II. Introduction

A. Purpose

The infrastructure of Leavenworth is of concern to its residents as well as to public officials. The more visible and commonly-used elements of the City's infrastructure are the street and highway system, the water distribution system, and the wastewater collection and conveyance system. A vital, yet often forgotten, element is the stormwater conveyance system that winds its way through the City, and provides the essential service of collecting stormwater runoff and ultimately conveying it to the Missouri River. Although the system was designed to operate efficiently and effectively, it is not adequate for today's expectations.

The reasons behind the inadequacies of the present stormwater conveyance system are multifaceted, and include the following:

- Age of the system components.
- Increased flows beyond the system's design capacity.
- Increased runoff resulting from development.
- Sedimentation from construction-related runoff.
- Channel bank erosion.
- Structural failures.
- New policies superseding former design criteria.
- Development in areas where flooding has become a concern as a result of upstream development.
- Improper maintenance of roadside ditches, including complete removal of the ditches.
- Increased maintenance needs of an aging and expanding drainage system.

Many of these aspects are interrelated; therefore, correction of one may result in the elimination of two or more causes.

The deterioration of the stormwater conveyance system has occurred over a long period of time. A stormwater conveyance system typically receives attention only when it fails to operate properly, causing property damage or even loss of life.

As the City has grown and developed, the demands on the stormwater system have increased. Whereas in the past, flooding was often viewed as inevitable and uncontrollable, it can now be controlled and its effects alleviated. As Leavenworth

competes with other cities to attract commerce and industry, prevention and control of flooding are becoming increasingly important. The challenge facing the City is to develop, implement, and maintain a stormwater system capable of operating well into the 21st century. Such a system must not only reduce or eliminate stormwater-related damage, inconvenience, and threat to life; but it must also enhance other aspects of the urban system by offering recreational opportunities, complementing the transportation network, and helping to realize development and redevelopment plans.

The Stormwater Master Plan is the initial step towards upgrading the stormwater system. It identifies and examines the flooding problems within Leavenworth, proposes practical planning level improvements, provides a sound, technically-based framework for development of the stormwater conveyance system, and identifies funding mechanisms. The severity of flooding within the City varies. For example, the Three Mile Creek watershed, which contains the most developed and older parts of town, experiences the most severe flooding and has the least amount of land available for improvements. The Five Mile Creek watershed, on the other hand is not fully developed and has an adequate system of open channels and space for construction of improvements, including detention facilities. The extent and types of improvements must be evaluated in light of the associated costs. Therefore, identification of the potential cost-recovery mechanisms is an essential element of this Stormwater Master Plan.

Different kinds of problems are encountered in different parts of the City, and each must be handled by the most appropriate corrective measures. The extent of flooding is equally important as it can indicate the location, or both the location and intensity of the problem. It is also a factor in developing funding sources and in assigning responsibilities and allocating resources for dealing with the problems.

B. Scope of Master Plan Work

The Stormwater Master Plan presents a preliminary assessment of the improvements needed for the Three Mile and Five Mile Creek watersheds as shown on Figure II-1. The scope of the master plan is broad in physical coverage and comprehensive in its assessment of the overall system. The detail provided in the master plan is at planning level, appropriate for this stage in the system's development, and in keeping with available resources and time.

The general appraisal of the watersheds is based on an overview of specific problems encountered throughout the City. Each problem warrants further attention: to prepare plans for capital improvements, to schedule special maintenance, or to postpone

action until more pressing needs are met. This study provides a general assessment of the costs of improvements and recommends a capital improvements program, which will enable Leavenworth to plan specific stormwater system projects and maintenance activities in a logical and effective manner.

This master plan describes the general locations, type, and approximate costs of needed improvements. The recommended improvements and costs presented in this Plan are preliminary; final design should not be based solely on these recommendations and analyses.

The Plan includes an appraisal of the City's stormwater management policies and design standards and recommendations for modifications where considered appropriate.

An evaluation of available financing options and identification of the most feasible methods for funding the needed stormwater improvements is also included in the Plan.

Three Mile Creek
Watershed

Five Mile Creek
Watershed

8L
10L
9L
8R
7L
7R
6R
6L
5R
S1L
4R
S1R
3R
5L
3L
2L
1L
S2L
S4L
S3L
2R
S2R
S8R
S4R
S3R
1R
S7R
S6R
S5R
11L
7L
3L
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Figure II-1: Wat
City of Leavenw
Stormwater Ma

Watershed
Subwaters
1L Subwaters

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