

Section 1

Introduction and Purpose

1.1 Introduction

The City of Lincoln, Nebraska (City), the Lower Platte South Natural Resources District (NRD), and United States Army Corps of Engineers (USACE) have been working together for the past several decades to provide flood protection for residents that live near the Salt Creek channel. The first major flood control effort began with the USACE Salt Valley Flood Control Project (1960s), which included 10 flood control dams and a levee system. Following the completion of these improvements, numerous planning efforts have been completed, including the USACE 205 and 216 studies, to identify additional feasible flood control improvements to increase the level of flood protection for area residents.

The USACE 205 study identified two technically feasible locations for constructing flood storage areas that would provide measurable flood control benefits, including an area along Oak Creek adjacent to the Lincoln airport, and the other location along Middle Creek between SW 27th and SW 40th Streets. In addition, the USACE 216 study results showed that the meanders and vegetation within Wilderness Park provide valuable flood control benefits and should be preserved.

With the recent completion of the Salt Creek DFIRM Update project, a state-of-the-practice hydrologic and hydraulic computer model is now available to further evaluate the feasibility of constructing additional flood control projects. The updated FEMA DFIRM identified over 5,600 habitable buildings within the Salt Creek floodplain between Saltillo Road and 98th Street. Therefore, the purpose of this project is to simulate the two storage area facilities as previously identified by USACE, and locations near Wilderness Park, using the latest computer model to better quantify the flood control benefits of these facilities. In addition, the functionality of each storage facility will be further evaluated based on the existing site characteristics, multi-use features, construction constraints, and input received during the public participation process.

There were two primary goals for the study. The first was to evaluate the potential impact that proposed offline storage would have on flood depths along Salt Creek. For the study, three locations with high suitability for offline storage were identified and evaluated. These sites were located in Wilderness Park, Middle Creek, and Oak Creek, as shown in Figure 1-1. The second goal was to evaluate the storage benefit of Wilderness Park under existing conditions using the Salt Creek DFIRM update model.

The project team was lead by the City and NRD. The City and NRD retained the consultant team of Camp Dresser & McKee Inc. (CDM), in association with Heartland Center for Leadership Development (HC) and Kirkham Michael Consulting Engineers (KM).

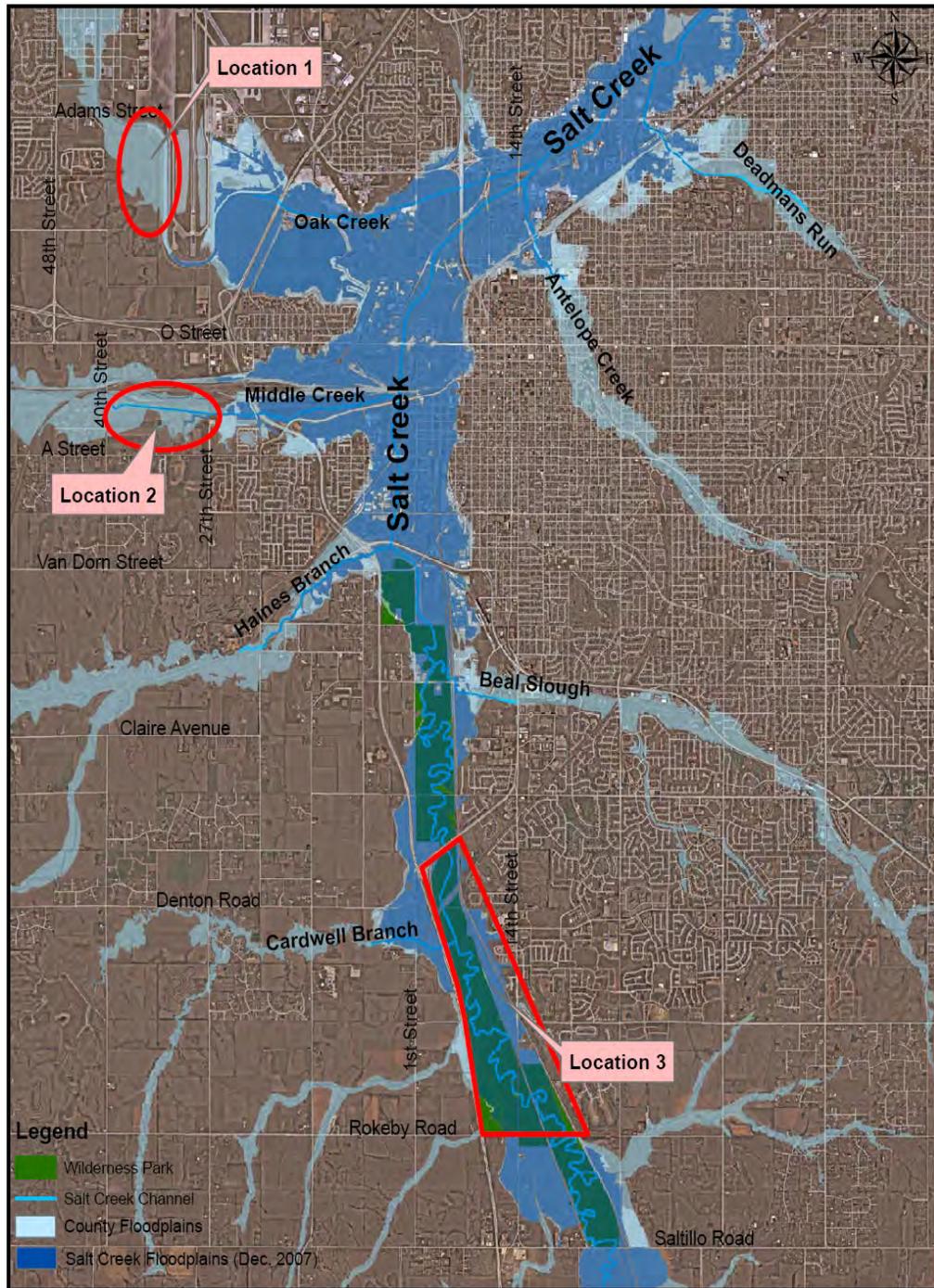


Figure 1-1 Locations for Flood Control Storage Areas

1.1.1 Salt Creek

Salt Creek flows north into Lincoln at Saltillo Road through Wilderness Park combining with Cardwell Branch, Beal Slough, Haines Branch, Middle Creek, and Oak Creek tributaries, as shown in Figure 1-2. Downstream from Oak Creek additional tributaries join Salt Creek including Antelope Creek, Deadmans Run, Little Salt Creek, and Stevens Creek. Salt Creek drainage area is significant; increasing from approximately 200 square miles at Saltillo Road to over 800 square miles after the confluence with Stevens Creek. As shown in Figure 1-2, the largest drainage areas to Salt Creek downstream of Saltillo Road are Middle Creek and Oak Creek. Previous studies had indicated that locations on Middle and Oak Creek were feasible for offline flood storage.

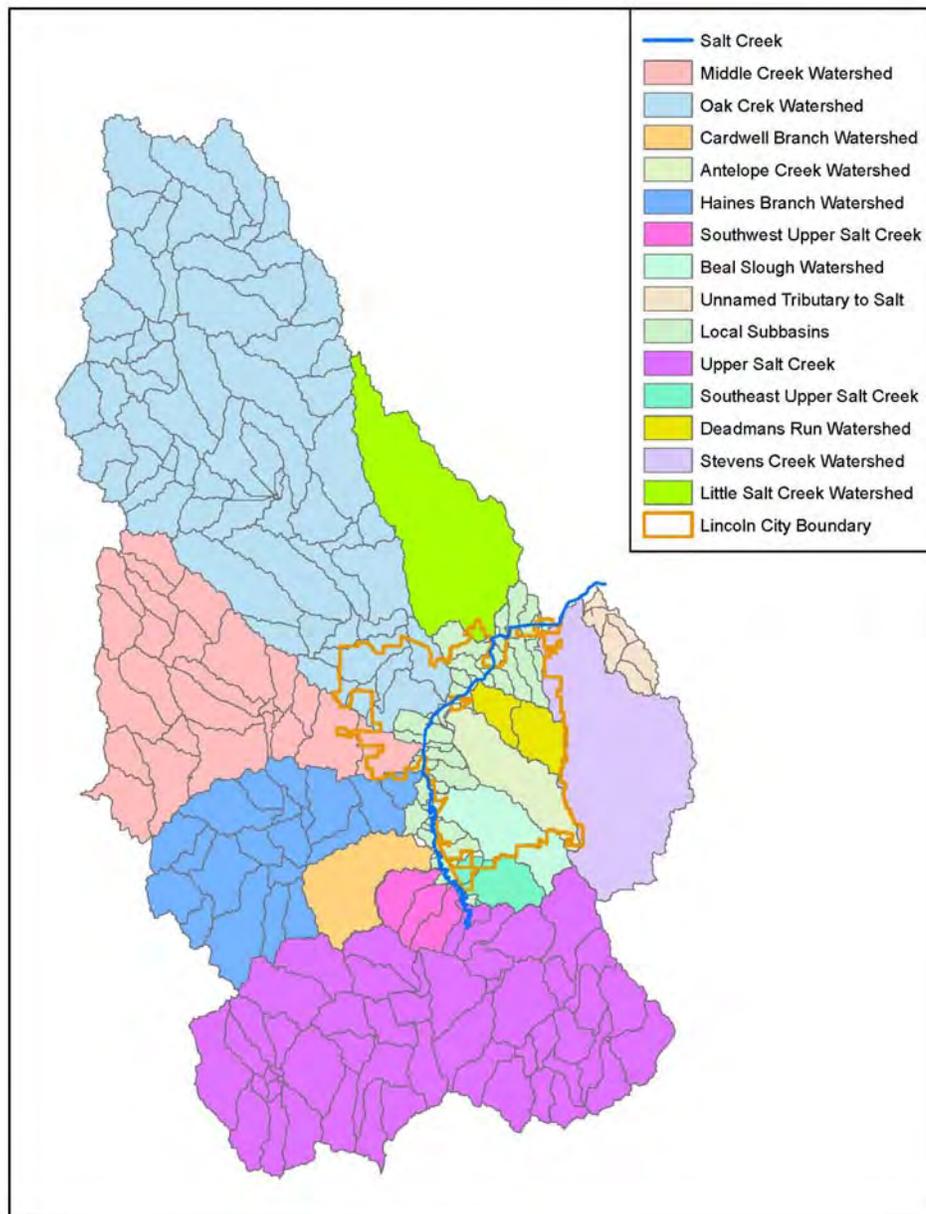


Figure 1-2 Salt Creek Watersheds

1.1.2 Oak Creek

The Oak Creek watershed is approximately 258 square miles, and is comprised of mostly rural, undeveloped land. Oak Creek drains southeast to Salt Creek. The most significant flood control structure in the Oak Creek watershed is Branched Oak Lake, which collects stormwater runoff from the western portion of the watershed. In addition, there are 26 other federal flood control dams in the watershed. Oak Creek flows south into Lincoln at Fletcher Street through Airpark West, a light industrial area that is owned and operated by the Lincoln Airport Authority, before turning east at the south end of the Lincoln Airport. Oak Creek then passes beneath I-80 and joins Salt Creek just downstream of 14th Street.

At the confluence with Salt Creek, the land is highly urbanized, and the high peak flow in Oak Creek during a large event causes flooding in this area. In addition to flooding due to Oak Creek, the Salt Creek channel conveys significant flow during an event, causing a backwater effect at the confluence. This backwater effect intensifies flooding along Oak Creek near the confluence.

1.1.3 Middle Creek

The Middle Creek watershed is approximately 100 square miles, and is also comprised mostly of rural, undeveloped land. Within the upper half of the Middle Creek Watershed are two USACE flood control structures, Pawnee Lake and Twin Lake. These two lakes collect stormwater runoff from the northern portion of the watershed. The southern portion of the watershed is uncontrolled. Middle Creek drains to the east into Lincoln at SW 40th Street beneath Homestead Expressway and then along the railyard area and Capital Parkway West before joining Salt Creek.

At the confluence with Salt Creek, there is a train yard to the north of the creek and a developed urban residential area to the south. As with Oak Creek, during an event, the backwater effect of Salt Creek combined with the high flow in Middle Creek causes flooding along Middle Creek near the confluence during an event.

1.1.4 Wilderness Park

Another feature of Salt Creek is Wilderness Park that is located adjacent to Salt Creek from Saltillo Road to the confluence with Haines Branch. As shown in Figure 1-3, Wilderness Park is a County owned and City operated park containing native grasses and forested area with a trail system along an old railroad. An active railroad also borders the park area. The park is approximately 1,400 acres with additional open space surrounding the park extent. Previous evaluation had indicated that increasing the overbank storage within Wilderness Park may help reduce flood elevations downstream along Salt Creek.

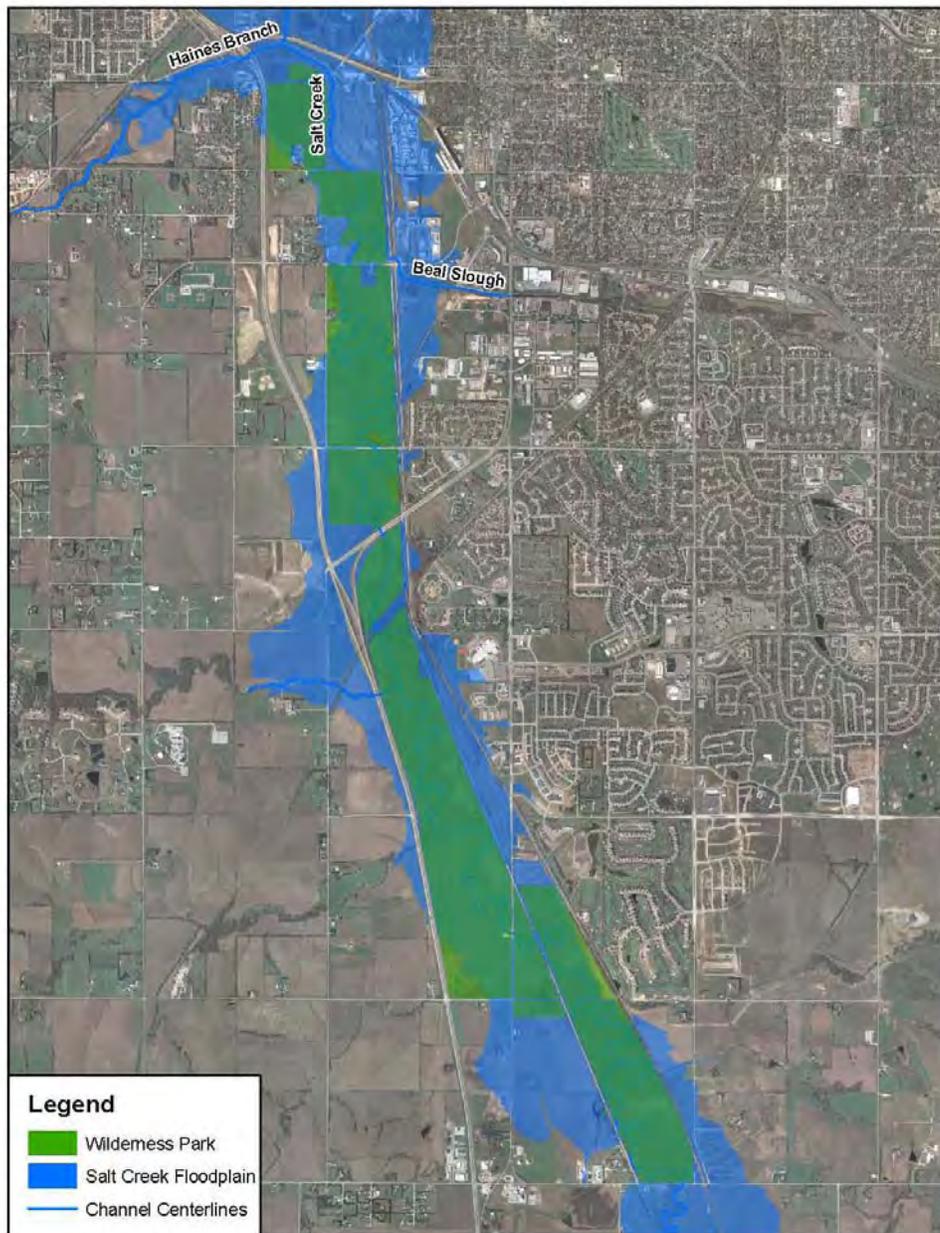


Figure 1-3 Wilderness Park

1.2 Goals and Objectives

The goal of the Study was to evaluate the potential flood benefits of offline storage basins at two previously identified locations along Middle and Oak Creek as well as to estimate the existing overbank flood storage within Wilderness Park. The objective was to demonstrate a greater than one benefit/cost ratio indicating that the flood benefits were greater than the cost of the offline detention basins. Using existing data, previous studies, updated hydrology and hydraulic models of Salt Creek, and established flood benefit procedures for the City of Lincoln, the project team completed the following task objectives.

1.2.1 Existing Data Review

- Review previous studies that evaluated the potential of stormwater detention along Oak Creek, Middle Creek, and Salt Creek.
- Collect and review previously collected field data of the offline storage locations
- Obtain and utilize existing GIS data sets available from the City, NRD, and County
- Utilize latest available Light Detection and Ranging (LiDAR) data to develop a 3-D land surface of study areas.

1.2.2 Hydrology and Hydraulics

- Utilize the recently completed hydrology and hydraulic models developed for the Salt Creek DFIRM project. The modeling program used for the hydrology was the U.S. Army Corps of Engineer's (USACE) Hydrologic Engineering Center's Hydrologic Modeling System program (HEC-HMS) and the hydraulic model used was the USACE Hydrologic Engineering Center's River Analysis System program (HEC-RAS), unsteady simulation.
- Evaluate the existing benefit of overbank flood storage within Wilderness Park using the existing DFIRM update hydraulic model.
- Modify existing hydrologic models used in the Salt Creek DFIRM update to meet Study needs.
- Compared the updated hydraulic model results with the previous Salt Creek DFIRM model.

1.2.3 Storage Area Evaluation

- Evaluated offline storage alternatives using the updated HEC-RAS unsteady model at all three locations.
- Analyzed various storage volumes and control structure configurations for all proposed sites.
- Based on this evaluation determined a preferred storage alternative for reducing flood elevations downstream along Salt Creek.

1.2.4 Conceptual Design of Preferred Alternative

- Develop conceptual-level design of the preferred storage alternative at each proposed site
- Calculate the flood benefit along Salt Creek using the HEC-RAS model and available GIS data layers.

1.2.5 Benefit-Cost Analysis

- Estimate planning-level construction costs of the preferred alternative based on conceptual storage area design.
- Quantify reduction in flooding depths and the associated structural damages for both existing and proposed storage conditions.
- Determine the planning-level benefit-cost ratio using the FEMA Benefit Cost Analysis Toolkit and City of Lincoln depth-damage curves for structural flood damage.

1.2.6 Public Participation (Proposed)

- Property owner meetings for those property owners directly impacted by the proposed storage alternative
- An open house to disseminate information and solicit feedback from the public.
- Project information sheet mailed to approximately 100 individual residents
- News release announcements and additional mailings to inform the public about this project.

1.2.7 Coordination

- Coordination with the Lincoln Airport Authority and Air National Guard base by including them in monthly progress meetings
- Coordination with Nebraska Emergency Management Agency to evaluate the possibility of grant funds that could be applied to this project.

1.3 Public Participation Process

This project originally planned on offering the property owners, citizens, and stakeholders a variety of ways to provide input to the study and to contribute to the development of alternative concepts and solutions. However, since this study resulted in a benefit-cost ratio of less than 0.5 it is not likely that the City will be able to obtain necessary alternative funding to move forward with the proposed offline storage alternatives. Therefore the public involvement process to complete this project is still being considered by the City and NRD. Public participation processes being considered are an information meeting with the property owners, distribution of a one-page factsheet summarizing the study results, or an open house and news release announcement.