CDM - Executive Summary

The City of Lincoln retained Camp Dresser & McKee Inc. (CDM), in association with Gould Evans Goodman, to provide professional engineering and planning services to evaluate various floodplain management alternatives. The project consisted of evaluating the economic impacts of floodplain management alternatives for existing public infrastructure along a portion of Dead Man's Run, and in newly developed areas. The purpose of the study was to provide the City with a comparative analysis of floodplain management alternatives that would not only be a useful management tool, but an informative study that could be used to help shape future floodplain management policy. The project consisted of three primary components as summarized below.

Economic Evaluation along Dead Man's Run

The economic evaluation along Dead Man's Run was focused on a channel reach extending from 33rd Street to 56th Street. The evaluation consisted of applying three floodplain management alternatives along this reach, and evaluating the economic consequences with regards to future flood damage to existing public buildings, public access streets, and stream crossing structures. The three floodplain management alternatives included:

- No Net Rise in the existing 100-year floodplain water surface elevation (WSE), combined with Compensatory Storage. Compensatory storage requires compensation for any flood storage volume lost to buildings or fill by providing a hydraulicly equivalent volume of flood storage on the site.
- 1/2-Foot Rise in the 100-year floodplain WSE
- 1-Foot Rise in the 100-year floodplain WSE (Existing City Policy)

The economic analysis was based on existing GIS data, depth damage curves, HECRAS modeling results, and as-built drawings. A separate economic evaluation was conducted for public buildings, public access streets, and public stream crossing for each floodplain management alternative. The results of the evaluation are summarized below.

Table ES-1 Percent Reduction in Flood Damage

Type of Public Infrastructure	Percent Reduction in Annual Flood Damage		
	No Net Rise in Existing 100-yr WSE	1/2-ft Rise in 100-year WSE	1.0-ft Rise in 100-yr WSE (Existing Policy)
Public Building Annual Flood Damage Costs	100%	75%	Base
Public Access Street Annual Flood Damage Costs	27%	14%	Base
Public Stream Crossing Structure Improvement Costs	44%	6%	Base

As shown in the table, more restrictive floodplain management alternatives can significantly reduce costs associated with flood damage and capital improvements.

Economic Evaluation in New Development

An economic analysis was conducted to evaluate the impacts of four floodplain alternatives in a typical new development adjacent to a floodplain. Three land uses (residential, commercial, and industrial) and four floodplain management alternatives (1-ft Rise, 1/2-ft Rise, No Net Rise/Compensatory Storage, and CUP/PUD) were considered for a total of twelve conceptual development scenarios.

The economic evaluation was based on a hypothetical undeveloped parcel of land adjacent to a typical 1,000-foot reach of channel in Lincoln, Nebraska that had an established FEMA floodplain and floodway. The hypothetical development site area was 58 acres of undeveloped land. For each development scenario, Gould Evans Goodman developed a conceptual development layout sketch that was used to estimate the cost to develop the site.

The basis of the economic analysis was to determine the cost to develop the site, including the purchase of the property, and the cost to install streets, water and sewer mains, and electrical service. Building costs were not included in the economic analysis. The results of the evaluation are summarized in the three tables shown below.

Table ES-2 Residential Development Costs

Floodplain Management Alternative	Developable Land (ac)	Percent Cost Increase
1-ft Rise Floodway (existing policy)	40 .5 ac	Base
1/2-ft Rise Floodway	19.2 ac	+8
No Net Rise/Compensatory Storage	35.7 ac	+14
CUP	10.0 ac	-1

Table ES-3 Commercial Development Costs

Floodplain Management Alternative	Developable Land (ac)	Percent Cost Increase
1-ft Rise Floodway (existing policy)	43.5 ac	Base
1/2-ft Rise Floodway	21.5 ac	+3
No Net Rise/Compensatory Storage	22.8 ac	+21
PUD	14.5 ac	+6

Table ES-4 Industrial Development Costs

Floodplain Management Alternative	Developable Land (ac)	Percent Cost Increase
1-ft Rise Floodway (existing policy)	38.1 ac	Base
1/2-ft Rise Floodway	17.9 ac	+4
No Net Rise/Compensatory Storage	25.5 ac	+10
CUP	14.0 ac	+3

In general, the economic impact analysis found that development costs increased with more restrictive floodplain management regulations. The increase in development costs, compared to the City's existing floodplain management policy, ranged from less than 0 percent for a residential CUP development to 21 percent for a commercial no net rise/compensatory storage alternative. However, more restrictive floodplain management alternatives will provide a proactive versus reactive approach to future flooding by:

- Maintaining channel storage to reduce downstream flow increases and corresponding increases in flood elevations
- Providing appropriate set-back distances to reduce future flood damage and avoid expensive retrofit projects
- Improving water quality and the environment by preserving the riparian zone adjacent to the stream
- Enhancing the quality of life of local residences by incorporating recreational amenities within the open green spaces
- Increasing property values of property adjacent to maintained open space

Floodplain Management Alternatives and Example Programs

A qualitative assessment of various floodplain management approaches that have been successfully implemented by other municipalities across the Country was conducted. The floodplain approaches that were reviewed included:

- No Net Rise and Compensatory Storage
- Property Buyouts
- Cluster (Open Space) Development
- Greenfield Approach
- Best Management Development Practices
- Floodplain Mitigation

A fact sheet was developed for each floodplain approach, which included a brief description of the concept, a list of advantages and disadvantages, implementation considerations, a list of communities that have implemented the concept, and a reference listing. In addition, the stormwater management programs for Tulsa, Oklahoma; Lake County, Illinois; and Johnson County, Kansas, were highlighted to provide examples of nearby communities that are currently implementing various proactive floodplain management strategies.