

Executive Summary

Introduction

The City of Lincoln (City) and the Lower Platte South Natural Resources District (NRD) are in the process of developing a *Comprehensive Watershed Management Plan for the City of Lincoln* and its future growth areas. This comprehensive watershed plan is being developed basin by basin, through the completion of watershed master plans for individual basins. Watershed master plans are used as planning tools to be referenced in conjunction with future development and to serve as a guide in the preparation of capital improvement projects (CIPs). The City and NRD have previously adopted watershed master plans for the Beal Slough, Southeast Upper Salt Creek, and Stevens Creek basins (Figure ES-1 on the following page) and are now working on master plans for Cardwell Branch and Little Salt Creek watersheds.

To continue with the planning process, the City and NRD sponsored the Deadmans Run Watershed Master Plan (Master Plan) study. The primary goal of the study was to develop planning tools and comprehensive improvement projects that reduce the potential for street and building flooding, address existing erosion problems, and improve water quality. A diverse public participation program was implemented to gather input from the public and address citizen concerns, including the establishment of an 18-member Citizens Advisory Committee.

The Deadmans Run watershed study area is approximately 9 square miles located in the northeast portion of the City, as indicated on Figure ES-2. Deadmans Run, a right-bank tributary of Salt Creek, begins in the eastern part of the City. The Deadmans Run main channel flows northwest, ultimately draining into Salt Creek just downstream of Cornhusker Highway. The entire watershed is located within Lincoln's city limits and includes residential neighborhoods, the University of Nebraska East Campus, and commercial areas such as Westfield Shopping Center.

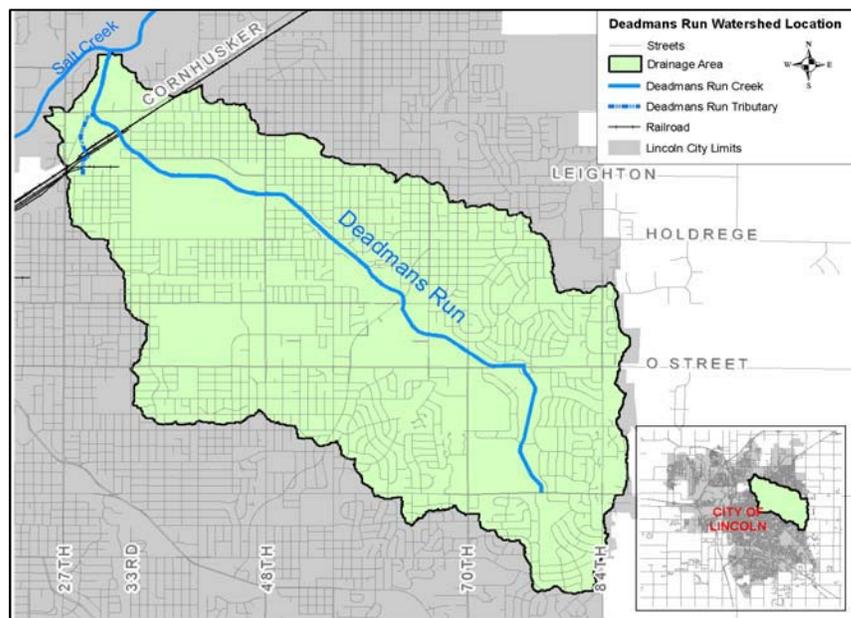


Figure ES-2
Deadmans Run Watershed Area Map

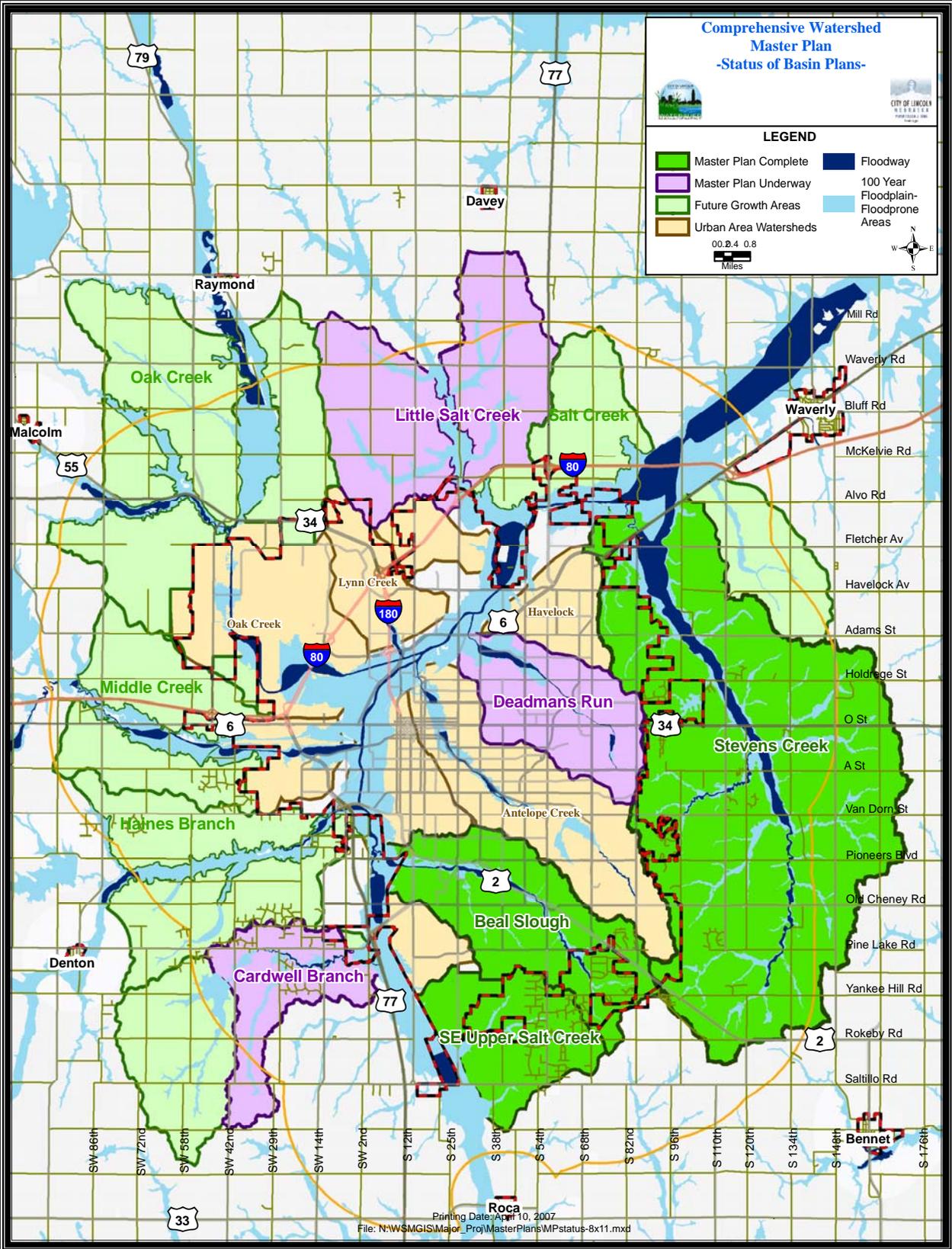


Figure ES-1
City of Lincoln Comprehensive Watershed Management Plan

Like many watersheds throughout the country, the Deadmans Run watershed is fully urbanized and contains a limited amount of open green space. As a result, the process of developing solutions to mitigate flooding becomes very challenging because of the physical limitations that significantly reduce the number of suitable locations for flood control projects. However, the improvement alternatives analysis used for this study focused on utilizing existing open space where available with the goal of minimizing stakeholder disruption.

The project team was led by the City and NRD. The City and NRD retained the consultant team of Camp Dresser & McKee Inc. (CDM), in association with Mead & Hunt (M&H), Applied Ecological Services (AES), Heartland Center for Leadership Development (HC), and Kirkham Michael to provide assistance with the planning effort.

Public Participation Process

As part of the master planning process, a comprehensive public participation process was used to solicit input from a broad range of stakeholder groups. The stakeholder groups included property owners, business community and environmental groups, and neighborhood representatives. The public participation process included the following:

- The involvement and input of an 18-member Citizen Advisory Committee representing a broad cross section of interests in the watershed, who met with the project team during a series of four meetings that began in November 2006 and ended in September 2007.
- A series of three open houses in June 2006, November 2006, and October 2007 that attracted over 200 people.
- A series of 10 information sessions with property owners and interested citizens regarding potential CIPs.
- A series of three newsletters mailed to over 4,200 individual residents and organizations. In addition, a project website was used to post alternatives under consideration, upcoming events, and materials distributed to the advisory committee.

The public input and feedback received during this process was used by the project team to formulate and refine its Master Plan recommendations. Section 1 of the Master Plan provides further details regarding the public participation process.

Master Plan Elements

The Master Plan consists of three major elements: (1) floodplain management tools, (2) capital improvement projects, and (3) benefit-cost analysis. A brief summary of each major element follows:

Floodplain Management Tools

One of the major elements of the Master Plan is updated 100-year floodplain and floodway boundary maps. This information will provide a planning tool to protect existing homes and businesses from potential flood hazards in the future. The Master Plan recommends the adoption of this information for local regulatory purposes. The Master Plan recognizes that these floodprone areas will be reflected on the Federal Emergency Management

Agency (FEMA) floodplain maps at some time in the future when FEMA finalizes the Flood Insurance Rate Map Physical Map Revision.

The study floodplain map is shown on Figure ES-3, which encompasses approximately 982 buildings within the floodplain limits. In the lower reach of the watershed along Huntington Avenue, the depth of potential flooding is 5 to 7 feet in many areas, which could result in significant property damage and potential loss of life if the 100-year storm occurred.

Capital Improvement Projects

A comprehensive set of CIPs were developed to address flooding problems, severe stream erosion, and water quality issues. Problem areas were identified along the main channel of Deadmans Run that pose a serious public safety concern with respect to potential building flooding, street flooding, or stream instabilities. In addition, the study evaluated potential management strategies and projects to improve the quality of stormwater runoff. The overall goal was focused on utilizing existing open space to minimize stakeholder disruption.

As part of the project formulation process, improvement alternatives were evaluated based on physical limitations, design considerations, economic feasibility, stakeholder disruption, and the overall public benefit. The projects that were determined to provide measurable benefits were included as recommended projects.

The primary objective of the CIP development was to reduce future flood damages based on the 10-, 50-, and 100-year storm events. This resulted in a series of recommended projects that involve channel widening and bridge/culvert upgrades, which will significantly reduce the flood hazards along the main channel extending from the Salt Creek confluence to Vine Street. However, improving the channel and drainage structures will increase the peak flows along the main channel by eliminating overbank storage, which can cause adverse impacts downstream. Therefore, stormwater detention basin projects, which are designed to temporarily store and attenuate flood waters, are recommended to minimize the increases in peak flow rates.

The improvement projects to address stream erosion in the watershed focused on resolving critical stream instability issues along unlined portions of the main channel that have the potential to adversely impact buildings and public infrastructure. Regarding water quality, new structural best management practices (BMPs), retrofitting existing ponds with water quality features, end of pipe treatments, and stream stability measures were the primary focus (Section 6). The new structural BMPs were identified based on available open space in the watershed, while existing detention ponds were considered based upon opportunities for enhancements and proper location.

The evaluation process resulted in 13 capital improvement projects. The general location and the types of improvements are illustrated on Figure ES-4. The total conceptual level cost estimate for the 13 CIPs is approximately \$50 million. Section 8 of the Master Plan provides further detail regarding the improvement projects.

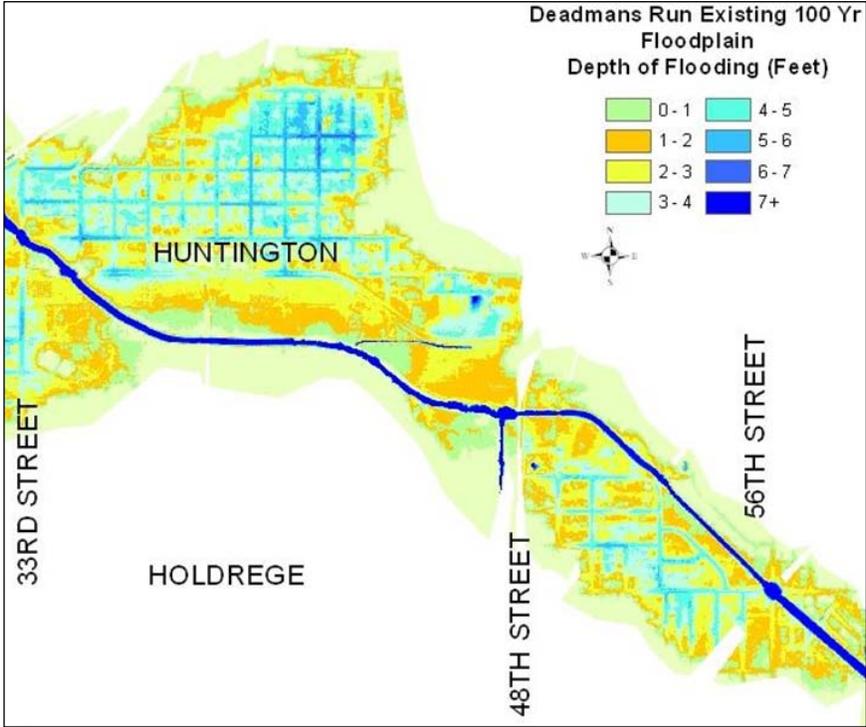
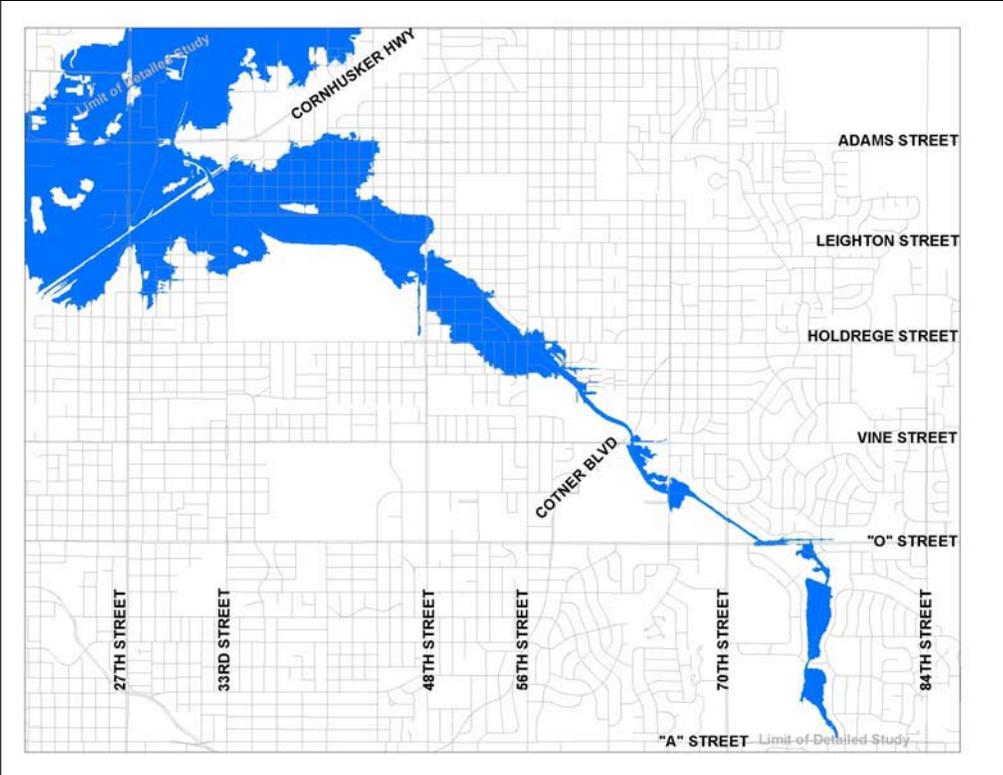


Figure ES-3
Floodplain Map and Depth of Potential Flooding

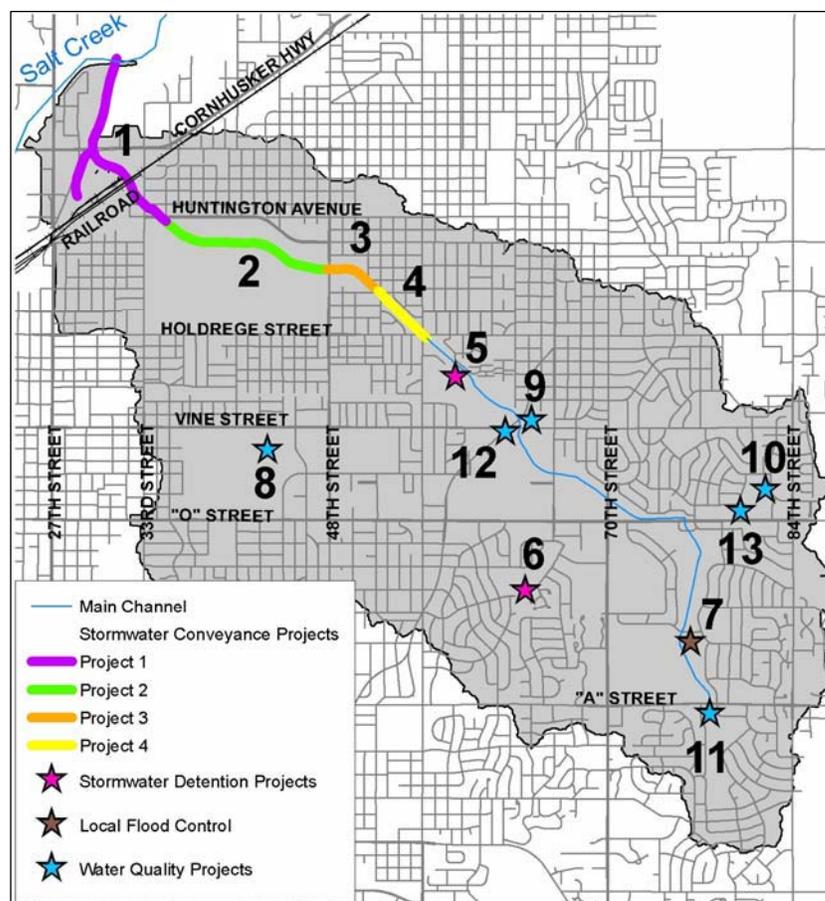


Figure ES-4
Conceptual Level Improvement Projects

The 13 CIPs are grouped into stormwater conveyance, stormwater detention, local flood control, and water quality based on their primary function. A brief description of each project is provided in Table ES-1.

The recommended projects accomplish the goals of reducing the potential for future flood damages, achieving stream stabilization, and improving water quality. The local flood control project (project 7) and water quality projects (projects 8 through 13) can be constructed independently of the other recommended projects. However, projects 1 through 6 are dependent on each other to ensure the net benefit of flood reduction is realized throughout the project area and that no adverse impacts occur downstream. Therefore, projects 1 through 6 are considered a watershed-based solution, which will require an implementation plan using construction sequencing. Section 10 of the Master Plan provides further details on CIP implementation.

In the portion of the watershed where the majority of the buildings are located within the floodplain, Figure ES-5 compares the study 100-year floodplain (existing conditions) with the potential 100-year floodplain after implementing projects 1 through 6. The total number of buildings taken out of the FEMA floodplain is 807 buildings, and another 175 buildings receive flood protection benefits.

Table ES-1
Deadmans Run Watershed CIP Summary

Project No.	Improvement Description	Estimated Project Cost
Stormwater Conveyance		
1	Widening and reshaping the main channel from the Salt Creek confluence to Huntington Street. In addition, a portion of a west tributary near State Fair Park Drive will be improved. The improvements also include significant upgrades to several stream and railroad crossings. The implementation of this project will require close coordination with the Antelope Valley project to optimize community benefits.	\$25,234,000
2	Widening and reshaping the main channel from Huntington Street to 48 th Street. A combination of structural retaining walls and natural features will be used to minimize property impacts.	\$9,198,000
3	Widening and reshaping the main channel from 48 th Street to 52 nd Street, using flood bench terraces. The improvements also include upgrading the 48 th Street bridge and replacing the pedestrian crossing.	\$2,474,000
4	Widening and reshaping the main channel from 52 nd to 56 th Street and upgrading stream crossings at both roadway locations.	\$7,764,000
Stormwater Detention Basins		
5	Constructing an off-line dry stormwater detention basin next to the main channel, to reduce the magnitude of floodwaters downstream.	\$2,932,000
6	Constructing an in-line dry stormwater detention basin in Taylor Park to reduce the magnitude of floodwaters downstream.	\$1,440,000
Local Flood Control		
7	Installing an earth berm to mitigate a localized flooding problem.	\$19,000
Water Quality		
8	Modifying an existing pond located near Wyuka Cemetery to integrate water quality features.	\$47,000
9	Installing a water quality stormwater facility within Bethany Park to improve water quality.	\$113,000
10	Modifying two existing ponds located near Russwood Boulevard to integrate water quality features.	\$35,000
11	Installing a water quality stormwater facility located immediately north of Trendwood Park to improve water quality.	\$142,000
12	Installing a below ground hydrodynamic separator structure to remove trash and debris from stormwater runoff.	\$237,000
13	Implementing stream stability measures to control erosion with Herbert Park.	\$211,000
Estimated Cost		\$49,846,000

Benefit-Cost Analysis

Due to the magnitude of the recommended CIP program, specifically the watershed solution that consist of projects 1 through 6, a benefit-cost analysis was conducted to evaluate the economic feasibility of implementing these projects. The economic evaluation was conducted using a benefit-cost ratio (BCR) approach based on FEMA procedures.

The FEMA BCR procedure consists of determining whether the cost of the mitigation project today will result in sufficient flood damage reduction in the future to justify the capital investment of the project. If the benefit is determined to be greater than the estimated project cost, then the project is considered justified. However, if the benefit is less than the project cost, then the project is not considered cost-effective. Thus, the BCR, which is calculated by dividing the benefits by the costs, should have a value of 1.0 or greater to justify the economic feasibility of constructing large-scale improvement projects.

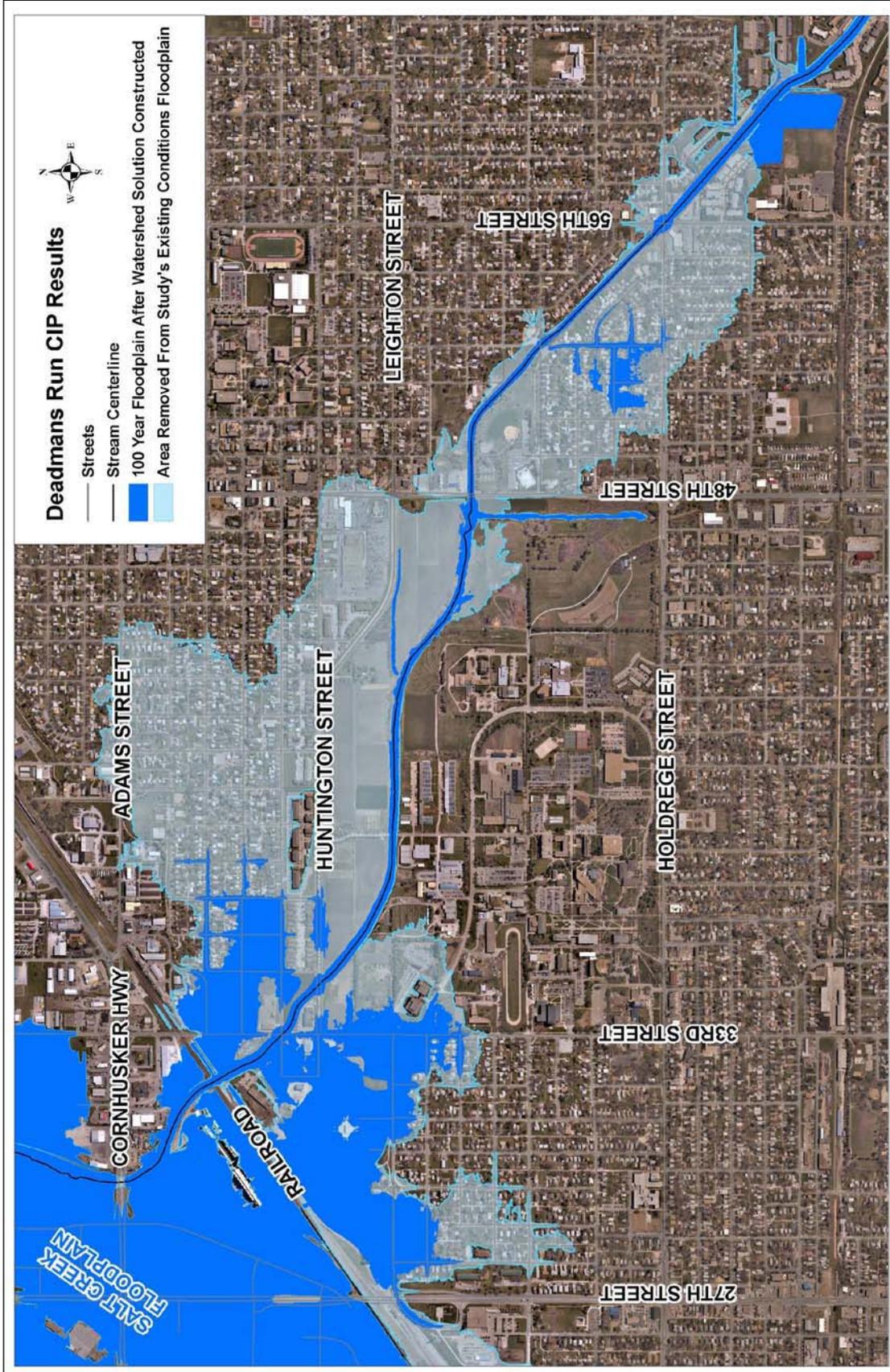


Figure ES-5
100-Year Floodplain Comparison

Significant losses suffered during a severe flood can be attributed to physical damages to building structures and their associated interior contents. The process of estimating physical damages is fairly straightforward using automated geographic information system (GIS) tools to estimate the severity of flooding associated with the various flood return intervals (i.e., 10-, 50-, and 100-year design storms). Conversely, the process of estimating economic and casualty losses, and emergency management costs, requires significant research, analysis, and assumptions. For this study, the goal was to develop a preliminary BCR based solely on physical damages since the data for this category was readily available, and because the projects are still conceptual and detailed economic information is not available.

For the Deadmans Run watershed solution (projects 1 through 6) a preliminary BCR value of 0.79 was estimated based solely on physical damages. Typically, if the BCR ratio is above 0.75 when only assuming physical damages, then the BCR will exceed 1.0 when the economic, casualty losses, and emergency management costs are factored into the calculations. Therefore, at this conceptual stage of the project formulation process, projects 1 through 6 appear to be economically viable.

Summary

The Deadmans Run Watershed Master Plan provides the necessary planning tools and CIPs to address flood management, stream stability, and water quality. The City and NRD should use this Master Plan as a reference and guide for the implementation of improvement projects in the Deadmans Run Watershed through the City Capital Improvement Programs and NRD's Long Range Implementation Plan. The agencies should use cooperative efforts to address project timing, prioritization between basins, and the sharing of responsibility.

By using the detailed study information and applying the Master Plan elements described above, multiple goals will be achieved including:

- Protection of future homes and businesses from flood hazards
- Reduction of potential future flood damages
- Long-term stream stability that protects public infrastructure
- Improvements to stream stability and water quality
- Improvements to aquatic and riparian habitat
- Opportunities for multiple benefits through an integrated approach to watershed planning
- Compliance with city, state, and federal regulatory requirements to protect and preserve water quality