation Improvements
• Other Alternatives???
Conceptual Project Alternatives

• Dam Rehabilitation Options
  – Stability Berm
  – Raise Dam
  – Replace Existing Spillway
  – Construct New Spillway
Construction Operations

- Monday-Friday (Excluding Federal, State & Local Holidays)
- Preliminary Construction Schedule
  - Start: Spring 2017
  - End: Fall 2017
National Environmental Policy Act


Greg Allington – McMillen, LLC
NEPA Project Manager

National Environmental Policy Act (NEPA) of 1969 (Public Law 91-190) and the Council on Environmental Qualities regulations at 40 CFR Parts 1500-1508
NRCS NEPA

• Environmental analysis required for major federal actions.
• The NRCS is the funding agency for the dam rehabilitation project (65%).
• The project sponsor provides the remaining 35% cost-share for the dam rehabilitation project.
NEPA Requirements

• Environmental Assessment (EA)
  – NRCS NEPA requirements
  – Analysis looks at potential impacts to the natural and man-made environment
NEPA Requirements

- NEPA Process
  - Scoping
    - Express initial concerns and suggest alternatives to be considered
  - Draft EA
    - Public review of alternatives and environmental impacts
  - Final EA
    - Proposed alternative published to public
  - Finding of No Significant Impact (FONSI)
    - Project approval by NRCS
Typical Scoping Concerns

- Project Purpose and Need
- Design Alternatives Include:
  - A No-Action Alternative
  - Dam Decommissioning Alternative
  - Action Alternatives
- Natural Environment
- Man-made Environment
- Mitigation
Scoping Comments

• Formal comments may be submitted by:
  – Email
  – Written Letter
  – Comment Card
  – Oral

• Scoping Report: Summarizes issues, alternatives and concerns from the public
Schedule

• NEPA Environmental Assessment
  – Start: August 2013
  – Public Scoping Comment End: October 8, 2013
  – Draft EA Public Comment: February 2014
  – FONSI: Spring 2014
NEPA Contact Information

• Please contact Dan Axness or Greg Allington with McMillen with questions and comments:

  - Phone: 208-342-4214
  - Fax: 208-342-4216
  - Email: drycreek@mcmillen-llc.com
  - Address: 1401 Shoreline Drive
  Boise, ID 83702
Questions

???
Dry Creek Debris Basin
1.0 INTRODUCTION

The USDA - Natural Resources Conservation Service (NRCS) is working with the North Utah Water Conservancy District as the project sponsor through the Small Watersheds Program, to rehabilitate the existing Dry Creek Debris Basin to continue to provide flood control and damage reduction as well as sediment accumulation.

Dry Creek Debris Basin was built within the American Fork-Dry Creek Watershed under authority of the Small Watersheds Program. The structure was designed and built in 1962 as a high hazard structure to reduce flood damages to downstream cropland, roads, and irrigation infrastructure. It was designed to store surface runoffs from the 100-year, 1-hour rainfall and slowly release the stored water through the outlet pipe. Dams with possible downstream impacts (such as impacts to homes) have more stringent design criteria than sites without downstream impacts.

The extent of the Dry Creek Debris Basin Survey Area is depicted in the attached maps. This area encompasses the construction limits that would be utilized during the rehabilitation of the dam. The Dry Creek Debris Basin was designed to capture and retain sediment and water during precipitation events.

McMillen, LLC (McMillen) was retained by the NRCS to complete a waters of the U.S. and wetland identification, evaluation, and delineation services at the debris basin. This delineation presents the identification of potentially jurisdictional wetlands and waters of the U.S. within the Dry Creek Debris Basin Survey Area (Map 1). The U.S. Army Corps of Engineers (USACE) will provide the final jurisdictional determination for wetlands and waters of the U.S. located within the rehabilitation area.

1.1 Project Location and Site Description

Dry Creek Dam and Debris Basin is located near the base of the western slope of the Wasatch Mountains, within the city of Highland and just north of Lehi, in Utah County, Utah. The Wasatch Mountains are part of the Middle Rocky Mountains physiographic providence.
The extent of the Dry Creek Debris Basin Rehabilitation Project Area is depicted in Attachment A - Maps. This area encompasses the construction limits that would be utilized during the rehabilitation of the dam. The Dry Creek Debris Basin is a retention basin that stores seasonal runoff and provides flood control during extreme weather events. The wetlands and waters of the U.S. described in this report were observed within the project footprint, which will herein be referred to as the “Survey Area”.

1.2 Regulations

The following regulations apply to work located within wetlands and waters of the U.S. in Utah:

- Federal
  - USACE: Under Section 10 and 404 of the Clean Water Act, a USACE permit is required for discharge of dredged or fill materials in wetlands and waters of the U.S.
  - Environmental Protection Agency: Under Section 402 of the Clean Water Act, a National Pollutant Discharge Elimination System (NPDES) Storm Water General Permit for Construction Activities is required for construction activities that disturb more than 1 acre and discharge pollutants to surface waters.

- State
  - Utah Department of Environmental Quality: Under Section 401 of the Clean Water Act, an approval will be required so that the project does not violate state water quality standards. Certification is obtained as part of the USACE Section 10 and 404 Permit review process.
  - Utah Division of Water Rights: A Stream Alteration Permit must be reviewed and approved by the UDWR.

1.3 Conditions at the Time of Delineation

This report is based on conditions that existed at the time the delineation was performed. If changes are made to the Survey Area after the date of this report, a wetland biologist should be consulted to review the investigation and recommendations so that written amendments or affirmation can be provided as appropriate.

2.0 METHODOLOGY

Delineation surveys were performed in April 2014. McMillen wetland biologists performed waters of the U.S./ordinary high water mark (OHWM) and wetland delineation on the identified features in the Survey Area. The formal delineation followed the guidance set forth in the following documents:

- 1987 USACE Wetland Delineation Manual (Environmental Laboratory 1987),
- 2008 USACE Regional Supplement to the USACE Wetland Delineation Manual: Arid West Region (USACE 2008),
- 2010 Field Indicators of Hydric Soils in the United States (NRCS 2010), and

The wetland delineation manual and supplement listed above follow the three-parameter approach for making wetland determinations, such that positive indicators of wetlands must be present for each of the following parameters: 1) vegetation, 2) soils, and 3) hydrology.
2.1 Document Review

A review of available documents pertaining to the project was conducted. This review assisted with directing the focus of the waters of the U.S. and wetland delineation to potential critical aquatic features. The following documents were reviewed:

- Historical and current aerial photos,
- United States Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) maps (USFWS 2013) (Map 2),
- NRCS soil survey data (NRCS 2013) (Map 3),
- United States Geological Survey (USGS) 1:24,000-scale 7.5-minute topographic map (USGS 2014), and
- Other available general background information provided by NRCS and the Utah Automated Geographic Reference Center (UAGRC).

2.2 Field Investigation

The objective of the waters of the U.S. delineation was to determine the extent of jurisdictional waters and wetlands within the Survey Area based on the presence of hydrophytic vegetation, hydric soils and wetland hydrology indicators for wetlands and the presence of an OHWM along the creek. The formal waters of the U.S. delineation was conducted on April 9, 2014 by McMillen biologists (Greg Allington and Aimee Hill). The weather was sunny during the delineation, with temperatures ranging from 60°F to 65°F.

2.1.1 Waters of the U.S. Delineation Methodology

Streams, lakes and reservoirs were delineated according to their OHWM in accordance with the guidance set forth by the USACE in their delineation manual titled *A Field Guide to the Identification of the Ordinary High Water Mark in the Arid West Region of the Western United States* (USACE 2008). The project area is immediately adjacent to the USACE Arid West Region. The OHWM is defined by the USACE as:

> “Federal jurisdiction over a non-wetland WoUS extends to the OHWM, defined in 33 CFR Part 328.3 as the line on the shore established by fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of the soil, destruction of terrestrial vegetation, or the presence of litter and debris. In the Arid West region of the United States, waters are variable and include ephemeral/intermittent and perennial channel forms.”

Physical characteristics that are present on the shoreline of a watercourse may vary depending on the type of water body and conditions of the area. There are no required physical indicators that must be present to make an OHWM determination. However, the following physical characteristics were considered when making the determination:

- Natural line impressed on the bank
- Changes in the character of soil
- Presence of litter or debris (drift lines)
- Vegetation matted down, bent, or absent
- Leaf litter disturbed or washed away
- Deposition
- Shelving or topographic breaks
- Destruction of terrestrial vegetation
- Wracking
- Sediment sorting
- Scour
- Multiple observed flow events
- Bed and banks
- Change in plant community
- Water staining

Other methods for determining the OHWM that do not include physical observation:

- Lake and stream gage data
- Spillway height
- Historic records of water flow
- Elevation data
- Flood predictions
- Statistical evidence

Combinations of physical characteristics and other methods should be used when available for determining the OHWM. As a result, many types of water bodies occur with varying conditions, including topography, channel morphology and flow dynamics. Other physical characteristics indicative of the OHWM may also be used that are not identified in the USACE guidance.

2.3 Wetland and Waters of the U.S. Characterization

The delineations conducted for this project were characterized according to their Cowardin (Cowardin et al. 1979) classification. The Cowardin classification system categorizes wetlands and deepwater habitats according to five separate systems: Marine, Estuarine, Riverine, Lacustrine, and Palustrine. These systems are then stratified into subsystems based on the plant community type. These systems are further stratified into classes and subclasses based on substrate material. Each class and subclass is then annotated with specific modifiers for water regimes, water chemistry, soil, and other special characteristics. The USFWS uses this classification system on their National Wetland Inventory (NWI) maps and it is used in this report to describe the general structure of the waters and wetlands.

The wetlands and streams identified in this project were also classified according to their hydrogeomorphic (HGM) characteristics in order to determine their location and function within the watershed. HGM classifications include the following:

- Depressional,
- Riverine,
- Lake-fringe,
- Slope,
- Flats, and
- Freshwater tidal.

2.4 Field Methods

The Survey Area was investigated for indicators of wetland parameters. If one of the three wetland parameters (hydrophytic vegetation, hydric soils or wetland hydrology indicators) was observed, then a more detailed examination of the area was performed. Upon discovery of all three wetland parameters adjacent to an upland area, the boundary line of the wetland would have been identified and followed until the delineation was complete. No wetland sites were identified outside of the OHWM of the basin.

The site was investigated for indicators of OHWM characteristics. If flowing water or a dry streambed was observed, additional investigations were performed upstream and downstream to locate the source of the water and/or the confluence with another stream. Specific physical characteristics of the streams were examined in order to facilitate locating the OHWM, which was delineated (e.g. OHWM 1).
A map of the waters of the U.S. delineation was prepared depicting the location of the sample plots. The OHWM points were recorded in the field at the time of the delineation using a TOPCON GRS-1 Global Positioning System (GPS) with antenna (±1-foot accuracy). The delineation was conducted on April 9, 2014. Delineation maps of the site are presented in Attachment A and Geographic Information System (GIS) shapefiles were also provided to NRCS of the wetland and OHWM delineation. Attachment B provides a photographic record of the site and the identified waters of the U.S.

3.0 RESULTS

3.1 Document Review

3.1.1 Historical and Current Aerial Photographs

Aerial photographs dating back to 1993 indicate that conditions at the debris basin have not changed in 21 years that would indicate changes to hydrology patterns that could have altered waters of the U.S. in the Survey Area.

3.1.2 NRCS Soil Survey Data

Soil information presented in this section has been summarized from NRCS Web Soil Survey data. Utah County is comprised of two prominent physiographic features: first, an area of sloping land adjacent to the base of the mountains and second, a larger and more level area farther removed from the mountains. The Dry Creek Debris Basin lies within the second area and consists mainly of floodplain alluvium from within the creek. The dam materials are derived from mixed sources. These soils are briefly described in Table 1.

Table 1. NRCS Web Soil Survey Data

<table>
<thead>
<tr>
<th>Name</th>
<th>Ecological Site</th>
<th>Slope (%)</th>
<th>Comment</th>
<th>Hydric Soil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Redola Loam</td>
<td>Loamy Bottom (Great Basin Wildrye)</td>
<td>0-3</td>
<td>Typically comprised of well-drained, nonsaline alluvium derived from limestone and sandstone.</td>
<td>No</td>
</tr>
<tr>
<td>Hillfield Silt Loam</td>
<td>Upland Loam</td>
<td>20-30</td>
<td>Well-drained, nonsaline alluvium derived from mixed sources.</td>
<td>No</td>
</tr>
<tr>
<td>Dagor Loam</td>
<td>Upland Loam</td>
<td>1-3</td>
<td>Well-drained, nonsaline alluvium derived from granite, quartzite and schist.</td>
<td>No</td>
</tr>
<tr>
<td>Cobbly Alluvial Land</td>
<td>Depressions on lake terraces</td>
<td>1-3</td>
<td>Poorly drained, nonsaline to slightly saline alluvium derived from mixed sources.</td>
<td>No</td>
</tr>
</tbody>
</table>

3.1.3 USFWS NWI Maps

NWI data shows the presence of open waters (in the basin) and wetlands along the eastern edge of the basin (NWI 2013). Table 2 lists these wetland types and their classifications.
Table 2. NWI Wetland Types with Cowardin Classifications

<table>
<thead>
<tr>
<th>Classification Abbreviation</th>
<th>System</th>
<th>Class</th>
<th>Water Regime</th>
<th>Special Modifier</th>
</tr>
</thead>
<tbody>
<tr>
<td>PABFh</td>
<td>Palustrine</td>
<td>Aquatic Bed</td>
<td>Semipermanently Flooded</td>
<td>Diked/Impounded</td>
</tr>
<tr>
<td>PUSAh</td>
<td>Palustrine</td>
<td>Unconsolidated Shore</td>
<td>Temporarily Flooded</td>
<td>Diked/Impounded</td>
</tr>
<tr>
<td>PEMCh</td>
<td>Palustrine</td>
<td>Freshwater Emergent</td>
<td>Seasonally Flooded</td>
<td>Diked/Impounded</td>
</tr>
</tbody>
</table>

3.1.4 USGS Maps

The USGS map identified the general topography and important site features within and in the vicinity of the Survey Area. Dry Creek and the debris basin, access roads and surrounding topography were illustrated on this map.

3.2 Field Investigation

McMillen identified Dry Creek and the debris basin to be potential jurisdictional waters of the U.S. For purposes of estimation, Map 3 depicts those wetlands and waters known to exist within the Survey Area, which includes potential construction impact zones, staging and access areas.

3.2.1 Soils

Soil samples were taken within wetland areas (where feasible). Hydric soil conditions were identified within sandy loam soils, with oxidized rhizospheres and darker organic material or gleying as qualifiers.

3.2.2 Vegetation

Recent maintenance activities at the site have resulted in the removal of vegetation from the banks and the creek. The attached photos (Attachment B) show the lack of vegetation at the site.

Table 3. Vegetation Observed and Wetland Indicator Status

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
<th>Wetland Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergents:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phalaris arundinacea</td>
<td>Reed canarygrass</td>
<td>FACW</td>
</tr>
<tr>
<td>Woody Shrubs and Trees:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Willow spp.</td>
<td>Willow spp.</td>
<td>FACW</td>
</tr>
</tbody>
</table>

3.2.3 Hydrology

Dry Creek was flowing at the time of the site visit both above and below the dam. There were signs of an ordinary high water mark associated with both the creek and the basin, which was ponded below the OHWM and was discharging flow downstream via the spillway. The basin appears to receive some flow from eastern hillside seeps and/or springs (Map 4; see Attachment B for photos).
3.2.4 Waters of the U.S. and Wetlands

A delineation of the OHWM was completed within the Survey Area to identify the limits of jurisdictional waterways. The OHWM is usually concurrent with the 2-year flood event and woody vegetation does not typically grow below this mark. Potentially jurisdictional waters of the U.S. in the Survey Area can be divided into a natural creek (Dry Creek), an associated pond (the Dry Creek Debris Basin), and associated emergent wetlands.

**Dry Creek**

Dry Creek, along with its tributaries, Fort Creek and Schoolhouse Springs, are the primary sources of water in the project area. Dry Creek is a small seasonal 3rd order stream that begins on the western flank of Mt Timpanogos (elevation 11,752 ft) and flows southwest for approximately 15 miles to its terminus with Utah Lake. Dry Creek originates from headwater drainages fed by snowmelt and several small lakes including Lake Hardy (elevation 9,466 ft). The stream, in the upper 4.5 miles, transitions from an alpine environment to a subalpine environment before entering the valley. This section of stream typically would have riparian areas, large seasonal flow fluctuations, limited overhead cover and steep gradients. It flows through steep sloped areas of mixed montane forests and open meadows (Hayward 1945). Dry Creek exits the mountains and appears to have perennial flows for approximately 5 miles through increasingly urbanized areas before entering the Dry Creek Debris Basin. Below this, Dry Creek becomes heavily impacted by urbanization, going seasonally dry in many locations. The remaining 4.75 miles flows through channelized sections and culverts adjacent to farmland and subdivisions before emptying into Utah Lake (USDA 2013).

The Survey Area was broken into 3 segments for the delineation. The creek upstream of the highway (SR-91) is approximately 10 feet wide with a cobbly riverbed and a willow and cottonwood riparian buffer. Between SR-91 and the basin, the creek flows from a large culvert downstream. This area is considered to be part of the debris basin, therefore it has been cleared and grubbed for routine operations and maintenance (Attachment B – Photo 2). The third segment is located immediately downstream of the dam embankment, where flows from the Principal Spillway Outlet channel and the Auxiliary Spillway from Dry Creek (Attachment B – Photo 3). The creek is approximately 4 feet wide along the side channel and 15-20 feet wide immediately below the dam. The banks of the main channel are grouted and/or rock riprapped for bank stabilization.

**Dry Creek Debris Basin**

The debris basin acts as a retention pond for the Dry Creek seasonal flows that could have the potential to flood downstream properties due to piping and channelization associated with extensive development. During both the April field visit, the basin was ponded (see Attachment A for photos) and fed by two intermittent streams as well as Dry Creek. The basin is classified by NWI as Palustrine Aquatic Bed (Pond), Semipermanently Flooded, Diked/Impounded, and the delineation confirmed the classification. The basin is approximately 4.9 acres of open water.

**Unnamed Ditch**

An unnamed ditch flows directly into the south end of the basin. The small channel appears to collect drainage from the neighboring subdivision and may be spring-fed. The channel is a 1-2 foot wide intermittent drainage that has been heavily disturbed. Vegetation was removed from the area in 2013 (standard operation and maintenance activities at the dam and basin). This drainage flows 350 linear feet within the Survey Area (exhibited in Attachment A – Map 3 and Attachment B – Photo 4).

**Unnamed Stream**

An unnamed stream flows into Dry Creek just upstream of the basin. The channel is a 4-6 foot wide intermittent drainage with a cobbly bed and steep, incised banks at the creek. Vegetation was removed
from the banks of the stream upstream to a certain elevation (standard operation and maintenance activities at the dam and basin). Above that elevation, the stream has a dense riparian buffer dominated by a willow and cottonwood community. The creek flows 950 linear feet within the Survey Area (exhibited in Attachment A – Map 3 and Attachment B – Photo 5).

Photographs of Dry Creek and the Debris Basin are shown in Attachment B. Typical signs of the OHWM were consistent both upstream and downstream of the basin and in the basin itself, and included the following:

- Natural line impressed on the bank
- Shelving or topographic break
- Scouring
- Debris deposits
- Water marks on large boulders, concrete structures, and vegetation
- Absence of upland vegetation (woody shrubs)

**Wetland A**
Wetland A is an emergent wetland within the Survey Area associated with Dry Creek. Abutting a riparian zone along the creek that includes willow and cottonwood overstory, this cobbly, riverbed wetland appears to be inundated only seasonally or intermittently, but saturated year-round. The wetland is 0.02 acres in size.

**Wetland B**
Wetland B is an emergent wetland within the Survey Area associated with Dry Creek. Abutting a riparian zone along the creek that includes willow and cottonwood overstory, this cobbly, riverbed wetland appears to be inundated only seasonally or intermittently, but saturated year-round. The wetland is 0.08 acres in size.

**Wetland C**
Wetland C is a scrub shrub wetland within the Survey Area associated with Dry Creek. This wetland is located along the principal spillway outlet channel, immediately below the Dry Creek Dam. The banks of this side channel appear to have been planted with willow species. The wetland is 0.03 acres in size.

The features delineated were classified according to the Cowardin classification system as presented in Table 4. A detailed map showing the locations of each water of the U.S. and wetland is located in Attachment A.

### Table 4. Key Characteristics of Waters of the U.S. and Wetlands Within the Survey Area

<table>
<thead>
<tr>
<th>Feature Name</th>
<th>Classification &amp; Hydrologic Indicators</th>
<th>Soil Indicators</th>
<th>Dominant Plants</th>
<th>Notes</th>
<th>Area or Length in the Survey Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Creek Debris Basin</td>
<td>Open Water (OW) Pond</td>
<td>Inundated</td>
<td>OW – no vegetation</td>
<td>Flood control reservoir</td>
<td>4.9 ac</td>
</tr>
<tr>
<td>Dry Creek Upstream of Hwy</td>
<td>OW; 10+ ft channel</td>
<td>Riverwash, cobble apparent</td>
<td>Riparian buffer; no emergent vegetation in channel.</td>
<td>Flowing at time of survey.</td>
<td>325 ft</td>
</tr>
<tr>
<td>Dry Creek Hwy to Basin</td>
<td>OW; 10+ ft channel</td>
<td>Riverwash, cobble apparent</td>
<td>no vegetation</td>
<td>Vegetation removed during maintenance in 2013.</td>
<td>1660 ft</td>
</tr>
</tbody>
</table>
### Feature Name

<table>
<thead>
<tr>
<th>Feature Name</th>
<th>Classification &amp; Hydrologic Indicators</th>
<th>Soil Indicators</th>
<th>Dominant Plants</th>
<th>Notes</th>
<th>Area or Length in the Survey Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Creek Downstream of Dam</td>
<td>OW; 5 ft side channel+15-20 ft main channel</td>
<td>N/A</td>
<td>Side channel: Wetland C on banks. No vegetation in channel, banks riprapped</td>
<td>Main channel maintained downstream of dam; vegetation removed periodically.</td>
<td>235 ft and 350 ft</td>
</tr>
<tr>
<td>Ditch</td>
<td>OW; 1-2 ft channel</td>
<td>N/A</td>
<td>no vegetation</td>
<td>Flowning at time of survey</td>
<td>350 ft</td>
</tr>
<tr>
<td>Stream</td>
<td>OW; 5+ ft channel</td>
<td>N/A</td>
<td>banks eroded and incised. Upstream riparian veg on banks.</td>
<td>Flowning at time of survey</td>
<td>950 ft</td>
</tr>
<tr>
<td>Wetland A</td>
<td>PEM wetland; shoreline, floodway of creek</td>
<td>Sandy loam, redox conditions</td>
<td>RCG, grasses (riparian buffer upland)</td>
<td>Upper bench area, cobbly riverbed, banks of creek</td>
<td>0.02 ac</td>
</tr>
<tr>
<td>Wetland B</td>
<td>PEM wetland; shoreline, floodway of creek</td>
<td>Sandy loam, redox conditions</td>
<td>RCG, grasses (riparian buffer upland)</td>
<td>Upper bench area, banks of creek</td>
<td>0.08 ac</td>
</tr>
<tr>
<td>Wetland C</td>
<td>PSS wetland; 5+ ft channel</td>
<td>Banks with OW</td>
<td>willow</td>
<td>banks of spillway outlet channel</td>
<td>0.03 ac</td>
</tr>
</tbody>
</table>

Notes: Photos Attachment B; OW = open water; PEM = palustrine emergent; PSS = palustrine scrub shrub

### 4.0 CONCLUSIONS AND RECOMMENDATIONS

The delineation of waters of the U.S. including wetlands was performed in April 2014 by McMillen within the Survey Area for the Dry Creek Debris Basin Rehabilitation project in Utah County, Utah. The inventory was performed to help NRCS identify potential design and construction constraints related to critical aquatic features that occur within the Survey Area. The boundaries of the identified aquatic features are depicted in the attached maps.

The Survey Area includes 3 segments of Dry Creek (2,570 feet in length) and the Dry Creek Debris Basin (4.9 acres), which at the time of field visits did show signs of hydrology and hydric soils but were lacking in vegetation. Also identified and delineated within the area were 2 streams (unnamed ditch at 350 feet and unnamed stream at 950 feet in length in the Survey Area) and 3 wetlands (a total of 0.13 acres), all considered to be potentially jurisdictional.
5.0 REFERENCES


ATTACHMENT A

MAPS
NRCS Dry Creek Debris Basin Rehabilitation
Wetland Delineation Report

Legend
- Dry Creek Debris Basin
- Roads
- Lakes and Reservoirs
- Streams

NOTES:
Aerial photo from 2009 NAIP 1-m orthophoto. Shaded reliefs derived from 10- and 90-m USGS DEMs. Points, lines and polygons supplied by various state and federal sources, including USFS, UDOT, and USGS.
Legend

- Survey Area
- Soils
- Dry Creek
- Roads

NOTES:
Aerial photo from 2009 NAIP 1-m orthophoto. Points, lines and polygons supplied by various state and federal sources, including NRCS, UDOT, and USGS. Soil contours obtained from USDA-NRCS Web Soil Survey.

Map 2: Soils
NRCS Dry Creek Debris Basin Rehabilitation
Wetland Delineation Report
Legend

- Survey Area
- Dry Creek
- OHWM
- Roads

NOTES:
Aerial photo from 2009 NAIP 1-m orthophoto. Points, lines and polygons supplied by various state and federal sources, including USFS, UDOT, and USGS.

Map 3: Waters of the U.S.
NRCS Dry Creek Debris Basin Rehabilitation
Wetland Delineation Report

McMILLEN, LLC
DESIGN with Vision. BUILD with Integrity
Delineated polygons supplied by various state and federal sources, including USDA, USGS.

NRCS Dry Creek Debris Basin Rehabilitation
Wetland Delineation Report

Legend
- Wetland C (0.03 Acres)
- Wetland A (0.02 Acres)
- Wetland B (0.08 Acres)
- Dry Creek
- Roads

NOTES:
Aerial photo from 2009 NAIP 1-m orthophoto. Points, lines and polygons supplied by various state and federal sources, including USFS, UDOT, and USGS.
ATTACHMENT B

SITE PHOTOGRAPHS
Photo 1. Dry Creek Debris Basin, looking northeast from the dam embankment.

Photo 2. Dry Creek, where it flows into the basin
(April 2014, looking northeast from the basin upstream toward the highway)
Photo 3. Dry Creek downstream of dam. Left: Wetland C on the banks of the Principal Spillway Outlet Channel.

Photo 4. Stream 1, looking upstream from the basin.
Photo 5. Stream 2 looking upstream of the basin (note: vegetation removed to a point; grassy, weedy banks and riparian buffer upstream)

Photo 6. Wetland A, looking upstream along Dry Creek.
Photo 7. Wetlands A (left) and B (right) along Dry Creek, upstream of the highway (SR-91).

Photo 8. Wetland C along the banks of the Principal Spillway Outlet channel.
**Project Site:** Dry Creek – Wetland A  
**City/County:** Utah County  
**Sampling Date:** 4/8/14  
**Applicant/Owner:** NUCWCD  
**State:** UT  
**Investigator(s):** Greg Allington and Aimee Hill (McMillen, LLC)  
**Section, Township, Range:** Sec. 34 T4S R1E  
**Landform:** terrace  
**Local relief:** Flat  
**Subregion (LRR):** Lat: 40.432183 Long: -111.815342 Datum: WGS84  
**Soil Map Unit Name:** Mixed and cobbly alluvial land  
**Are climatic / hydrologic conditions on the site typical for this time of year?** Yes  
**Are Vegetation, Soil, or Hydrology, significantly disturbed?** Yes  
**Are Vegetation, Soil, or Hydrology, naturally problematic?** Yes  
**SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.**  
**Hydrophytic Vegetation Present?** Yes  
**Hydric Soil Present?** Yes  
**Wetland Hydrology Present?** Yes  
**Remarks:** Wetland is located on the eastern bank of Dry Creek, upstream of the Dry Creek Debris Basin.  

**VEGETATION – Use scientific names of plants**  

<table>
<thead>
<tr>
<th>Tree Stratum (Plot Size: 10 ft)</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Dominance Test Worksheet:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
<td>Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)</td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td>Total Number of Dominant Species Across All Strata: 2 (B)</td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td>Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)</td>
</tr>
<tr>
<td>4.</td>
<td>0%</td>
<td></td>
<td>= Total Cover</td>
<td>Prevalence Index worksheet:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total % Cover of:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Multiply by:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>OBL species 0 x1 = 0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FACW species 2 x2 = 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FAC species 0 x3 = 0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FACU species 0 x4 = 0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>UPL species 0 x5 = 0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Column Totals: 2 (A) 4 (B)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Prevalence Index = B/A = 2.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes Dominance Test is &gt;50%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes Prevalence Index is ≤3.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No Wetland Non-Vascular Plants¹</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No Problematic Hydrophytic Vegetation¹ (Explain)</td>
</tr>
</tbody>
</table>

  ¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.  

<table>
<thead>
<tr>
<th>Sapling/Shrub Stratum (Plot Size: 10 ft)</th>
<th>0% = Total Cover</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Phalaris spp.</td>
<td>70% Yes FACW</td>
</tr>
<tr>
<td>2. Equisetum (scouring rush)</td>
<td>&lt;10% Yes FACW</td>
</tr>
<tr>
<td>3.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td></td>
</tr>
<tr>
<td>Woody Vine Stratum (Plot Size: 10 ft)</td>
<td>80% = Total Cover</td>
</tr>
<tr>
<td>1.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
</tr>
<tr>
<td>% Bare Ground in Herb Stratum &lt;5%</td>
<td></td>
</tr>
</tbody>
</table>
### SOIL

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

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Color (moist)</th>
<th>%</th>
<th>Color (Moist)</th>
<th>%</th>
<th>Type 1</th>
<th>Loc 2</th>
<th>Texture</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>12-16</td>
<td>7.5 YR 3/1</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sandy loam</td>
<td>Darker on top</td>
</tr>
</tbody>
</table>

1Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. 2Location: PL=Pore Lining, 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

**Indicators for Problematic Hydric Soils:**

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

**Restrictive Layer (if present):**

- **Type:**
- **Depth (Inches):**

**Hydric Soils Present?** Yes [ ] No [ ]

**Remarks:**

### HYDROLOGY

**Wetland Hydrology Indicators:**

<table>
<thead>
<tr>
<th>Primary Indicators (minimum of one required; check all that apply)</th>
<th>Secondary Indicators (2 or more required)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Water (A1)</td>
<td>Water Marks (B1) (Riverine)</td>
</tr>
<tr>
<td>High Water Table (A2)</td>
<td>Sediment Deposits (B2) (Riverine)</td>
</tr>
<tr>
<td>Saturation (A3)</td>
<td>Drift Deposits (B3) (Riverine)</td>
</tr>
<tr>
<td>Water Marks (B1) (Nonriverine)</td>
<td>Drainage Patterns (B10)</td>
</tr>
<tr>
<td>Sediment Deposits (B2) (Nonriverine)</td>
<td>Dry-Season Water Table (C2)</td>
</tr>
<tr>
<td>Drift Deposits (B3) (Nonriverine)</td>
<td>Crayfish Burrows (C8)</td>
</tr>
<tr>
<td>Surface Soil Cracks (B6)</td>
<td>Saturation Visible on Aerial Imagery (C9)</td>
</tr>
<tr>
<td>Inundation Visible on Aerial Imagery (B7)</td>
<td>Shallow Aquitard (D3)</td>
</tr>
<tr>
<td>Sparsely Vegetated Concave Surface (B8)</td>
<td>FAC-Neutral Test (D5)</td>
</tr>
</tbody>
</table>

**Field Observations:**

- **Surface Water Present?** Yes [ ] No [ ] Depth (inches): 0
- **Water Table Present?** Yes [ ] No [ ] Depth (inches): 6-8

**Saturation Present?** (includes capillary fringe)

- Yes [ ] No [ ] Depth (inches): 6-16

**Wetland Hydrology Present?** Yes [ ] No [ ]

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available: 20 years of aerial photos show Dry Creek in the area of Wetland A with some flow in the channel.

**Remarks:**
## WETLAND DETERMINATION DATA FORM – Arid West Region

### Project Site:
**Dry Creek – Wetland B**

### Applicant/Owner:
**NUCWCD**

### Investigator(s):
**Greg Allington and Aimee Hill (McMillen, LLC)**

### Landform (hillslope, terrace, etc.):
**terrace**

### Local relief (concave, convex, none):
**Flat**

### Subregion (LRR):
**Lat: 40.432183**

### Soil Map Unit Name:
**Mixed and cobbly alluvial land**

### Are climatic / hydrologic conditions on the site typical for this time of year?:
- **Yes**
- **No**

### Are Vegetation, Soil, Or Hydrology significantly disturbed? Are "Normal Circumstances" present?:
- **Yes**
- **No**

### Are Vegetation, Soil, Or Hydrology, naturally problematic? (If needed, explain any answers in Remarks.):
- **Yes**
- **No**

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

<table>
<thead>
<tr>
<th>Hydrophytic Vegetation Present?</th>
<th>Yes</th>
<th>No</th>
<th>Is the Sampling Area within a Wetland?</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydric Soil Present?</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wetland Hydrology Present?</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Remarks:**
*Wetland is located on the western bank of Dry Creek, upstream of the Dry Creek Debris Basin.*

### VEGETATION – Use scientific names of plants

#### Tree Stratum (Plot Size: 10 ft)

<table>
<thead>
<tr>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Sapling/Shrub Stratum (Plot Size: 10 ft)

<table>
<thead>
<tr>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Herb Stratum (Plot Size: 10 ft)

<table>
<thead>
<tr>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Woody Vine Stratum (Plot Size: 10 ft)

<table>
<thead>
<tr>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Remarks:**
*Flood zone of creek; riparian zone adjacent to wetland with willow and cottonwood overstory.*

### Remarks:
*Flood zone of creek; riparian zone adjacent to wetland with willow and cottonwood overstory.*

---

**Wetland is located on the western bank of Dry Creek, upstream of the Dry Creek Debris Basin.**

### Dominance Test Worksheet:

<table>
<thead>
<tr>
<th>Number of Dominant Species That Are OBL, FACW, or FAC:</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Number of Dominant Species Across All Strata:</td>
<td>2</td>
</tr>
<tr>
<td>Percent of Dominant Species That Are OBL, FACW, or FAC:</td>
<td>100%</td>
</tr>
</tbody>
</table>

### Prevalence Index worksheet:

<table>
<thead>
<tr>
<th>Total % Cover of:</th>
<th>Multiply by:</th>
</tr>
</thead>
<tbody>
<tr>
<td>OBL species</td>
<td>x1 = 0</td>
</tr>
<tr>
<td>FACW species</td>
<td>x2 = 4</td>
</tr>
<tr>
<td>FAC species</td>
<td>x3 = 0</td>
</tr>
<tr>
<td>FACU species</td>
<td>x4 = 0</td>
</tr>
<tr>
<td>UPL species</td>
<td>x5 = 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Column Totals:</th>
<th>Prevalence Index = B/A = 2.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

Yes

- **Dominance Test is >50%**
- **Prevalence Index is ≤3.0**
- Morphological Adaptations (Provide supporting data in Remarks or on a separate sheet)
- Wetland Non-Vascular Plants
- Problematic Hydrophytic Vegetation (Explain)

1Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

### Hydrophytic Vegetation Present? Yes No

---

**Remarks:**
*Flood zone of creek; riparian zone adjacent to wetland with willow and cottonwood overstory.*
### SOIL

#### Sampling Point: SP1WB

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

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Color (moist)</th>
<th>%</th>
<th>Color (Moist)</th>
<th>%</th>
<th>Type</th>
<th>Loc</th>
<th>Texture</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>12-16</td>
<td>7.5 YR 3/1</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sandy loam</td>
<td>Darker on top</td>
</tr>
</tbody>
</table>

1° Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains.  
2° Location: PL=Pore Lining, M=Matrix

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

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histid (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

#### Indicators for Problematic Hydric Soils1:

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

#### Restrictive Layer (if present):

- Type:  
- Depth (Inches):  
- Hydric Soils Present? Yes ☑ No ☐  

#### Remarks:

### HYDROLOGY

#### Wetland Hydrology Indicators:

**Primary Indicators (minimum of one required; check all that apply)**

- 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)
- Sparsely Vegetated Concave Surface (B8)

- 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 Tilled Soils (C6)
- Thick Muck Surface (C7)
- 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)
- Crayfish Burrows (C8)
- Saturation Visible on Aerial Imagery (C9)
- Shallow Aquitard (D3)
- FAC-Neutral Test (D5)

#### Field Observations:

- Surface Water Present? Yes ☑ No ☐  
- Water Table Present? Yes ☑ No ☐  
- Saturation Present? (includes capillary fringe) Yes ☑ No ☐  

#### Wetland Hydrology Present? Yes ☑ No ☐  

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available: 20 years of aerial photos show Dry Creek in the area of Wetland B with some flow in the channel.

#### Remarks:
WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Dry Creek – Wetland C
Applicant/Owner: NUCWCD
Investigator(s): Greg Allington and Aimee Hill (McMillen, LLC)
Landform (hillslope, terrace, etc.): terrace

Wetland Determination Data Form - Arid West Region

Vegetation – Use scientific names of plants

Tree Stratum (Plot Size: 10 ft)

<table>
<thead>
<tr>
<th>Number</th>
<th>Tree Stratum</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sabine/Shrub Stratum (Plot Size: 10 ft)

<table>
<thead>
<tr>
<th>Number</th>
<th>Tree Stratum</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Willow spp</td>
<td>90%</td>
<td>YES</td>
<td>FACW</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Herb Stratum (Plot Size: 10 ft)

<table>
<thead>
<tr>
<th>Number</th>
<th>Tree Stratum</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Woody Vine Stratum (Plot Size: 10 ft)

<table>
<thead>
<tr>
<th>Number</th>
<th>Tree Stratum</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

% Bare Ground in Herb Stratum <2

Hydrophytic Vegetation Present? Yes ☐ No ☑

Hydric Soil Present? Yes ☐ No ☑

Subregion (LRR): Lat: 40.427556 Long: 111.822586 Datum: WGS84

Soil Map Unit Name: Mixed and cobbly alluvial land

Summary of Findings – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ☐ No ☑

Hydric Soil Present? Yes ☐ No ☑

Wetland Hydrology Present? Yes ☐ No ☑

Remarks: Wetland is located on the banks of an inlet flowing into Dry Creek, downstream of the Dry Creek Dam.

Prevalence Index Worksheet:

<table>
<thead>
<tr>
<th>Species</th>
<th>% Cover</th>
<th>Multiply by</th>
</tr>
</thead>
<tbody>
<tr>
<td>OBL</td>
<td>0</td>
<td>x1 = 0</td>
</tr>
<tr>
<td>FACW</td>
<td>1</td>
<td>x2 = 2</td>
</tr>
<tr>
<td>FAC</td>
<td>0</td>
<td>x3 = 0</td>
</tr>
<tr>
<td>FACU</td>
<td>0</td>
<td>x4 = 0</td>
</tr>
<tr>
<td>UPL</td>
<td>0</td>
<td>x5 = 0</td>
</tr>
</tbody>
</table>

Column Totals: 1 (A) 2 (B)

Prevalence Index = B/A = 2.0

Yes Dominance Test is >50%
Yes Prevalence Index is ≤3.0
No Morphological Adaptations1 (Provide supporting data in Remarks or on a separate sheet)
No Wetland Non-Vascular Plants1
No Problematic Hydrophytic Vegetation1 (Explain)

1Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☐ No ☑
**Project Site:**  Dry Creek – Wetland C

### SOIL

**Sampling Point:** SP1WC

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

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Color (moist)</th>
<th>%</th>
<th>Color (Moist)</th>
<th>%</th>
<th>Type</th>
<th>Loc</th>
<th>Texture</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1^Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains.  2^Loc= Location: PL=Pore Lining, 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

### Indicators of Problematic Hydric Soils:

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

### Restrictive Layer (if present):

- Type: 
- Depth (Inches): 
- Hydric Soils Present?: Yes ☑️ No

**Remarks:**  Assumed hydric; problematic area due to willow root system (no access).

### HYDROLOGY

**Wetland Hydrology Indicators:**

- Primary Indicators (minimum of one required; check all that apply)
- Secondary Indicators (2 or more required)

<table>
<thead>
<tr>
<th>Surface Water (A1)</th>
<th>Salt Crust (B11)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Water Table (A2)</td>
<td>Biotic Crust (B12)</td>
</tr>
<tr>
<td>Saturation (A3)</td>
<td>Aquatic Invertebrates (B13)</td>
</tr>
<tr>
<td>Water Marks (B1) (Nonriverine)</td>
<td>Hydrogen Sulfide Odor (C1)</td>
</tr>
<tr>
<td>Sediment Deposits (B2) (Nonriverine)</td>
<td>Oxidized Rhizospheres along Living Roots (C3)</td>
</tr>
<tr>
<td>Drift Deposits (B3) (Nonriverine)</td>
<td>Presence of Reduced Iron (C4)</td>
</tr>
<tr>
<td>Surface Soil Cracks (B6)</td>
<td>Recent Iron Reduction in Tilled Soils (C6)</td>
</tr>
<tr>
<td>Inundation Visible on Aerial Imagery (B7)</td>
<td>Thick Muck Surface (C7)</td>
</tr>
<tr>
<td>Sparsely Vegetated Concave Surface (B8)</td>
<td>Other (Explain in Remarks)</td>
</tr>
</tbody>
</table>

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

**Field Observations:**

- Surface Water Present? Yes ☑️ No
- Water Table Present? Yes ☑️ No
- Saturation Present? (includes capillary fringe) Yes ☑️ No
- Depth (inches): 0

**Wetland Hydrology Present?:** Yes ☑️ No

**Remarks:**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:
WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Dry Creek – Debris Basin
Applicant/Owner: NUCWCD
Investigator(s): Greg Allington and Aimee Hill (McMillen, LLC)
Landform (hillslope, terrace, etc.): terrace

VEGETATION – Use scientific names of plants

<table>
<thead>
<tr>
<th>Tree Stratum (Plot Size: 10 ft)</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td>0% = Total Cover</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sapling/Shrub Stratum (Plot Size: 10 ft)</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td>0% = Total Cover</td>
</tr>
</tbody>
</table>

Herb Stratum (Plot Size: 10 ft)

Woody Vine Stratum (Plot Size: 10 ft)

<table>
<thead>
<tr>
<th>Woody Vine Stratum (Plot Size: 10 ft)</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

% Bare Ground in Herb Stratum <5%

Hydrophytic Vegetation Present? Yes ☐ No ☑
Hydric Soil Present? Yes ☐ No ☑
Wetland Hydrology Present? Yes ☐ No ☑

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

Hydrophytic Vegetation Present? Yes ☐ No ☑

Is the Sampling Area within a Wetland? Yes ☐ No ☑

Remarks: Ponded, open water basin along Dry Creek.

<table>
<thead>
<tr>
<th>Dominance Test Worksheet:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)</td>
</tr>
<tr>
<td>Total Number of Dominant Species Across All Strata: 0 (B)</td>
</tr>
<tr>
<td>Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)</td>
</tr>
</tbody>
</table>

Prevalence Index worksheet:

<table>
<thead>
<tr>
<th>Total % Cover of:</th>
<th>Multiply by:</th>
</tr>
</thead>
<tbody>
<tr>
<td>OBL species 0 x1 = 0</td>
<td></td>
</tr>
<tr>
<td>FACW species 0 x2 = 0</td>
<td></td>
</tr>
<tr>
<td>FAC species 0 x3 = 0</td>
<td></td>
</tr>
<tr>
<td>FACU species 0 x4 = 0</td>
<td></td>
</tr>
<tr>
<td>UPL species 0 x5 = 0</td>
<td></td>
</tr>
<tr>
<td>Column Totals: 0 (A) 0 (B)</td>
<td></td>
</tr>
</tbody>
</table>

Prevalence Index = B/A = 0.0

No Dominance Test is >50%
No Prevalence Index is ≤3.0
No Morphological Adaptations (Provide supporting data in Remarks or on a separate sheet)
No Wetland Non-Vascular Plants
No Problematic Hydrophytic Vegetation (Explain)

Remarks: Flood zone of creek; riparian zone adjacent to wetland with willow and cottonwood overstory.
SOIL

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

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Color (moist)</th>
<th>%</th>
<th>Color (Moist)</th>
<th>%</th>
<th>Type</th>
<th>Loc</th>
<th>Texture</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains.  2Location: PL=Pore Lining, 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 Gleyed Matrix (S5)
- Sandy Redox (S6)
- Stripped Matrix (S6)
- Loamy Mucky Mineral (F1)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Redox Depressions (F8)

Restrictive Layer (if present):

Type:  Depth (inches):  Hydric Soils Present?: Yes ☒ No ☐


HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- 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)
- Sparsely Vegetated Concave Surface (B8)

Secondary Indicators (2 or more required)

- 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 Tilled Soils (C6)
- Thick Muck Surface (C7)
- Other (Explain in Remarks)

Field Observations:

Surface Water Present? Yes ☒ No ☐ Depth (inches): 12-18
Water Table Present? Yes ☒ No ☐ Depth (inches):
Saturation Present? (includes capillary fringe) Yes ☒ No ☐ Depth (inches):

Wetland Hydrology Present? Yes ☒ No ☐

Remarks:

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available: 20 years of aerial photos show Dry Creek in the area of the basin with some flow in the channel and the basin.

Project Site: Dry Creek – Basin

Sampling Point: basin
January 15, 2015

Mr. Larry Crist  
Field Supervisor  
U.S. Fish and Wildlife Service  
Utah Field Office  
2369 West Orton Circle, Suite 50  
West Valley City, Utah 84119  

Reference: NRCS Dry Creek Dam and Debris Basin Rehabilitation  

Dear Mr. Crist:  

INTRODUCTION  

The Natural Resources Conservation Service (NRCS), in conjunction with the North Utah County Water Conservancy District as the project sponsor, are proposing to rehabilitate the Dry Creek Dam and Debris Basin in Utah County, Utah. McMillen, LLC is preparing a National Environmental Policy Act (NEPA) Supplemental Watershed Plan and Environmental Assessment (Plan-EA) for NRCS. A Preferred Alternative for the project has been selected and is identified in the Draft Plan-EA that is being released for agency and public comment. This memo documents the basis for our determination that the proposed action would have No Effect on federally-listed ESA species or critical habitat for such.

PROJECT CONSULTATION TO DATE  

On March 6, 2014, NRCS submitted a Biological Evaluation letter to USFWS for geotechnical explorations at Dry Creek Dam and Debris Basin. The letter requested concurrence with a No Effect determination for federally-listed ESA species within Utah County. USFWS issued concurrence with the No Effect determination for the geotechnical explorations on March 18, 2014.

PROPOSED ACTION  

The purpose and need for the project is for Dry Creek Dam and Debris Basin to meet current USDA-NRCS and Utah State Dam Safety regulations and current engineering standards.

The project would continue to provide current benefits for the authorized purpose of flood prevention, and further benefits through a new purpose of additional municipal and irrigation (M&I) water storage (please see the enclosed Vicinity Map, Project Area Maps, Rehabilitation Map, and photographs of the project area for further detail).

Dam  
The dam crest elevation would be increased by 4 feet. The embankment slope conditions would be improved and a toe drain added. A stability berm would be constructed downstream of the dam. Excavated material from the basin meeting required standards would be reused as fill to raise the dam and construct the stability berm. If additional material is required for these improvements it will be purchased from a local distributor.
**Debris Basin**

Soil and vegetation within the existing debris basin limits (an approximate 21.8-acre area) would be removed and the basin would be graded to an elevation 4,735 feet AMSL. Fine-grained sediment excavated from the basin (if encountered) that meets required standards may be used to construct a seepage treatment blanket adjoining the upstream dam embankment. Excavated sediment not used for construction of the seepage blanket would be disposed of at an approved off-site disposal facility. Testing of excavated material is not anticipated as potential hazardous waste sites are not located near the project area and no naturally occurring or background contaminants, pesticides, or herbicides occur or are commonly utilized in the basin.

The basin would be inundated with water to keep a constant approximate 21.8-acre pool at an elevation of approximately 4,761.2 feet AMSL. The pooled water would allow for additional non-agricultural irrigation water regulation and recreation benefits and would be adequately designed to maintain fish habitat. The debris basin would be designed for capacities of approximately 186 acre-feet for sediment storage, 85 acre-feet flood storage and 200 acre-feet or irrigation/recreation water storage.

The separation berm would be constructed to trap sediment in the basin, but the top height would be below the proposed constant pool elevation. This would allow hydraulic connectivity of the entire basin while preventing sediment transport across the berm. A concrete pad would be installed (at top elevation 4,735 feet) in the basin on the upstream side of the separation berm, to allow for ease of accumulated sediment removal during Operation and Maintenance (O&M) activities. Dewatering of the basin would occur for O&M sediment removal. Dewatering pump/piping would be formulated during final design. An additional 1-acre, 5-foot deep pool would be excavated in the southern portion of the basin which would provide protection for fish species during the O&M dewatering for sediment removal in the northern portion of the basin upstream of the separation berm.

**Principal Spillway**

The principal spillway riser outlet would be replaced at the same elevation with a new structure and trash rack. The existing principal spillway 30” reinforced concrete outlet pipe would remain in place. The outlet channel to Dry Creek would be armored and stabilized with rock riprap. Some shrub/scrub vegetation may be removed along the outlet channel alignment (approximately 160 linear feet) to facilitate construction.

**Auxiliary Spillway**

The existing auxiliary spillway would be demolished and replaced with a new auxiliary spillway. The new auxiliary spillway crest would be 5 feet higher in elevation and would utilize a piano key weir shape. The new piano key weir auxiliary spillway would be able to adequately route the PMF event and the spillway connection to Dry Creek would be maintained and armored where needed with rock riprap to prevent erosion. Raising the auxiliary spillway would add 200 acre-feet of additional non-agricultural irrigation and recreation water storage capacity.

**Freshwater Supply Features**

A 24 inch diameter reinforced concrete fresh water supply pipe would be installed that would extend approximately 2,683 feet from the piped Murdock Canal to the northern portion of the debris basin. This pipe would divert fresh water from the Murdock Canal into the basin. The freshwater supply pipe would discharge into the basin from the northern end at an outlet, and along the northwest side down a rock channel feature. The rock channel feature would be connected to the freshwater supply pipe and freshwater would be discharged down the rock feature into the basin allowing fresh water distribution in the pond as well as providing aeration.
Sponsor Funded Improvements
Paved parking lots would be constructed within the 1.5 and 2.2 acre construction staging areas. Picnic tables and benches would be added in the vicinity of the paved parking areas. A restroom facility would be constructed adjoining the paved parking area closest to the basin. A bridge would be constructed over the freshwater rock feature to allow public accessibility across the basin. A sand beach would be added between the paved parking lot with the restroom facility and the basin and would also include an access/boat ramp into the water. All of the sponsor funded improvements would be constructed within areas disturbed during construction activities. These recreation improvements would be borne by the sponsor and are assumed to not be covered by funding from the Small Watershed Rehabilitation Program (PL 83-566, as amended by PL 106-472).

Construction Schedule
Construction is scheduled to start in spring 2016 and be complete in fall 2016 pending snow conditions.

SPECIES

The U.S. Fish and Wildlife Service (USFWS) Environmental Conservation Online System (ECOS) was accessed on March 24, 2014 to obtain a species list for Utah County. Additionally the USFWS Information, Planning, and Conservation System (IPaC) was accessed on March 24, 2014 and an IPaC Preliminary Species List was obtained for the project area. The following threatened or endangered species were identified in the Utah County species list, but were not identified as species that should be considered in an effects analysis, according to the USFWS IPaC Preliminary Species List:

- Deseret milk-vetch (*Astragalus desereticus*)
- Clay phacelia (*Phacelia argillacea*)
- Humpback chub (*Gila cypha*)
- Colorado pikeminnow (*Ptychocheilus lucius*)
- Bonytail chub (*Gila elegans*)
- Razorback sucker (*Xyrauchen texanus*)

The proposed project would have No Effect to the species listed above or to their critical habitat as they are not located within or near the project area, and not included on the IPaC Preliminary Species List for the project area. A copy of the USFWS species list for Utah County and the USFWS IPaC Preliminary Species List have been included as an enclosure to this letter. Additionally, known occurrences of special status species and locality data was obtained from the Utah Natural Heritage Program, Division of Wildlife Resources (UDWR) in October 2013.

The table below identifies threatened, endangered, proposed, or candidate species acknowledged in the USFWS IPaC Preliminary Species List that should be considered in an effects analysis for the proposed project.

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Status</th>
<th>Critical Habitat in Utah County</th>
<th>Critical Habitat in Project Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greater sage-grouse (Centrocercus urophasianus)</td>
<td>Candidate</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Yellow-billed cuckoo (Coccyzus americanus occidentalis)</td>
<td>Proposed Threatened</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>June sucker (Chasmistes liorus)</td>
<td>Endangered</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Least chub</td>
<td>Candidate</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Common Name</td>
<td>Status</td>
<td>Critical Habitat in Utah County</td>
<td>Critical Habitat in Project Area</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>-------------</td>
<td>---------------------------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td><em>(Iotochthys phlegethontis)</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ute ladies’-tresses <em>(Spiranthes diluvialis)</em></td>
<td>Threatened</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Canada lynx <em>(Lynx canadensis)</em></td>
<td>Threatened</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

- = Critical habitat has not been designated for the species.

**EFFECTS DETERMINATION**

**Greater sage-grouse**
The greater sage-grouse inhabits sagebrush plains, foothills and mountain valleys that contain sagebrush as the primary plant community. There are no known occurrences of the species within one mile of the project area based on information provided by the UDWR. There are no primary sagebrush plant communities located within the immediate vicinity of the project area. The greater sage-grouse is not expected to occur in the project area due to heavy human presence and since there is no suitable habitat within the vicinity of the dam. Therefore, the project would have **No Effect** on this species. Critical habitat has not been designated for greater sage-grouse.

**Yellow-billed cuckoo**
The yellow-billed cuckoo typically inhabits lowland large space riparian areas (~100+ acres) with dense cottonwood trees, willows, and other riparian shrubs. They prey upon large insects from tree and shrub foliage. The reservoir and dam are located in a mountainous area primarily composed of aspen and conifer trees with minimal riparian species. The project area does not contain a large unfragmented tract of riparian habitat suitable for the yellow-billed cuckoo and they are not expected to inhabit this area. There are no known occurrences of the species within one mile of the project area based on information provided by UDWR and it is unlikely that the species would be found within the project area. Accordingly, it has been determined that the project would have **No Effect** on this species. Critical habitat has not been designated for yellow-billed cuckoo.

**June sucker**
Historical distribution of the June sucker has always been very narrowly distributed, occurring naturally in Utah Lake and its tributaries. Currently, the species is only found in Utah Lake and the Provo River. It is not known whether the species utilized Dry Creek specifically, but potential June sucker use of all Utah Lake tributaries during periods of high runoff did exist historically. However, between the Dry Creek Debris Basin and Utah Lake, Dry Creek has been piped in multiple segments and fish passage is blocked. According to the UDWR, there have been no recorded observations of the June sucker in Dry Creek and they are not expected to be present within the project area. Therefore, rehabilitation of the dam would have **No Effect** on these species. There will be **No Effect** to June sucker critical habitat because no critical habitat is located within or adjacent to the project area.

**Least chub**
Least chub typically inhabit slow moving stream segments and spring seep pools with dense vegetation. According to the UDWR, there are no documented occurrences of least chub in Dry Creek and the creek does not contain suitable habitat. Because least chub are not expected to be present within the project area, it has been determined the project would have **No Effect** on these species. Critical habitat has not been designated for least chub.
Ute ladies’-tresses
Ute ladies’-tresses occur along riparian edges, gravel bars, old oxbows, high flow channels, and moist to wet meadows along perennial streams. The species typically occurs in undisturbed, very wet seep areas with high flows. The study area does not experience continual high flows year-round due to the intermittent nature of the creek, and although the basin itself is a wetland, it is highly disturbed from maintenance activities. According to the UDWR, there are no known occurrences of the species within one mile of the project area. Ute ladies’-tresses are not expected to be present within the vicinity of the Dry Creek Dam and Debris Basin project due to absence of occupied habitat, the lack of suitable habitat, the high amount of disturbance from sediment removal during regular maintenance activities, and the intermittent nature of the stream. The project would have No Effect on this species. Critical habitat has not been designated for Ute ladies’-tresses.

Canada lynx
The Canada lynx typically reside in moist boreal forests at high elevations that have cold, snowy winters. The predominant vegetation of boreal forests consists of montane conifer trees with minimal human disturbance. The area surrounding the reservoir and dam does not contain a large unfragmented tract of montane coniferous forest and is disturbed from recreational human presence. According to the UDWR, there are no known occurrences of the species within one mile of the project area. The Canada lynx is not expected to occur in the vicinity of the project since there is no suitable habitat or prey base within the vicinity of the site. Therefore, the project would have No Effect on this species. There will be No Effect to Canada lynx critical habitat because no critical habitat has been designated for the species within the state of Utah.

CONCLUSION

In conclusion, based on the short duration, and limited scope from dam rehabilitation at the Dry Creek Dam and Debris Basin project site, the following effect determinations have been made for ESA listed species known to occur in Utah County:

- Deseret milk-vetch – No Effect
- Clay phacelia – No Effect
- Humpback chub – No Effect
- Colorado pikeminnow – No Effect
- Bonytail chub – No Effect
- Razorback sucker – No Effect
- Greater sage-grouse – No Effect
- Yellow-billed cuckoo – No Effect
- June sucker – No Effect
- June sucker critical habitat – No Effect
- Least chub – No Effect
- Ute ladies’-tresses – No Effect
- Canada lynx – No Effect
- Canada lynx critical habitat – No Effect

NRCS has provided these No Effect Determinations on the Dry Creek Dam and Debris Basin Rehabilitation project for your records. If you have any questions, please contact Derek Hamilton, EWP biologist, at (801) 524-4560.

Sincerely,
BRONSON SMART
State Engineer

Enclosures
- Vicinity Map
- Project Map
- Rehabilitation Alternative Map
- Project Photos
- USFWS Utah County Listed and Candidate Species List
- USFWS IPaC Preliminary Species List
NRCS Dry Creek Debris Basin Rehabilitation

Legend
- Project Area
- Principal Spillway
- Auxiliary Spillway
- Upstream Embankment
- Downstream Embankment
- Existing Access Road
- Dry Creek
- Murdock Canal Pipeline
- Roads

NOTES:
Aerial photo from 2009 NAIP 1-m orthophoto. Points, lines and polygons supplied by various state and federal sources, including UDOT and USGS.
NOTES:

Aerial photo from 2009
NAIP 1-m orthophoto.
Points, lines and polygons supplied by various state and federal sources, including UDOT and USGS. Design features obtained from McMillen, LLC
Concept Design drawings dated July 2014.

Legend
Fresh Water Supply Pipe
Regrade Bank
Rodads
Stability Berm
Murdock Canal Trail
Murdock Canal Pipeline
Concrete Pad
Dry Creek

Dam Rehabilitation - Dam Raise
With Additional Storage
NRCS Dry Creek Debris Basin Rehabilitation
Draft Supplemental Watershed Plan No. 13
and Environmental Assessment

McMillen, LLC
DESIGN with Vision. BUILD with Integrity.

USDA

Photograph 1 – 08/15/2013
Standing on the W side of the debris basin looking SE across the project area.

Photograph 2 – 08/15/2013
Standing on the SW side of the debris basin looking NE across the project area.

Photograph 3 – 02/14/2014
Standing on the N side of the debris basin looking NE at a portion of the project area.

Photograph 4 – 02/14/2014
Standing on the N side of the debris basin looking SE across the basin area.
Photograph 5 – 02/14/2014
Standing on the N side of the basin looking S-SE toward the auxiliary spillway.

Photograph 6 – 02/14/2014
Looking NE across the northern potion of the project area. Highway 92 in the background.

Photograph 7 – 08/15/2013
Standing at the top of the auxiliary spillway looking SW.
<table>
<thead>
<tr>
<th>Group</th>
<th>Name</th>
<th>Population</th>
<th>Status</th>
<th>Lead Office</th>
<th>Recovery Plan Name</th>
<th>Recovery Plan Stage</th>
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</thead>
<tbody>
<tr>
<td>Birds</td>
<td>Yellow-billed Cuckoo (Coccyzus)</td>
<td>Western U.S. DPS</td>
<td>Proposed Threatened</td>
<td>Sacramento Fish And Wildlife</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birds</td>
<td>Greater sage-grouse</td>
<td>entire</td>
<td>Candidate</td>
<td>Wyoming Ecological Services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fishes</td>
<td>Humpback chub (Gila cypha)</td>
<td>Entire</td>
<td>Endangered</td>
<td>Upper Colorado River</td>
<td>Humpback Chub - 1990 2nd</td>
<td>Final Revision 2</td>
</tr>
<tr>
<td>Fishes</td>
<td>Colorado pikeminnow</td>
<td>except Salt and Verde R.</td>
<td>Endangered</td>
<td>Upper Colorado River</td>
<td>Colorado Pikeminnow</td>
<td>Final Revision 2</td>
</tr>
<tr>
<td>Fishes</td>
<td>Bonytail chub (Gila elegans)</td>
<td>Entire</td>
<td>Endangered</td>
<td>Upper Colorado River</td>
<td>Bonytail Chub Revised</td>
<td>Final Revision 1</td>
</tr>
<tr>
<td>Fishes</td>
<td>Least chub (lotichthyrs)</td>
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<td>Endangered</td>
<td>Utah Ecological Services Field</td>
<td>June Sucker</td>
<td>Final</td>
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<tr>
<td>Fishes</td>
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<td>Endangered</td>
<td>Upper Colorado River</td>
<td>Razorback Sucker - Recovery</td>
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</tr>
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<td>Powering Plants</td>
<td>Desert milk-vetch (Astragalus)</td>
<td>Entire</td>
<td>Threatened</td>
<td>Utah Ecological Services Field</td>
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<tr>
<td>Powering Plants</td>
<td>Clay phacelia (Phacelia)</td>
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<td>Utah Ecological Services Field</td>
<td>Clay Phacelia</td>
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<td>Final</td>
</tr>
<tr>
<td>Powering Plants</td>
<td>Ute ladies`-tresses (Spiranthes)</td>
<td>Threatened</td>
<td>Utah Ecological Services Field</td>
<td>Ute Ladies`-Tresses Draft</td>
<td></td>
<td>Draft</td>
</tr>
<tr>
<td>Mammals</td>
<td>Canada Lynx (Lynx canadensis)</td>
<td>(Contiguous U.S. DPS)</td>
<td>Threatened</td>
<td>Montana Ecological Services</td>
<td>Recovery Outline for the</td>
<td>Outline</td>
</tr>
</tbody>
</table>

**USFWS Utah County Listed and Candidate Species List Accessed March 24, 2014**
This resource list is to be used for planning purposes only — it is not an official species list.

Endangered Species Act species list information for your project is available online and listed below for the following FWS Field Offices:

Utah Ecological Services Field Office
2369 WEST ORTON CIRCLE, SUITE 50
WEST VALLEY CITY, UT 84119
(801) 975-3330
http://www.fws.gov
http://www.fws.gov/utahfieldoffice/

Project Name:
Dry Creek Debris Basin Rehabilitation
Natural Resources of Concern

Project Location Map:

Project Counties:
Utah, UT

Geographic coordinates (Open Geospatial Consortium Well-Known Text, NAD83):
MULTIPOLYGON (((-111.8214395 40.43147, -111.8152811 40.4316007, -111.8135216 40.4315843, -111.8177273 40.4293303, -111.8191864 40.4278439, -111.8185642 40.4275172, -111.8190577 40.4269619, -111.8201949 40.4269619, -111.8210532 40.4263412, -111.8205383 40.4259981, -111.8208387 40.4257531, -111.8213751 40.4259491, -111.8219759 40.4257205, -111.8233063 40.4250017, -111.8257289 40.4263738, -111.8249993 40.4271252, -111.8253856 40.4279909, -111.8246989 40.4281706, -111.8241839 40.428775, -111.8217377 40.4294283, -111.8213086 40.4299183, -111.8214395 40.43147)))
**Project Type:**
Dam

*Endangered Species Act Species List (USFWS Endangered Species Program).*
There are a total of 6 threatened, endangered, or candidate species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fishes may appear on the species list because a project could cause downstream effects on the species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the Critical habitats within your project area section below for critical habitat that lies within your project area. Please contact the designated FWS office if you have questions.

**Species that should be considered in an effects analysis for your project:**

<table>
<thead>
<tr>
<th>Birds</th>
<th>Status</th>
<th>Has Critical Habitat</th>
<th>Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greater sage-grouse <em>(Centrocercus urophasianus)</em></td>
<td>Candidate</td>
<td>species info</td>
<td>Utah Ecological Services Field Office</td>
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Canada Lynx \((Lynx\ canadensis)\)
Population: (Contiguous U.S. DPS)
Threatened
species info
Final designated critical habitat
Utah Ecological Services Field Office

Critical habitats within your project area:

There are no critical habitats within your project area.

FWS National Wildlife Refuges \((USFWS\ National\ Wildlife\ Refuges\ Program)\).

There are no refuges found within the vicinity of your project.

FWS Migratory Birds \((USFWS\ Migratory\ Bird\ Program)\).

Most species of birds, including eagles and other raptors, are protected under the Migratory Bird Treaty Act (16 U.S.C. 703). Bald eagles and golden eagles receive additional protection under the Bald and Golden Eagle Protection Act (16 U.S.C. 668). The Service's Birds of Conservation Concern (2008) report identifies species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become listed under the Endangered Species Act as amended (16 U.S.C 1531 et seq.).

Migratory bird information is not available for your project location.

NWI Wetlands \((USFWS\ National\ Wetlands\ Inventory)\).

The U.S. Fish and Wildlife Service is the principal Federal agency that provides information on the extent and status of wetlands in the U.S., via the National Wetlands Inventory Program (NWI). In addition to impacts to wetlands within your immediate project area, wetlands outside of your project area may need to be considered in any evaluation of project impacts, due to the hydrologic nature of wetlands (for example, project activities may affect local hydrology within, and outside of, your immediate project area). It may be helpful to refer to the USFWS National Wetland Inventory website. The designated FWS office can also assist you. Impacts to wetlands and other aquatic habitats from your project may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal Statutes. Project Proponents should discuss the relationship of these requirements to their project with the Regulatory Program of the appropriate
The following wetlands intersect your project area:

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EMERGENCY ACTION PLAN

DRY CREEK DAM

UTAH COUNTY, UTAH

OPERATED BY
NORTH UTAH COUNTY WATER CONSERVANCY DISTRICT
AMERICAN FORK, UTAH

APPROVED FOR USE BY:

Earl S. Clark
Chairman
North Utah County Water Conservancy District

9/1/11
Date

Copy No. _________
DRY CREEK DAM
EMERGENCY ACTION PLAN

Participant Concurrence

We, the undersigned, representing our respective organizations, have read the Emergency Action Plan for Dry Creek Dam, and understand our responsibilities in the execution of this plan should an emergency occur:

[Signatures and dates]

Utah County Engineer

Utah County Sheriff / County Emergency Management Director

Lehi City Public Works Office and City Engineer

Chairman, North Utah County Water Conservancy District

North Utah County Conservancy District
Dry Creek Dam

Emergency Action Plan
August 1, 2011
**DRY CREEK DAM**

**EMERGENCY ACTION PLAN**

This copy includes the following revisions:

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<td>Jay Franson replaced Carl Clark as NUCWCD Chairman; Contact info updated on Notification Flow Charts A &amp; B (pp. 6 - 7 &amp; back cover); and in the Emergency Communications Directory (see p. 26).</td>
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PART I. INTRODUCTION

EAP SUMMARY SHEET

This Emergency Action Plan for Dry Creek Dam defines responsibilities and provides procedures designed to identify unusual and unlikely conditions in time to take remedial actions and to notify appropriate public officials of possible, impending, or actual failure of the dam. The plan also provides for notification when flood releases may create major flooding.

The Utah County Engineer, who is also Director of Public Works, listed at the top of the following Notification Flow Charts “A” and “B” has overall responsibility for emergency actions that need to be initiated for such dams. The next key person responsible for initiation and coordination of emergency action notification is the Chairman of the North Utah County Water Conservancy District. This Conservancy District is the owner of the dam.

The “Dam Tender” referenced in this updated document is a technically qualified employee of the dam owner, who provides operation, periodic maintenance, and advanced warning assistance pertaining to the dam. The dam tender should possess the qualifications, training and experience with the specific type of facility involved.

The County Engineer, Conservancy District Chairman, and the Dam Tender must be knowledgeable in recognizing an emergency situation or unusual condition and must act immediately to minimize danger to the structure and to all persons within the immediate area - especially those in the downstream channel.

As a minimum procedure, the responsible emergency action person or persons for the Dry Creek Dam shall immediately:

- Identify the emergency situation
- Contact the Utah County Sheriff and others on the following flow charts, as necessary
- With assistance from the State Engineer Office and Office of Comprehensive Emergency Management (CEM), as needed, determine necessary actions to be taken
- Carry out and document actions taken, and
- Maintain continuing contact with the State Engineer Office, State CEM (as needed, enlist help to remain at the communication source, or relay information)
NOTES:
1. Public activation of this flow chart may be accomplished by dialing 911. The 911 Operator will notify the Sheriff and the Sheriff will notify the Dam Tender.

2. If the person you are contacting is not available, you are responsible to complete his/her notification procedures.

3. Call the National Weather Service only if the potentially dangerous situation is due to inclement weather conditions.

UTAH PUBLIC SAFETY DIVISION OF COMPREHENSIVE EMERGENCY MANAGEMENT
Office: 801-538-3400
DRY CREEK DAM
NOTIFICATION FLOW CHART B
FAILURE IS IMMINENT OR HAS OCCURRED

(1) UTAH CO. ENGINEER IDENTIFIES OR VERIFIES PROBLEM CONDITION
RICHARD NIELSON
Work: 801-851-8601
Cell: 801-404-7010
Home: 801-465-3556

(2) CONTINUE TO MONITOR AND UPDATE STATUS OF WATER LEVEL AND EMBANKMENT

(3) UTAH COUNTY SHERIFF
Emergency: 911
Utah County Central Dispatch: 801-851-4100

(4) COORDINATE EVACUATION OF DOWNSTREAM RESIDENTS AND WARNING OF CITY OFFICIALS

(5) UTAH HIGHWAY PATROL
(801) 887-3800

(6) NO. UT. CO. WATER CONSERVANCY DISTRICT
CHAIR: JAY FRANSON
Cell: 801-376-3198
Work: 801-756-0309
Home: 801-756-8266

(7) DAM TENDER: ALAN JENKINS
Cell: 801-885-3838
Home: 801-885-3454

(8) LEHI CITY ENGINEER: LORIN POWELL
Cell: 801-836-1021

(9) NATIONAL WEATHER SERVICE
See Note 3
Lead Forecaster: 801-524-4377
Brian MacInerny: 801-971-2033

(10) UTAH STATE ENGINEER’S OFFICE
DAM SAFETY SECTION

(11) DAVE MARBLE
Office: 801-538-7376
Home: 801-254-8760
Cell: 801-580-5128

(12) EVERETT TAYLOR
Office: 801-538-7372
Cell: 801-698-2377

(13) BRET DIXON
Office: 801-538-7373
Cell: 801-673-5913

(14) UTAH PUBLIC SAFETY DIVISION OF COMPREHENSIVE EMERGENCY MANAGEMENT
Office: 801-538-3400

NOTES:
1. Public activation of this flow chart may be accomplished by dialing 911. The 911 Operator will notify the Sheriff and the Sheriff will notify the Dam Tender.

2. If the person you are contacting is not available, you are responsible to complete his/her notification procedures.

3. Call the National Weather Service only if failure is due to inclement weather conditions.
PART II. GENERAL RESPONSIBILITIES UNDER THE PLAN

A. Owner Responsibility

The North Utah County Water Conservancy District owns Dry Creek Dam. The owner has the responsibility to operate, maintain and repair Dry Creek Dam. The responsible official of the North Utah Water Conservancy District is the District Chairman. On-site periodic and on-call operation and maintenance of the dam is the responsibility of the Dam Tender, a technically qualified contract employee of the owner.

The owner:

- insures safe operation of the dam
- maintains and repairs the dam as needed to insure safe operation
- insures the dam complies with applicable local, state and federal law
- secures and appoints a dam tender
- directs the dam tender in operating and maintaining the dam
- provides training for the dam tender as required
- updates and distributes the Emergency Action Plan (EAP) and Standard Operating Procedures (SOP) documents for Dry Creek Dam
- determines and identifies conditions or triggering agents that initiate or require emergency actions
- initiates actions to be taken and clearly communicates the emergency situation to those who need to be contacted
- issues warning messages if dam failure is impending or has occurred
- communicates with county and local public safety officials; Utah County Engineer; Utah State Department of Natural Resources, State Engineer Office, Dam Safety Section; and the State Division of Comprehensive Emergency Management, as needed.

Dam Tender:

- operates and maintains the dam according to approved Standard Operating Procedures
- maintains records as required by law and by the owner
- monitors conditions or triggering agents that initiate or require emergency actions
- cooperates with local public safety officials and other entities implementing the Emergency Action Plan
B. Sample Warning Messages

DAM HAS FAILED

“This is [give name], Utah County Engineer; [or Conservancy District Chairman]; concerning Dry Creek Dam, located 2.5 miles upstream from Lehi. Flooding can be expected. The flood plain below must be evacuated immediately.”

DAM FAILURE IS POSSIBLE

“This is [give name], Utah County Engineer; [or Conservancy District Chairman]; concerning Dry Creek Dam, located 2.5 miles upstream from Lehi. Failure of Dry Creek Dam is possible. Flooding in the flood plain may be expected at any time. The flood plain below may require evacuation.”

A POTENTIAL EMERGENCY SITUATION AT THE DAM HAS DEVELOPED OR IS DEVELOPING

“This is (give name), Utah County Engineer; or Conservancy District Chairman; concerning Dry Creek Dam, located 2.5 miles upstream from Lehi. A potential emergency situation at the dam has developed, which if it continues may result in failure or uncontrolled releases from Dry Creek Dam. Flooding in the flood plain may be expected. Further information will be provided as it develops.”

C. Emergency Declaration

The Chairman of North Utah County Water Conservancy District is responsible for declaring the existence of an emergency at the Dry Creek Dam. The District Chairman is also responsible for declaring the termination of an emergency at the Dry Creek Dam, after consultation with the State Engineer Office, Dam Safety Section.

The County Engineer, State Engineer, State Dam Safety Officer, County Sheriff, or other responsible public safety official, may also, upon cause, declare an emergency condition at Dry Creek Dam.

Consultation among the parties concerned with the dam should take place prior to declaring an emergency, if time permits.

D. Responsibility for Notification

In coordination with the County Engineer, the Chairman of North Utah County Water Conservancy District as the on-site operational entity is responsible to notify the Utah County Sheriff and local officials. As time allows, he should seek advice and assistance. However, if failure is impending or has occurred, and the dam owner cannot be quickly contacted, the overall responsibility for notification continues with the Utah County Engineer.
The District Chairman is also responsible to notify the Weather Service (NWS), which has general responsibility for issuing flood warnings. The National Weather Service must be notified of any impending or actual dam break flooding, so that flood warnings can be issued via the Emergency Broadcast System (EBS).

The District Chairman is also responsible to notify the Utah State Office of Comprehensive Emergency Management (CEM) for emergency management assistance. CEM will in turn contact all appropriate governmental entities such as the Governor’s Office, FEMA, State Geologist and State Engineer area office.

E. Responsibility for Evacuation

The Utah County Sheriff is responsible for warning and evacuation planning. The District Chairman is responsible for notifying the Utah County Sheriff when flooding is anticipated or a failure is impending or has occurred.

The North Utah County Water Conservancy District cannot assume the responsibility of governmental entities for evacuation of people.

F. EAP Coordinator Responsibility

The Chairman of North Utah County Water Conservancy District is designated as the Emergency Action Plan Coordinator. The EAP Coordinator is responsible for EAP-related activities, including (but not limited to) preparing revisions of the EAP, establishing training sessions, coordinating EAP exercises with the Utah County Sheriff Office and the Utah County Emergency Preparedness Director, etc. Persons having questions or concerns should address them to the District Chairman (see Notification Flow Chart A, page 2).

G. EAP Revisions

This EAP should be reviewed every year for applicability and accuracy. Names and phone numbers listed in the Communications Directory should be verified annually, updated pages prepared and provided to all copyholders by the EAP Coordinator. When conditions and/or key personnel change, the EAP needs to be updated.
PART III. EMERGENCY PROCEDURES

EMERGENCY SITUATIONS

Whenever possible video and still photos of the problem site should be taken. These will be useful in evaluating and alleviating emergency situations.

A. Failure or Impending Failure of the Dam

DOWNSTREAM HAZARD POTENTIAL: Dry Creek Dam could present a high hazard potential to the downstream area as a result of failure or unsound operation. Should it fail, loss of life and potential economic loss may occur.

The dam's location in the watershed above Lehi should alert the reader of urgency in event of a failure.

WARNING MESSAGES: The initial warning message would be one of three possible emergency conditions.

1. Advise that a POTENTIAL emergency situation exists, or is developing, and advise concern for the safety of the dam.

2. A WATCH of the strong possibility of failure and calling for the evacuation of the flood plain.

3. A WARNING of failure and calling for immediate evacuation of the flood plain.

(Notification Flow Charts A and B located in the front of this EAP graphically define the notification and warning process.)

a. Failure

If the dam is failing, the Chairman of the North Utah County Water Conservancy District (or the other operating personnel at the dam) must immediately initiate downstream evacuation notification using the following procedures:

(1) Inform the Utah County Sheriff and the Utah County Engineer by phone or radio (refer to the Communications Directory for phone numbers and backup systems).

(2) Contact the National Weather Service and the Utah Division of Comprehensive Emergency Management (CEM). CEM will inform other appropriate federal, state and county government offices.

(3) Coordinate efforts with Utah County Sheriff Office, the Utah County Emergency Preparedness Director and municipal public safety entities in alerting all downstream areas.

(4) Contact downstream dam operators and major water users if possible.

North Utah County
Conservancy District
Dry Creek Dam

Emergency Action Plan
August 1, 2011
(5) Maintain contact with Utah State Department of Natural Resources, State Engineer Office, Dam Safety Section.

The Utah County Sheriff or the National Weather Service (NWS) in case of imminent flooding due to dam failure or severe weather conditions must activate the Emergency Broadcast System (EBS).

b. Impending failure

If the District Chairman suspects impending failure, the following procedures should begin immediately:

1. Inform the Utah County Sheriff and the County Engineer by phone or radio (refer to the Communications Directory for phone numbers or backup systems)
2. Coordinate with the Sheriff's Office regarding contacting the National Weather Service
3. Contact the Utah Division of Comprehensive Emergency Management
4. Maintain contact with the State Engineers Office, Dam Safety Section.
5. Continue to monitor and update the status of the dam water level and embankment
6. Initiate corrective measures and other actions based on technical and safety input from the above entities

Note: As early as possible, notify the Utah County Sheriff Office of possible flooding downstream; make certain all key officials understand the impending situation.

B. Projected Flooding

If the reservoir water surface is projected to rise above the top of the dam, immediately contact the Utah County Engineer and Utah State Division of Comprehensive Emergency Management. In the event of flooding due to severe weather conditions, initiate action to contact the National Weather Service. Information reported should include:

- current reservoir water surface elevation
- observed water surface rise rate
- weather conditions in the vicinity -- past, present and future
- discharge condition of the stream above and below the dam.
- known conditions at locations upstream and downstream from the dam

C. Earthquake

LATITUDE: 90 degrees 25.7 North    LONGITUDE: 111 DEGREES 49.3' WEST

ZONE: Dry Creek Dam is located in an area subject to earthquakes of major damaging intensity.

SEISMIC EVALUATION: an evaluation has not been performed as part of this EPA.
EARTHQUAKE OCCURRENCE action steps are outlined below under section
"1. Under Normal Communication Conditions" and under section
"2. Under Communication Outage Conditions" as follows:

1. Under Normal Communication Conditions
   a. If an earthquake is felt or reported to have occurred in the area, use the following procedures:
      (1) Immediately conduct an overall visual dam inspection
      (2) IF THE DAM IS DAMAGED TO THE EXTENT THERE IS INCREASED FLOW PASSING DOWNSTREAM, IMMEDIATELY IMPLEMENT FAILURE OR IMPENDING FAILURE PROCEDURES
      (see next page)

   b. If visible damage has occurred, but is not serious enough to cause dam failure, then immediately take the following steps:

      (1) Observe nature, location and extent of damage. The description of slides, sloughs and sudden subsidence should include:
          • Location
          • Extent (severity)
          • Rate of subsidence
          • Effect on adjoining structures
          • Springs or seeps
          • Reservoir and tail water elevations
          • Prevailing weather conditions
          • Other facts believed pertinent

      (2) Evaluate impending failure hazard

      (3) Report all information to the Utah County Engineer and State Engineer Office, Dam Safety Section. If key personnel are unavailable, report directly to Utah County Sheriff Office.

      It is extremely important that the person receiving your report understands your evaluation and description of the potential hazard at the dam.
      A decision on further action required should be made promptly.

      Re-inspect the damage site and maintain communications with key personnel previously receiving the report.

   c. If dam failure is not impending continue evaluation by thoroughly inspecting for damage including:
      • both dam faces for cracks, settlement and seepage
      • abutments for possible displacement
      • drains and seeps
• spillway structure
• outlet works
• visible reservoir and downstream areas for landslides
• other appurtenant structures

d. Report inspection findings to the Utah County Engineer and the State Engineer Office, Dam Safety Section

e. If apparent damage has not occurred to the dam, embankments or appurtenant structures, "No Damage" report should be made to the State Engineer Office, Dam Safety Section; and the Utah County Engineer

f. Continue to inspect and monitor the facilities for at least 48 hours or as instructed by the State Engineer Office, Dam Safety Section or the Utah County Engineer, in the event unobservable or delayed damage should occur.

g. A secondary inspection should also be made within two weeks or a month after the initial inspection because some damage to structures may not be apparent immediately after an earthquake. It is possible that delayed settlement of structures, the reactivation of old slides, or the development of new slides may occur.

h. Survey settlement and alignment measurement points as requested by the State Engineers Office, Dam Safety Section, or the Utah County Engineer

2. Under Communication Outage Conditions

If all communications from the dam are lost and there is potential for impending failure of the dam, use the following checklist as a guide during an earthquake event (most likely at this point, there would be one or more personnel on site -- from the Conservancy District, County Engineer Office and local public safety):

a. Quickly inspect the dam and evaluate the potential failure hazard

b. Check for sloughs, slides, slumps and other signs of distress near dam abutments

c. If failure is impending, use all measures that can reduce reservoir storage. Warning downstream residents and other entities is imperative. If possible, enlist aid through the Utah County Emergency Preparedness Director and the Utah County Sheriff's Office. The Utah County Sheriff Office and local public safety staff should perform personally warning downstream residents and other entities.

d. Continue trying to communicate with or send word to key Utah County and local municipal contacts, and to the State Engineer Office, Dam Safety Section.
D. UNUSUAL OCCURRANCES

The North Utah County Water Conservancy District should continue to address possible occurrences of an unusual nature through its Dry Creek Dam operation and maintenance activities, and continuous monitoring by the Dam Tender, periodic site visits by its technical officers, and joint annual inspections with the State Engineer Office, Dam Safety Section. As problems areas and remedial requirements are determined, the Conservancy District Chairman should confer with the State Engineer Office, Dam Safety Section, and undertake corrective measures.

Unusual occurrences include:

1. Slumping or cracking of Dam Abutments -- determine:
   - location
   - size of affected area(s) in height, width and depth
   - extent (severity)
   - estimated discharge (whether clear or cloudy water)
   - reservoir and tail water elevations

2. Failure of Appurtenances or Operating Equipment
   Determine probable cause of failure, duration and effects on reservoir operation; also determine:
   - needed replacement parts
   - type of labor available
   - needed repair equipment
   - available temporary replacements or temporary alternatives
   - any other facts believed pertinent

3. New Springs, Seeps or Boggy Areas
   a. If new water flows and boggy areas develop, determine:
      - location
      - size of affected area(s)
      - estimated discharge
      - nature of discharge (whether clear or cloudy water)
      - reservoir and tail water elevation
   b. Map Data -- If necessary to further analyze conditions, a map should be prepared showing the extent of all seep areas, springs and any other pertinent data, including the dates of recording reservoir levels.
4. Rapid Increase or Cloudy Appearance in Seepage

a. If existing or new springs, seeps and boggy areas develop rapid increases in cloudy water, determine:
   • location
   • size of affected area(s)
   • estimated discharge
   • nature of discharge (whether clear or cloudy water)
   • reservoir and tail water elevation

b. Monitor continuously to determine corrective measures

c. Map data -- If necessary to further analyze conditions, a map should be prepared showing the extent of all seep areas, springs and any other pertinent data, including the dates of recording reservoir levels.

d. Settlement points -- Surface measurement readings (for settlement points) will help clarify abnormal conditions. Observations should be recorded and reported.

5. Landslides

a. All landslides or potential landslides in the Dry Creek Dam area should be reported and recorded. This includes landslides that have or could move into the outlet works, spillway area, or into the reservoir (rapidly displacing a large volume of water). This also includes landslides or potential landslides, which may affect abutment and/or landslides moving into the downstream channel.

b. Identify landslide areas by name and location and determine:
   • size
   • possible cause
   • degree of effect on operation
   • probability of additional movement of disturbed area or other slide areas
   • development of new slide areas, and
   • other pertinent facts

c. For a landslide that occurs in the downstream channel determine:
   • size (including depth and percent across outlet channel)
   • capability of immediately closing outlet works
   • other inflows
   • location in relation to dam toe, and other appurtenant structures
   • availability or need for heavy equipment
6. Severe Storms
   Based on advanced weather warning reports and actual occurrence of a severe storm
   (including heavy rainstorm, unusual snowfall, high winds, etc.), monitor and evaluate
   flows into the dam and maintain contact with the Utah County Engineer, National
   Weather Service and the State Engineer.

7. Drowning, Major Accident or Criminal Action
   If such an event occurs, obtain pertinent details and notify the Utah County
   Sheriff -- emergency (911) or Dispatch.

E. Dam Attendance And Communication Procedures

   The Dry Creek Dam will be attended continuously when threatened by physical
   harm such as extreme runoff conditions or earthquake.

   Refer to Flow Charts A and B above and the Communications Directory for normal and
   emergency phone numbers for the Chairman of the North Utah County Water Conservancy
   District who is also the EAP Coordinator, the Dam Tender employed by the District, the Utah
   County Engineer who has overall responsibility for dam emergency action, Utah State level
   contacts, Utah County Sheriff, Lehi City, and other key entities and personnel.
PART IV. PREVENTATIVE ACTION

A. Surveillance

Dry Creek Dam is not continuously manned because it is normally in use during inclement weather and seasonal runoff conditions. However, a remote, electronic telemetry system was installed at the Dam by the Lehi City in 2011 to monitor any spillway flows. Lehi City provides security for the system, monitors and shares data with the Conservancy District/Dam Tender. The Dam Tender periodically monitors the three piezometers and undertakes maintenance so is often on site.

Failure of the dam may endanger human life and cause significant property damage. It is imperative that procedures be developed and implemented to identify conditions requiring emergency actions, and to promptly alert public safety officials responsible for evacuating residents and other entities, which would be affected in the event of an emergency at the dam. The information must be clear and concise, so that responsible officials may react with confidence and activate the Emergency Action Plan (EAP), if necessary, without requiring additional personnel to visit the site to verify conditions.

Dry Creek Dam will be monitored around-the-clock, in shifts, by the Dam Tender who is employed by the North Utah County Water Conservancy District, the District Chairman and other qualified personnel during periods of actual or forecasted high flows. A technically qualified observer will be at the dam continually, when flood conditions or signs of serious structural distress have been identified and there will be reliable communication systems in place with backup.

B. Directions and Access to the Dam Site

Dry Creek Dam is located approximately 4 miles north of Lehi, in Utah County. There is road access to the dam crest from the north abutment, but the road is gated and normally locked at the edge of the Conservancy District property. The un-bridged spillway is located midway between the abutments and prevents vehicle access to the south end of the abutment from the north end. All roads to the dam gate are paved all-weather roads. The dam location was in a rural county area during construction in 1961, but the adjacent area to the west is now a shopping/fast food/commercial area with a large Smith’s Grocery anchor store.

1. From Lehi, Utah – From the intersection of Center Street and Main Street in Lehi City travel west .25 miles (3 blocks) on Main Street to the intersection of 300 West and Main Street, thence north on 300 West for 2.7 miles to the intersection of 8200 West and 3200 North, thence east 1.8 miles to the gate and road leading to the right abutment of the dam.

2. From Salt Lake City, Utah – Follow I-15 south 27 miles to Exit 287 (Alpine Exit), thence east 3.7 miles on State Route 92 (Highland Highway) to the intersection of Highland Highway and Highland Boulevard, thence south 0.2 miles to the gate and road leading to the right abutment of the dam.
A location access map is included in Part V of this EAP. Operation of the Dry Creek Dam spillway will not flood the access road to the dam.

The nearest airport is the Provo Airport located west of Provo City, approximately 16 miles southeast of the dam. Helicopters may land at the Provo airport and at a temporary pad, which can be marked near the dam.

C. Response During Periods Of Darkness

Response to potential or actual emergency conditions during periods of darkness may be complicated by poor visibility. If 24-hour surveillance is required at the dam, portable lighting equipment, located near the abutments, will be used to illuminate the operating deck, crest, groins and toe.

D. Power Failure

There are no electrically operated appurtenances at the Dry Creek Dam.

E. Response Time

Response time to verify an emergency depends in part on weather conditions. Anticipated response times for various weather scenarios are listed below:

<table>
<thead>
<tr>
<th>Weather Conditions</th>
<th>Estimated Time To Access Dam from Lehi or American Fork</th>
<th>Estimated Time to Assess Emergency</th>
<th>Estimated Time to Notify Country Sheriff by cell phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sunny Day</td>
<td>15 minutes</td>
<td>5 minutes</td>
<td>5 minutes</td>
</tr>
<tr>
<td>Rainy Day</td>
<td>15 minutes</td>
<td>10 minutes</td>
<td>5 minutes</td>
</tr>
<tr>
<td>Winter</td>
<td>20 minutes</td>
<td>10 minutes</td>
<td>10 minutes</td>
</tr>
<tr>
<td>Night</td>
<td>20 minutes</td>
<td>20 minutes</td>
<td>15 minutes</td>
</tr>
</tbody>
</table>

F. RESPONSE DURING PERIODS OF ADVERSE WEATHER AND FLOODING

ALTERNATIVE SYSTEMS OF COMMUNICATION

In the event of power or cell phone communications tower failure, the Utah County Sheriff could be contacted by dispatching a courier with a written message to the nearest municipal public safety office and having them contact the Sheriff Office via their radio or backup system. If time and resources permit, the Utah County Sheriff may dispatch emergency radio communications technicians at the dam to maintain direct communications with the Sheriff's Office. The Sheriff is responsible for recruiting, training, and supervising volunteer communications staff as appropriate.
G. Coordinating Information On Flows

Information on flows based on weather and runoff forecasts, failure and other emergency conditions will be coordinated with the Utah County Engineer and the Utah County Sheriff Office; the Utah State Engineer Office, Dam Safety Section; and the State Office of Comprehensive Emergency Management (CEM). The Conservancy District Chairman will coordinate with the above entities and contact the National Weather Service (NWS) to assist in monitoring storms, river stages, and flood waves etc. resulting from a dam break. The NWS and CEM may also supplement warnings being issued using its own communication systems.

H. Emergency Reservoir Evacuation

Emergency evacuation of Dry Creek Dam reservoir should only be undertaken under extreme emergencies. The Conservancy District Chairman, in consultation with the Utah County Engineer and the State Engineer Office, Dam Safety Section, will decide if emergency evacuation is appropriate. Notification should be given to the Utah County Sheriff and National Weather Service in advance so they can take appropriate action. Releases should be ramped so that downstream users and others who will be impacted receive visual confirmation of increased stream flows in addition to public warnings.

I. Emergency Inflow Reduction

As time permits, actions should be taken to reduce inflows to Dry Creek Dam reservoir from upstream dams or drainage control structures. Prior to modifying any stream flows, however, effort should be made to coordinate with upstream water users (if any, during an emergency period), and secure concurrence from the Utah County Engineer and the State Engineer Office, Dam Safety Section.

Note that under a 2010 North Utah County Water Conservancy District license agreement with the Utah Department of Transportation (UDOT), the Department constructed a detention pond in 2011 on the northwest upper area of the Dry Creek Dam property. The footprint of the pond will not encroach below the top of dam elevation. Inflows to the new detention pond include drainage from the upgraded SR92 State Highway and adjacent areas most of which already drained into Dry Creek directly. The overall positive impact is detention of road drainage, and if filled then delayed, reduced flow of settled drain water into the dam from the pond overflow.

J. Warning System

A remote, electronic telemetry system was installed at the Dam by the Lehi City in 2011 to monitor any spillway flows during the run-off season. Lehi City will monitor and share data with the Conservancy District/Dam Tender. The instrument will be reinstalled each spring.
In addition to use of personal cell phones, which almost all technical personnel will have in their possession while monitoring the dam, the nearest landline telephone is located nearby in the commercial shopping area next to the dam. Temporary mobile radio communications may also be established at the dam post during an emergency. Warning of failure or notification of impending failure of the dam must be communicated to the Utah County Sheriff’s Office. That office will implement appropriate procedures to warn and or also evacuate the downstream population.

PART V.  Inundation Maps Assumptions and Vulnerable Sites

A. Inundation Maps Assumptions

Updated Inundation Maps (located in final Appendix 7.) used a worse case scenario water evacuation from Dry Creek Dam. The flood Inundation Data (Appendix 5.), analysis and mapping is based on the assumption of an unlikely but possible major storm or storms with runoff filling the dam(s) and likely flowing over the spillway, and then because of one or more negative factors, the dam failing during a storm event. The 2011 updated maps should be useful for population and other evacuation planning, for a pre-emergency exercise, and for actual implementation. The Inundation Data and Maps, for example, can help answer questions such as: In a worst case flood from the failed dam, what is the projected depth of water that could hit a certain point in a city or park or road in how many minutes?

The computer model used to delineate the evacuation areas was the U.S. Army Corps of Engineers Hydrologic Engineering Center Flood Hydrograph Package HEC-1. Probable maximum precipitation was calculated using U.S. Army Corps of Engineers Hydro-meteorological Report No. 49. The Base maps for the map sheets are USGS 7.5 Minute Quads and 2009 National Aerial Imagery Program (NAIPs) photos. Additional assumptions include:

- rivers or streams were full at the beginning of the storm/dam break event
- dam begins failing when water is one foot over the top of the dam
- the upstream drainage is wet at the time of the storm event (AMCII conditions)
- the timing of “Onset of Local Flooding” shown on the map tables begin when the dam starts to fail (1 ft. of top of dam)
- a “Rainy Day Failure” is defined as occurring as a result of storm flows overtopping the dam
- a “Sunny Day Failure” is defined as occurring as a result of piping through the embankment
- the inundated area for a sunny day failure is the same as the area of a rainy day failure. The rainy day failure results in deeper water. This is because homes, roads/sidewalks, ditches, storm drains, and other man-made structures will deflect and convey flood water out of natural drainage channels. Water system operators and municipalities need to be aware of this and make control adjustments as required.
B. Vulnerable Flood Sites
Below is a summary list of major structures and populated areas downstream from the dam, which may be affected. This list serves only as a guide for evacuation purposes.

1. Lehi City
2. Interstate 15
3. Union Pacific Railroad Tracks
4. State Street -- U.S. Highway 89
5. State Routes 197 and 73
6. D&RGW Railroad Track
7. Pioneer Crossing -- 1000 South, Lehi (new 2010)

PART VI. ADMINISTRATIVE PAGES (see below)

- Phone Record Form
- EAP References
- EAP Distribution List
North Utah County Water Conservancy District
DRY CREEK DAM
RECORD OF PHONE CONVERSATIONS

DATE__________________________________TIME____________________

PERSON CALLING_______________________________________________

PERSON CALLED________________________________________________

NATURE OF PROBLEM____________________________________________

LOCATION OF PROBLEM (looking down stream)________________________

APARENT CAUSE OF PROBLEM_______________________________________

EXTENT OF PROBLEM AREA (Measure, pace or estimate)_____________________

ESTIMATED QUANTITY OR UNUSUAL FLOW______________________________

COLOR OR TURBIDITY OF FLOW______________________________________

WATER LEVEL IN RESERVOIR________________________________________

NAME OF PERSON (S) WHO OBSERVED PROBLEM________________________

PHONE NUMBER OF OBSERVER_______________________________________

IS SITUATION WORSENING?________________________________________

WHAT REMEDIAL ACTIONS HAVE BEEN TAKEN____________________________

WHAT ARE THE CURRENT WEATHER CONDITIONS AT THE DAM?____________

REMARKS__________________________

North Utah County
Conservancy District
Dry Creek Dam

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August 1, 2011
REFERENCES

Dry Creek Dam Hydrology Report, Prepared for North Utah County Water Conservancy District; PSOMAS, Salt Lake City, Utah, 2007.


UTAH STATE ADMINISTRATIVE CODE – AS IN EFFECT ON 12/1/2011

Rule R655-12, Requirements for Operational Dams
(includes updated reference for content of “Emergency Action Plans”)

R655-12-6 Emergency Action Plans

All owners of high hazard and moderate hazard dams that require submission of plans pursuant to section 73-5a-202 shall prepare, maintain, and exercise an emergency action plan.

A. The emergency action plan shall include the following:

   1. A notification flowchart for informing emergency support agencies, downstream interests, and the State Engineer.

   2. A dam failure inundation map of a suitable scale and with sufficient topographical information that can be easily used by emergency support people. The map should be understandable by the public at large since persons who may be responsible for evacuation may have minimal training in reading maps. The State Engineer may waive the requirement for inundation maps if it can be shown that written descriptions of evacuation zones are clearer and easier to follow.

   3. Procedures to identify possible emergencies, at what level an emergency action are initiated, and who is responsible for making necessary contacts.

   4. A list of available materials, equipment, and manpower, which can be activated on short notice to deal with possible emergencies or to mitigate damage following a dam failure.

B. All emergency action plans must be approved by the State Engineer. All persons included in the notification flowchart should receive copies and understand their role in the plan.
North Utah County Water Conservancy District

DRY CREEK DAM

EMERGENCY ACTION PLAN

**Distribution List**

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</tr>
<tr>
<td>North Utah County Water Conservancy District</td>
<td>2, 3 &amp; 4</td>
</tr>
<tr>
<td>American Fork Office, Board Chairman, Dam Tender</td>
<td></td>
</tr>
<tr>
<td>Utah County Sheriff and Emergency Preparedness Director</td>
<td>5</td>
</tr>
<tr>
<td>Utah State Department of Natural Resources</td>
<td>6</td>
</tr>
<tr>
<td>State Engineers Office, Dam Safety Section</td>
<td></td>
</tr>
<tr>
<td>Lehi City Engineer and Water Department</td>
<td>7</td>
</tr>
<tr>
<td>NRCS State Engineer/Office</td>
<td>8</td>
</tr>
</tbody>
</table>
PART VI. APPENDICES

APPENDIX 1 EMERGENCY COMMUNICATIONS DIRECTORY

A. DAM OWNER & EMERGENCY ACTION PLAN COORDINATOR
   North Utah County Water Conservancy District (NUCWCD)
   Jay Franson, Chairman (January 2012)
   Phone: 801-376-3198 (cell)
           801-756-0309 (work)
           801-756-8266 (home)
   Address: 10179 North 5950 West, Highland, Utah 84003
   Email: jfranson@fransonciv.com

B. NUCWCD OFFICE
   John H. Jacobs, Secretary and Legal Counsel
   Phone: 801-756-7039
   Fax: 801-756-6072
   Address: 75 North Center, American Fork Utah 84003

C. DAM TENDER – NUCWCD
   Alan Jenkins, Operation and Maintenance
   Phone: 801-885-3838 (cell)
           801-491-3454/3455 (home/office)
   Address: 931 East 800 North, Mapleton, Utah 84664

D. UTAH COUNTY PUBLIC WORKS OFFICE
   Richard Nielson, Utah County Engineer
   Phone: 801-370-8601 (Office)
           801-404-7010 (cell)
           801 465-3556 (home)
   Address: 1074 South 680 West, Payson, Utah 84651

E. UTAH COUNTY SHERIFF & EMERGENCY MANAGEMENT DIRECTOR
   Utah County Sheriff
           911
   Utah County Central Dispatch
           801-851-4100

F. LEHI CITY
   Ron Foggin, Asst. City Administrator
   Scott Sampson, City Risk Manager
   Lorin Powell, City Engineer
   Lee Barnes, Water Department
   Water Department Emergency
   Phone: 801-836-1007 (cell)
           801-836-1006 (cell)
           801-836-1021 (cell)
           801-836-1036 (cell)
           801-836-0145

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North Utah County
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F. KEY CONTACTS AND SUPPORTING AGENCIES

Utah Division of Water Rights, Dam Safety Section:
Dave K. Marble, Asst. State Engineer

Work 801-538-7376
Cell 801-580-5128
Home 801-254-8760
FAX 801-538-7467

Kent Jones, Utah State Engineer (Office)
State Div. of Comprehensive Emergency Management
801-538-7240
801-538-3400

Ambulance or Fire
Utah Highway Patrol Dispatch
American Fork Hospital
911
801-887-3800
801-971-3300

National Weather Service, Brian MacInerney, Salt Lake
work 801-524-2033

State Conservation Engineer, NRCS, Bronson Smart
work 801-524-4559
Cell 801-710-5387

NRCS, Utah County Office, Dave Hansen, Ext. 20
work 801-377-5580

work 801-851-8621
Glen Tanner
work 801-851-8622

Utah Division of Wildlife Resources, Craig Walker
801-538-4700

Hazardous Material Spill; National Response Center
1-800-424-8802

Materials & Heavy Equipment:
- (Jason) Carlton Inc. Alpine (14 S 300 E) 801-756-2051
- Dam Construction Co. Lehi (9300 N 10420 W) 801-768-8372
- (Skip) Dunn Excavating, Orem (230 N Geneva Rd) 801-226-0359
- Evans Grader & Paving, Provo (2068 S Mt Vista Ln) 801-377-9999
- Fugal & Sons, Pleasant Grove (1001 S Main) 801-785-3152
- Geneva Rock, Orem (1565 W 400 N) 801-765-7800
- Geneva Pipe, Orem (1465 W 400 N) 888-225-2416
- HADCO Construction, Lehi (1850 N 1450 W) 801-766-7611
- R&D Excavating, Inc. Am. Fork (5629 N 6400 N) 801-492-9164
- Clay (& Cole) Peck, Lehi (268 E 360 S) 801-768-4166
- Mountainland Supply, Orem (1505 W 130 S) 801-224-6050
- Salt Lake Valley Sand & Gravel, Pt. of Mtn. 801-375-4370
- Westroc Highland (4600 W 1120 N) 801-756-7294
  Pleasant Grove (670 W 220 S) 801-785-5600

North Utah County
Conservancy District
Dry Creek Dam

Emergency Action Plan
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APPENDIX 2

DESCRIPTION OF THE DAM

Dry Creek Dam and catchment basin is located primarily in Highland, North Utah County. The dam is specifically located on Dry Creek in Section 34, T4S, R1E, Salt Lake Base and Meridian. It is an earth fill dam, constructed by the North Utah County Water Conservancy District during 1961. The main purpose is flood control during major storms and periods of high run off. At other times there are limited drainage flows through the catchment basin.
APPENDIX 3

POTENTIAL PROBLEMS AND IMMEDIATE RESPONSE ACTIONS

The information listed below is provided for general information. In the event one or more of these conditions exist at the Dry Creek Dam based on field observation, the responsible North Utah County Water Conservancy District (NUCWCD) officer, NUCWCD Dam Tender and the Utah County Engineer should immediately develop and initiate mitigating emergency actions.

The Utah State Department of Natural Resources, State Engineer Office, Dam Safety Section should be contacted as soon as possible with details of the problem, their input requested including confirmation of the mitigating and emergency action to be taken.

Overtopping by flood water
At this condition, the non-gated vertical shaft drop inlet structure (30") has the discharge capacity of up to 110 cfs. (ref. Dry Creek SOP-2). There is no gated structure at the dam.

Place sandbags along the crest to increase freeboard and force more water through the spillway.

Provide erosion-resistant protection to the downstream slope by placing plastic sheets or other material over eroding areas.

Divert floodwater around the reservoir basin if possible.
Restrict reservoir inflow if possible.

Create additional spillway capacity by making a controlled breach in a low embankment section or dike section where the foundation materials are erosion resistant.

Loss of freeboard or dam cross section due to storm wave erosion
Place additional riprap or sandbags in damaged areas to prevent further embankment erosion.

Lower the water level to an elevation below the damaged area.
Restore freeboard with sandbags or earth and rock fill. Continue close inspection of the damage area until the storm is over.

Slides on the upstream of downstream slope of the embankment
Lower the water level at a rate and to an elevation considered safe given the slide condition. If the outlet is damaged or blocked, pumping, siphoning, or a controlled breach may be required. Restore lost freeboard if required by placing sandbags or filling in the top of the slide. Stabilize slides on the downstream slope by weighing the toe area with additional rock, gravel or broken asphalt.

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Dry Creek Dam

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Erosional flows through the embankment, foundation, or abutments
Plug the reservoir side of the flow with whatever material is available (hay bales, bentonite or plastic sheeting if the entrance to the leak is in the reservoir basin).

Lower the water level until the flow decreases to a non-erosive velocity or until it stops.
Place a protective sand and gravel filter over the exit area to hold materials in place.
Continue lowering the water level until a safe elevation is reached.
Continue operating at a reduced level until repairs can be made.

Failure of Appurtenant structures such as outlets or spillways
Implement temporary measures to protect the damaged structure, such as closing an outlet or providing temporary protection for a damaged spillway.
Employ experienced professional divers if necessary to assess the problem and possibly implement repair.
Lower the water level to a safe elevation. If the outlet is inoperable, pumping, siphoning, or controlled breach may be required.

Mass movement of the dam on its foundation (spreading or mass sliding failure)
Immediately lower the water level until excessive movement stops.
Continue lowering the water until a safe level is reached.
Continue operation at a reduced level until repairs can be made.

Excessive seepage and high-level saturation of the embankment
Lower the water to a safe level.
Continue frequent monitoring for signs of slides, cracking or concentrated seepage.
Continue operation at a reduced level until repairs can be made.

Spillway backcutting threatening Reservoir Evacuation
Reduce the flow over the spillway by fully opening the main outlet.
Provide temporary protection at the point of erosion by placing sandbags, riprap materials, or plastic sheets weighted with sandbags.
When inflow subsides, lower the water to safe level.
Continue operating at a low water level in order to minimize spillway flow.
**Excessive Settlement of the Embankment**

Lower the water level by releasing it through the outlet or by pumping, siphoning, or a controlled breach.

If necessary, restore freeboard, preferable by placing sandbags.

Lower water to a safe level.

Continue operating at a reduced level until repairs can be made.

**Loss of abutment support or extensive cracking in concrete dams**

Lower the water level by releasing it through the outlet.

Attempt to block water movement through the dam by placing plastic sheets on the upstream face.

Lowering water to a safe level.

**Material and Heavy Equipment**

Names of material and heavy equipment suppliers are listed in the Communications Directory.
GLOSSARY

ABUTMENT - The part of the valley side against which the dam is constructed. Right and left abutments are those on respective sides of an observer when viewed looking downstream.

ACRE-FOOT (AC-FT) - The volume of water required to cover one acre one foot deep. This is the term commonly associated with reservoir storage and is equal to 43,560 cubic feet.

ACTIVE STORAGE CAPACITY - The amount of storage that can be released and utilized.

APPURTENANT STRUCTURES - Auxiliary features of a dam that are necessary to the operation of the dam. These may include spillways, outlet works, gates and valves, access structures, power plants, tunnels, and switchyards.

AXIS OF DAM - The plane or curved surface, arbitrarily chosen by a designer, appearing as a line, in plan or cross section, to which the horizontal dimensions of the dam can be referred.

BENCHMARK - A permanent physical mark of known horizontal coordinates and elevation.

BREACH - An opening or breakthrough in a dam.

CAPACITY - The maximum volume that can be stored in a reservoir below the primary spillway level.

CAVITATION - Wear on a hydraulic structure where a high hydraulic gradient is present.

COLLECTION PIPE - A conduit used to collect seepage waters from drainage blankets and drains and convey water to a point downstream of the dam.

CONDUIT - A closed channel to convey water through, under, or around a dam.

CONTOUR LINE - A line of consistent elevation on a map or drawing.

CREST LENGTH - The developed length of the top of the dam.

CREST WIDTH - The developed width of the top of the dam.

CUBIC FEET PER SECOND (CFS) - The unit expressing rates of discharge. One cubic foot per second is equal to the discharge through a rectangular cross-section one foot wide and one foot deep, flowing at an average velocity of one foot per second.

DAM - Any artificial barrier or obstruction, together with appurtenant works, constructed across a watercourse for the purpose of storage, control, or diversion of water.

DEAD STORAGE - The storage that lies below the invert of the lowest outlet and that cannot be withdrawn from the reservoir without pumping.
DIFFERENTIAL SETTLEMENT - Unequal settlement of a structure or soil mass, often leading to excessive stresses or unacceptable strains.

DRAINAGE AREA - The watershed or area that drains naturally to a particular point on a river, stream, or creek.

DRAWDOWN - The lowering of the reservoir's water surface level due to releases.

DROP STRUCTURES - Permanent structures used to facilitate the vertical downward movement of water without causing erosion.

DYNAMIC ANALYSIS - An analysis which predicts the stability and/or deformation of a dam due to seismic loads.

EARLY WARNING SYSTEM - An automatic device used to alert downstream interests of existing or impending high flows caused by storms or dam failures.

EMERGENCY ACTION PLAN (EAP) - A plan designed to alleviate hazards or reduce damages that may be caused by flooding due to dam failure or unusually high flow through the spillway system. An EAP contains procedures to be followed in the event of structural malfunctions or the occurrence of a natural event that approaches or exceeds the design limits of the dam.

EMERGENCY SPILLWAY - The spillway designed to convey excess water generated by unusual hydrological events through, over, or around a dam.

FACE - In reference to a structure, it is the external surface that limits the structure.

FLASHBOARDS - Lengths of timber, concrete, or steel placed on the crest of a spillway to raise the water level but which may be quickly removed in the event of a flood either by a tripping device or by a deliberately designed failure of the flashboards or their support.

FLOODPLAIN - The downstream area that would be inundated or otherwise affected by the failure of a dam or by large flows.

FLOOD ROUTING - The computation of the changes in the rise and fall in stream flow or reservoir levels as a flood moves downstream. The results provide hydrographs of flow or elevation versus time at given points on the stream or in a reservoir

FLOOD STAGE - The stage or elevation in which overflow of the natural banks of a stream or body of water begins.

FLOWLINE - The lowest point in a water conveyance structure where water can flow.

FOUNDATION OF DAM - The natural material on which the dam structure is placed.
GROIN - The area along the contact or intersection of the face of a dam with the abutments.

GROUT CURTAIN - A barrier to reduce seepage under a dam. Produced by injecting grout into a vertical zone in the foundation.

HAZARD CLASSIFICATION - A rating (e.g. low, moderate/significant, or high hazard) that is a representation of the probable loss of life and property damage downstream from a dam based on the results of breaching studies of the dam, and an identification of the area downstream that would be inundated.

HYDRAULIC HEIGHT - The vertical dimension of a dam as measured from the natural streambed at the downstream toe to the elevation of the water surface at the crest of the primary spillway.

HYDROGRAPH - A graphical representation of discharge, stage, volume, or other hydraulic property, with respect to time, for a particular point.

HYDROLOGY - The study of the properties, distribution, and movement of water on the earth’s surface, in the soil and underlying rocks, and in the atmosphere.

INCREMENTAL DAMAGE ASSESSMENT (IDA) - An analysis showing the influence of a dam failure when superimposed upon an extreme hydrologic event.

INfiltrATION RATE - The rate at which a given soil can accept surface water.

INFLOW DESIGN FLOOD (IDF) - The flood hydrograph used in the design of a dam and its appurtenant works particularly for sizing the spillway and outlet works, and for determining maximum temporary storage and height of dam requirements.

INLET CHANNEL - An open channel upstream from a spillway or conduit.

INTERNAL EROSION - See piping.

INUNDATION MAP - A map showing areas that would be affected by flooding such as uncontrolled release of a dam’s reservoir or passage of the design flood through the spillway.

LIQUEFACTION - The sudden loss of strength or stiffness of a soil resulting from dynamic loading as from earthquakes.

LOG BOOM - A floating device intended to prevent large floating debris from being carried into a spillway.

LOW-LEVEL OUTLET - A conduit from a reservoir, generally used for lowering the reservoir or for providing downstream releases.
MAXIMUM CAPACITY - The maximum volume of water that can be stored in a reservoir when filled to the crest of the dam.

NAPPE - A free-falling stream from a weir.

NORMAL FREEBOARD - The vertical distance between the primary spillway overflow and the top of the dam.

ONE HUNDRED YEAR FLOOD - The flood having a one percent probability of being equaled or exceeded in any given year.

ONE HUNDRED YEAR PRECIPITATION - The precipitation having a one percent probability of being equaled or exceeded in any given year.

OUTLET WORKS - A system of dam components that regulates or releases water impounded by a dam. Components of an outlet works include an entrance channel, intake structure, conduit, gate or valve housing, energy dissipaters, and return channel.

PEAK FLOW - The maximum instantaneous discharge that occurs during a flood. It is coincident with the peak of a flood hydrograph.

PERVIOUS ZONE - A part of the cross section of an embankment dam comprising material of high permeability.

PHREATIC SURFACE - The free surface of ground water at atmospheric pressure.

PIEZOMETER - An instrument for measuring pore water pressure within soil, rock, or concrete.

PIPEING - The progressive development of the internal erosion by seepage, appearing downstream as a hole or seam discharging water that contains soil particles.

POROUS INTERVAL - The portion of a piezometer where infiltrating water is allowed to act on the device.

PRINCIPLE SPILLWAY - The main spillway for normal operating conditions.

PROBABLE MAXIMUM FLOOD (PMF) - The flood that may be expected from the most severe combination of critical meteorological and hydrologic conditions that are possible in the region.

PROBABLE MAXIMUM PRECIPITATION (PMP) - The maximum amount of precipitation that could be expected to fall on a drainage under the most severe meteorologic conditions.
PSEUDO STATIC ANALYSIS - An approximate method for predicting the dynamic stability of a structure using static loads.

REMOTE OPERATION - The ability to operate equipment, such as spillway gates, from a location other than at the dam site.

RESERVOIR - The body of water impounded by a dam.

RESERVOIR AREA - The surface area of a reservoir when filled to a given water elevation.

RESERVOIR RIM - A term used to describe the land forms around the perimeter of the reservoir which could have an adverse impact on the dam or reservoir due to movement.

RESERVOIR STAGE - The measure of the depth or elevation of water in a reservoir to an estimated datum.

RESERVOIR DRAWDOWN CAPABILITY - An estimate of the time needed to fully or partially drain a reservoir.

RESIDUAL FREEBOARD - The vertical distance between the maximum water surface during a given hydrologic event and the top of the dam.

RIPRAP - A layer of large stone, broken rock, or precast blocks placed on the upstream slope of an embankment dam, on a reservoir shore, or on the sides of a channel, as a protection against waves, ice, and scour.

RISK - The probability that an adverse event such as a dam failure will occur.

SECONDARY SPILLWAY - See emergency spillway.

SEDIMENT POOL - The portion of the reservoir allotted to the accumulation of submerged sediment during the design life of the dam.

SLOPE PROTECTION - The protection of an embankment slope against wave action or erosion.

SPILLWAY - A structure over or through which flood flows are discharged. If the rate of flow is controlled by mechanical means, such as gates, it is considered a controlled spillway. If the elevation of the spillway crest is the only control, it is considered an uncontrolled spillway.

STANDARD OPERATING PROCEDURES - Written guidelines to be followed for normal and emergency operation of the components of a dam.

STAFF GAGE - A permanent instrument or device used to read reservoir stage.
STILLING BASIN - A basin constructed to dissipate excess energy of waters emerging from a spillway or outlet.

STOPLOGS - Beams placed on top of each other with their ends held in guides on each side of a channel or conduit.

STORAGE CAPACITY - The volume of water which can be stored at the elevation of the primary spillway, including both active and dead storage.

STRUCTURAL HEIGHT - The vertical dimension of a dam as measured from the natural streambed at the downstream toe of a dam to the top of a dam.

SURVEY MARKER - A permanent physical mark on a dam or a permanent structure used to measure changes in horizontal and vertical movement.

TOE OF DAM - The junction of a dam face with the foundation. For an embankment dam, the junction of the upstream face with ground surface is called the upstream toe, and the junction of the downstream face with ground surface is referred to as the downstream toe.

TRANSITION ZONE - A zone of material used to provide filter requirements between two zones of material which do not meet filter requirements.

TRASH RACK - A screen located at an intake to prevent the entry of floating or submerged debris.

UNGATED OUTLET - An outlet that allows uncontrolled flow through or around a dam.

UNIT HYDROGRAPH - A hydrograph which shows the rates at which runoff occurs for one-inch of storm runoff from a drainage area

UPLIFT - The upward water pressure in the pores of a material on the base of a structure.

WATER STOPS - Strips of material used to prevent leakage through joints between adjacent sections of concrete.

WEIR - A device used to measure or control water
APPENDIX 5 INUNDATION MAPPING DATA (9 pages)
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This program replaces all previous versions of HEC-1 known as HEC1 (Jan 73), HEC1G, HEC1D, and HEC1KW.

The definitions of variables -RTIMP- and -RTIOR- have changed from those used with the 1973-style input structure. The definition of -ANSK- on RM-CARD was changed with revisions dated 28 Sep 81. This is the FORTRAN77 version.

New options: DAMBREAK OUTFLOW SUBMERGENCE, SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY, DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL, LOSS RATE:GREEN AND AMPT INFILTRATION.

**KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM**

<table>
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<td>EMERGENCY ACTION PLAN SUNNY DAY AND RAINY DAY BREACH</td>
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**FREE**

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### KK RUNDRY
#### KM DRY CREEK DRAINAGE BASIN - RUNOFF HYDROGRAPH

| 16   | PI | .082 | .082 | .082 | .082 | .197 | .197 | .197 | .197 | 3.5 | 1.3 |
| 17   | PI | .7   | .5   | .318 | .318 | .318 | .318 | .125 | .125 | .125 | .125 |
| 18   | PI | .096 | .096 | .096 | .096 |   |   |   |   |   |   |

#### BA 40.0
#### PR 101
#### PW 1
#### PT 100
#### PW 1

| 27   | LS | 0    | 60   | 1   |   |   |   |   |   |   |   |
| 28   | UD | 1.86 |   |   |   |   |   |   |   |   |   |

#### KP 1
#### PR 901
#### PW 1
#### PT 999

### KK DAMDRY
#### KM SUNNY DAY BREAK - DRY CREEK DAM

#### KP 1
#### RS 1 ELEV 4760
#### SV 0 5 30 80 150 250 425
#### SE 4734 4760 4745 4750 4755 4760 4765
#### SQ 0 10 30 80 110 1018 2720 3820
#### SS SE 4742 4750 4755 4760 4762 4764 4765
#### ST 4750 3.1 1.5
#### SB 4734 2 4760

### KM RAINY DAY BREACH - DRY CREEK DAM

#### KP 2
#### SB 4734 36 .01 .52 4765

### KM ROUTE FLOWS THROUGH CHANNEL REACH NUMBER DRY CREEK ONE

#### RS 1 ELEV 4691
#### RC .08 .05 .08 3000 .0163 4720
#### RX 0 210 250 252 268 270 300 600
#### RY 4720 4700 4691 4690.9 4690.9 4691 4700 4720

### KM ROUTE FLOWS THROUGH CHANNEL REACH NUMBER DRY CREEK TWO

#### RS 1 ELEV 4658
#### RC .08 .05 .08 3000 .0110 4680
#### RX 0 220 230 232 248 250 290 700
#### RY 4680 4660 4658 4657.9 4657.9 4658 4660 4680

### KM ROUTE FLOWS THROUGH CHANNEL REACH NUMBER DRY CREEK THREE

#### RS 1 ELEV 4609
#### RC .08 .05 .08 4300 .0114 4640
#### RX 0 100 150 152 168 170 300 500
#### RY 4640 4620 4609 4608.9 4608.9 4609 4620 4640
IT

HYDROGRAPH TIME DATA

NMIN  5  MINUTES IN COMPUTATION INTERVAL
IDATE 1 0  STARTING DATE
ITIME 0000  STARTING TIME
NQ  300  NUMBER OF HYDROGRAPH ORDINATES
NDDATE 2 0  ENDING DATE
NDTIME 0055  ENDING TIME
ICENT 19  CENTURY MARK

COMPUTATION INTERVAL .08 HOURS
TOTAL TIME BASE 24.92 HOURS

ENGLISH UNITS

DRAINAGE AREA SQUARE MILES
PRECIPITATION DEPTH INCHES
LENGTH, ELEVATION FEET
FLOW CUBIC FEET PER SECOND
STORAGE VOLUME ACRE-FEET
SURFACE AREA ACRES
TEMPERATURE DEGREES FAHRENHEIT

JP  MULTI-PLAN OPTION
    NPLAN  2  NUMBER OF PLANS

JR  MULTI-RATIO OPTION
    RATIOS OF RUNOFF
        .30

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION  STATION  AREA  PLAN  RATIO 1
          RATIOS APPLIED TO FLOWS
HYDROGRAPH AT
+  RUNDRY  40.00  1  FLOW   .30
   TIME  4.00
   2  FLOW 9573.
   TIME  4.67

ROUTED TO
+  DAMDRY  40.00  1  FLOW  9761.
   TIME  .42
   2  FLOW 18072.
   TIME  4.25

** PEAK STAGES IN FEET **
1  STAGE  4760.00
   TIME  .01
2  STAGE  4765.93
   TIME  3.93
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RCHDC6  40.00  1 FLOW  700.
    TIME  2.33
    2 FLOW  9130.
    TIME  6.00

** PEAK STAGES IN FEET **
1 STAGE  4560.14
    TIME  2.25
2 STAGE  4560.67
    TIME  6.00

ROUTED TO

RCHDC7  40.00  1 FLOW  371.
    TIME  4.42
    2 FLOW  7678.
    TIME  7.00

** PEAK STAGES IN FEET **
1 STAGE  4520.06
    TIME  4.33
2 STAGE  4520.44
    TIME  6.92

ROUTED TO

RCHDC8  40.00  1 FLOW  169.
    TIME  10.00
    2 FLOW  4345.
    TIME  9.33

** PEAK STAGES IN FEET **
1 STAGE  4490.04
    TIME  9.67
2 STAGE  4490.42
    TIME  9.25

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION  DAMDRY

PLAN 1

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<th>ELEVATION</th>
<th>INITIAL VALUE</th>
<th>SPILLWAY CREST</th>
<th>TOP OF DAM</th>
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<td>DEPTH</td>
<td>STORAGE</td>
<td>OUTFLOW</td>
<td>OVER TOP</td>
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PLAN 2

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NORMAL END OF HEC-1 ***
APPENDIX 6          PHOTOS OF DAM DETENTION BASIN AND TERRAIN
                     (7 pages)
Notes:
1. A rainy day failure is defined as a failure which occurs as a result of storm flows overtopping the dam.
2. A sunny day failure is defined as a failure which occurs as a result of piping through the embankment.
<table>
<thead>
<tr>
<th>Index Number</th>
<th>Distance Downstream from Dam (miles)</th>
<th>Sunny Day Embankment Failure</th>
<th>Rainy Day Embankment Failure</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Estimated Travel Time From Start of Dam Failure to Onset of Local Flooding (hours)</td>
<td>Depth Above Normal High Water (feet)</td>
<td>Peak Flowrate (cfs)</td>
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