

FACTSHEET

TITLE: COMPREHENSIVE PLAN AMENDMENT NO. 03004, by the Director of Planning, at the request of the Public Works & Utilities Department and the Lower Platte South Natural Resources District, to adopt the Southeast Upper Salt Creek Watershed Master Plan as an approved subarea plan, and to amend the Land Use Plan to designate land as Green Space or Agricultural Stream Corridor along the 100 year flood prone corridor, on property generally located between Salt Creek and South 70th Street, from Yankee Hill Road to south of Saltillo Road.

STAFF RECOMMENDATION: Approval, as revised on August 20, 2003 (p.33-45).

FINDINGS OF FACT:

1. This comprehensive plan amendment was originally heard by the Planning Commission as part of the 2003 Comprehensive Plan Annual Review on May 21, 2003, and continued to be deferred at the request of the staff until August 20, 2003, while the staff continued discussions with affected landowners and other interested parties.
2. The original staff recommendation dated April 30, 2003, recommends approval, concluding that the Southeast Upper Salt Creek Watershed Master Plan will provide guidance for future development in this area and will aid in protecting future land uses from storm damage. The amendment to the Land Use Plan will provide guidance to future development as to the location of the area subject to a 100 year flood event that should be preserved. (See p.2-5).
3. On June 11, 2003, the staff submitted proposed additional language to the Executive Summary (p.18).
4. On July 23, 2003, a "*work-in-progress*" draft of revised text for the Executive Summary was submitted, including revisions proposed by attorney Mark Hunzeker on behalf of the landowners in the basin (p.19-24)
5. On August 6, 2003, revised text for the Executive Summary was submitted (p.25-32), including an alternative "Concept C" approach to provide flexibility, this proposed revision being based upon further discussions with attorneys Mark Hunzeker and Peter Katt representing landowners in the basin. At this time, the staff requested an additional continuance to provide additional time to all parties and members of the public to review and comment on the text.
6. On August 20, 2003, the final revised staff recommendation was submitted for consideration by the Planning Commission, including the alternative "Concept C" approach (p.33-45).
7. All correspondence submitted and considered by the Planning Commission is found on p.48-67.
8. The minutes of the Planning Commission hearings are found on p.68-85.
9. Staff responses to questions raised by Commissioner Marvin are found on p.46-47.
10. On August 20, 2003, the Planning Commission voted 5-4 to recommend approval of the original staff recommendation dated April 30, 2003 (presented to the Commission on May 21, 2003), which eliminates all references to Concept C (Krieser, Carlson, Taylor, Marvin and Steward voting 'yes'; Larson, Duvall, Bills-Strand and Schwinn voting 'no'). See Minutes p.82-85.
11. The original staff recommendation as recommended for approval by the Planning Commission is found on p.5. The **Executive Summary** as recommended for approval by the Planning Commission is found on p.7-15.
12. Concept diagrams for implementation of Master Plan "A" and Master Plan "C" are found on p.16, and the Southeast Upper Salt Creek Minimum Flood Corridor map is found on p.17.

FACTSHEET PREPARED BY: Jean L. Walker

REVIEWED BY: _____

REFERENCE NUMBER: FS\CC\2003\CPA.03004

SPONSOR: Planning Department

BOARD/COMMITTEE: Planning Commission
Public Hearing: 05/21/03, 06/11/03, 07/09/03, 07/23/03,
08/06/03 and 08/20/03
Administrative Action: 08/20/03

RECOMMENDATION: Approval of original staff recommendation dated April 30, 2003, (p.2-5) (5-4: Krieser, Carlson, Taylor, Marvin and Steward voting 'yes'; Larson, Duvall, Bills-Strand and Schwinn voting 'no').

DATE: September 15, 2003

DATE: September 15, 2003

2003 COMPREHENSIVE PLAN ANNUAL REVIEW

Comprehensive Plan Amendment No. 03004 Southeast Upper Salt Creek Watershed Master Plan

Applicant	Location	Proposal
Public Works and Utilities Department and Lower Platte South Natural Resources District	Generally the area between Salt Creek and S. 70 th Street, from Yankee Hill Road to south of Saltillo Road	(1) Adoption of the Southeast Upper Salt Creek Watershed Master Plan and (2) Amend Land Use Plan to designate land as Green Space along the 100 year flood prone corridor
<p>Recommendation: Approval</p> <p>The Southeast Upper Salt Creek Watershed Master Plan will provide guidance for future development in this area and will aid in protecting future land uses from storm damage. The amendment to the Land Use Plan will provide guidance to future development as to the location of the area subject to a 100 year flood event that should be preserved.</p>		

Status/Description

This amendment has two related parts proposed by the Public Works and Utilities Department and the Lower Platte South Natural Resources District (NRD):

- (1) Adoption of the Southeast Upper Salt Creek Watershed Master Plan (SEUSC) as an approved subarea plan of the Comprehensive Plan,
- (2) Amend the Land Use Plan to change the designation of various properties shown as Urban Residential, Low Density Residential or Industrial to Green Space or Agricultural Stream Corridor to reflect the location of the 100 year flood prone area as identified in the SEUSC master plan.

This amendment would designate that area as “Green Space” or “Agricultural Stream Corridor” in order to encourage this area to remain predominately in open space uses in order to preserve the flood storage, flood conveyance and water quality benefits. Currently, the Plan notes the location of the streams and drainage ways in this subarea, but does not identify the floodplain area, since it had not been previously mapped by the Federal Emergency Management Agency (FEMA). The mapped 100 year flood prone area in the SEUSC is comparable to the FEMA 100 floodplain. The flood prone area will not officially be designated by FEMA as floodplain, though, until an official request for map revision has been filed, reviewed and approved by FEMA. One of the Floodplain Task Force recommendations is that floodplain information from watershed plans be consistently used in the administration of floodplain regulations.

The “Green Space” is defined in the Plan on Page F 22 as an area that may have passive recreation uses but is predominately for active recreational uses, such as parks, golf courses or trails. It can be either public or privately owned. As implemented in this urban subarea, the green space could include passive open space, drainage ways, tree masses, yards, use as setback adjacent to commercial uses or in some circumstances, potentially even parking.

Comprehensive Plan Implications

On Page F 79-80, the Comprehensive Plan includes the following strategies:

“Develop a Watershed Management Master Plan for Lincoln and its future growth areas. Integrate existing neighborhoods and growth areas into watershed planning.

Utilize basin master plan **recommendations and components as analysis tools** to be referenced and compared with proposed development within the basin, and as a guide in the preparation of future capital improvement projects.

Future master planning efforts for largely undeveloped basins will rely more heavily on pro-active better management practice (BMP) measures and the **conservation of existing natural drainage features** to most effectively manage stormwater and floodplains. Designs of human made features should **seek to utilize bioengineering and other naturalized techniques**, incorporating trail systems and other linear park features where possible.”

The SEUSC Master Plan covers the urban planning zones designated S-1, S-2, S-3, and a portion of S-5. The completion of the SEUSC Master Plan is the second step toward the development of a Watershed Management Master Plan for Lincoln and its future growth areas. This is a phased, multi-year project which is being completed basin by basin, and will ultimately be integrated into a comprehensive, unified Master Plan. The first step in the process was the completion and adoption of the Beal Slough Stormwater Master Plan, which is now identified as an approved subarea plan of the Comprehensive Plan.

Watershed master planning is important to identify needs for stormwater and floodplain management prior to future development, to provide a database of watershed information and a computer modeling system to be used as analysis tools, and to identify capital projects needed to address flood control, water quality, or stream stability issues in the watershed. Project components and recommendations are intended to be referenced during the review of development proposals and evaluated relative to their impact on the watershed. Master planning provides the opportunity to identify and reserve regional detention sites during early planning stages in advance of development. Master planning and the performance and adequacy of stormwater storage basins to prevent increases in peak flows will require continued assessment with the growth of the City, and upstream flood storage is critical to preventing further increases to the floodplain.

The SEUSC Master Plan watershed master plan evolved from a public process led by the City of Lincoln Public Works and Utilities Department and the Lower Platte South Natural Resource District. This process included four open houses and multiple meetings with land owners that were used to present findings, gather input, and receive feedback on proposed master plan components. Open houses were held on March 26, 2001; June 4, 2002; July 25, 2002; and October 10, 2002. Water quality, stream stability, and flooding were three of the major topics addressed in the analysis and at the public meetings:

Stormwater Quality

The City is responsible for developing programs and projects to protect the quality of stormwater runoff and meet federal regulations for water quality under the National Pollutant Elimination System (NPDES) Permit issued to the City by the State of Nebraska. Projected pollutants from future urban runoff in this part of the watershed include sediment, nutrients such as nitrogen and phosphorus, heavy metals, and bacteria. Future conditions also project increased stream bank erosion unless sufficient riparian buffers are established or preserved to filter pollutants from adjacent land uses and flow increases are mitigated.

Stream Stability

Some channel bed erosion and bank sloughing is evident in selected locations within the watershed. However, erosion caused by increased flow rates and occurrence of bankfull conditions due to projected development is projected to increase if not adequately addressed. Channel velocities and depth of flow are projected to increase with loss of floodplain storage, aggravating or instigating new channel stability problems in affected reaches.

Flooding Along Streams and Channels

There are flood hazard concerns that will increase in the watershed unless master plan components are implemented that mitigate the effects of projected development. Currently, nine houses and several empty lots are in or near the 100-year floodprone area. As the basin develops, flow rates will increase for major storm events if floodplain storage is lost, increasing flood heights by 3-5 feet in the area between the BNSF Railroad and 40th Street.

Evaluation of Alternative Concepts

The SEUSC Watershed Master Plan examined two alternative concepts to address stormwater quality, stream stability, and flooding along streams:

Concept Plan A

Concept Plan A, which is reflected in the master plan and is the preferred concept, includes the preservation of the 100 year floodplain through the purchase of conservation easements below South 70th Street to Salt Creek. This concept also includes constructed wetlands to remove urban pollutants, detention facilities, and the use of bioengineering approaches to improve stream stability. Concept Plan A is estimated to cost \$8,425,000 to implement.

Concept Plan B

Concept Plan B was considered as an alternative during the evaluation process. It is not recommended for adoption in the master plan due to the cost and loss of water quality improvements. It included the preservation of a smaller flood corridor and the construction of a regional detention facility west of South 40th Street. The plan also included other detention facilities, water quality wetlands, and bioengineering approaches to improve stream stability. Concept Plan B was estimated to cost \$12,082,000 to implement. The loss of 100-year floodplain areas outside of a 400-foot flood corridor identified with this concept would require an additional \$3.7 million to meet the water quality goals established for this watershed as well as other measures to offset the storage lost outside the 400-foot flood corridor. Thus, Concept Plan B would only be acceptable if private development were to complete the water quality improvements needed to offset the impacts to water quality caused by development.

The SEUSC Watershed Master Plan recommended for adoption reflects Concept Plan A. While the cost of implementing the Master Plan will be significant, the up-front costs are much less than the future costs of stream degradation, increased flooding, and water quality degradation if the measures identified in the Plan are not taken. Also if Master Plan components are not completed up-front, there will be increased flooding, stream stability problems, and water quality degradation that will be unrecoverable.

Conclusion

The goal of the proposed Master Plan is to protect the 100-year floodplain and to construct water quality wetlands in the lower portion of the sub-basin to improve water quality. In doing so, the proposed Plan meets all of the stormwater management goals established for this watershed at a significantly lower cost than the alternative concept. The adoption of the SEUSC Watershed Master Plan as an approved component of the subarea plan is an important first step in its implementation. The Plan is anticipated to be implemented over a period of time with a combination of local funding (City and NRD), public/private partnerships, as well as state, federal and other grant resources. An approved Master Plan is the foundation needed to advance with funding alternatives.

Subarea plans in the Comprehensive Plan “offer greater details about the intended future of an area of the community — including land uses, infrastructure requirements, and development policies and standards.” The SEUSC will provide guidance to future zoning and subdivision decisions.

This amendment would designate the 100 year flood prone area as “Green Space” in order to encourage this area to remain predominately in open space uses in order to preserve the flood storage capacity of the drainage way. The Green Space designation does remove some urban residential and potential industrial land from development. However, it is important to preserve the flood storage capacity of the 100 year flood prone area

Amend the Comprehensive Plan as follows:

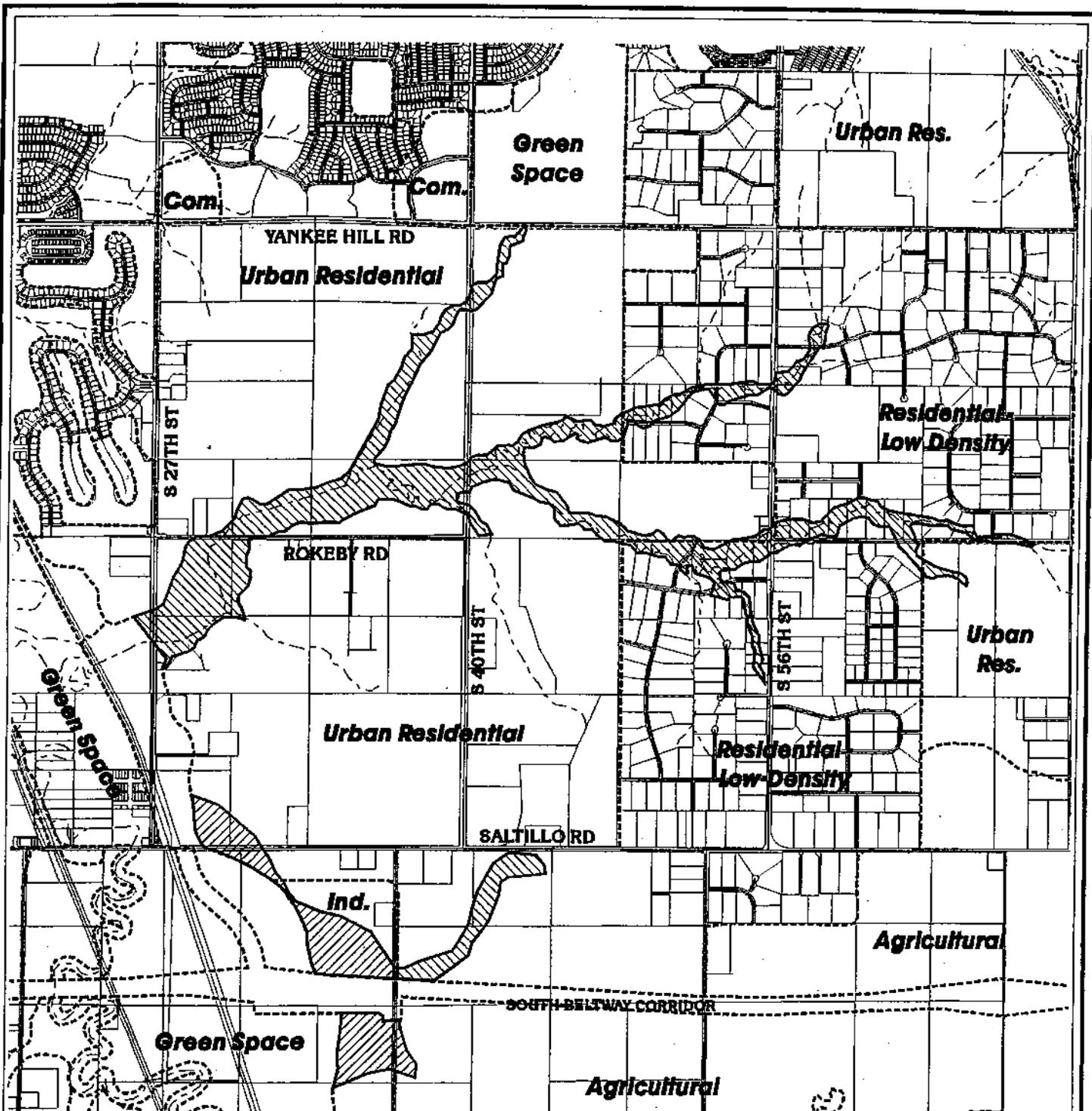
- 1) Amend the “Lincoln/Lancaster County Land Use Plan”, figure on pages F23 and F25, to designate as ‘Green Space’ and “Agricultural Stream Corridor” the 100 year flood prone area as shown on the attached map.
- 2) Add the “Southeast Upper Salt Creek Watershed Master Plan, 2003” to the list of approved subarea plans on Page F 156.
- 3) Add a new section to the end of the Watershed Management section on page F 80 as follows:

“The following watershed studies are adopted in order to provide guidance to watershed management activities within the basin:

! Stevens Creek Watershed Study and Flood Management Plan, 1998 (for rural watershed)

! Beal Slough Stormwater Master Plan, May 2000

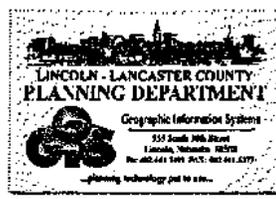
! Southeast Upper Salt Creek Watershed Master Plan, 2003”



SE Upper Salt Creek Watershed

Comprehensive Plan Proposed Amendment # 4

- Land Use Boundary
- Res** Land Use Category
-  From Urban Residential, Residential Low Density, and Industrial to Green Space
-  From Urban Residential, Industrial and Agricultural to AG Stream Corridor



EXECUTIVE SUMMARY

Urban Planning Zones S-1, S-2, S-3 and a portion of S-5 have been identified as part of the Tier I growth area by the Lincoln-Lancaster County Comprehensive Plan. This means they are expected to become developed within the next 25 years. These Urban Planning Zones are called the Southeast Upper Salt Creek Watershed.

GOALS AND OBJECTIVES

Successful master planning for stormwater management involves identifying issues, establishing goals, and preparing a plan to meet those goals. Public involvement in each of these areas is key to developing support for the Master Plan. Recognizing this, four open houses were held by the City of Lincoln Public Works and Utilities Department and the Lower Platte South Natural Resources District. The purpose of these forums was to gather public input on existing conditions, present study findings on existing and projected conditions, present and receive feedback on potential proposed concept components, determine the degree of public support for those concepts, present opinions of probable costs and relative benefits of two concept master plan alternatives, and determine the preferred alternative.

Some of the key issues that were identified through the watershed master planning process follow:

- Stream stability and management of increased volume and runoff due to urbanization and development in the watershed
- Increased flood hazard and risk due to development in the floodplain
- Evaluation of runoff quantity and quality on wetlands and other environmental resources
- Road crossings, existing development in the floodplain and private property rights
- Funding and coordination with floodplain regulation review
- Evaluating and improving upland land use and water quality during and after development
- Management of runoff and drainage into Wilderness Park
- Lack of delineated floodplain in the watershed

The following goals were identified through the public involvement process:

- Preserve stream bed and banks that are stable, and improve stability of those at risk
- Reduce flood hazard to existing and future buildings and to infrastructure
- Coordinate components to provide multi-purpose use potential
- Improve water quality and preserve or restore instream and riparian habitat
- Identify funding opportunities

The recommended master plan components discussed in this report have been selected to attain those goals. They have been analyzed to determine the degree to which they attain the goals and solve the problems, or take advantage of the opportunities presented in the Southeast Upper Salt Creek (SEUSC) Watershed.

EVALUATION

Stormwater Quality

Current threats to stormwater quality in the SEUSC Watershed are runoff from adjacent crop ground, sediment from stream bed bank erosion, and potential runoff from failed or poorly maintained individual sanitary septic systems. Projected conditions will exacerbate the water quality threats from adjacent land uses and increase stream bank erosion unless sufficient riparian buffers are established or preserved to filter pollutants from adjacent land uses and flow increases are mitigated. This could be accomplished by preserving the existing 100-year flood prone area or through a combination of regional detention and preserving a portion of the floodplain.

Stream Stability

Some channel bed erosion and bank sloughing is occurring near the mouth of the S-1 watershed west of 14th Street, and is evident in S-5 in the two artificial channels between South 38th Street and the BNSF Railroad ditch. The channel has scoured several feet in the southern channel. Stream velocities are at or above erosive velocities for existing and projected conditions. Development, to date, in the S-3 watershed has not caused significant stormwater impacts on downstream reaches because of the low density and low percent impervious area associated with large lot acreages. Some channel bed erosion and bank sloughing is occurring near the mouth of the S-2 watershed west of the BNSF Railroad.

Erosion caused by increased flow rates, and increased occurrence of bankfull conditions due to projected development, will increase if not adequately addressed. Land disturbance activities associated with projected development could also adversely affect surface water quality if appropriate Best Management Practices (BMPs) are not installed and maintained. A bioengineering approach is the preferred solution. If properly designed, it would be appropriate for most channel reaches.

Construction sites in the basin can be a significant source of erosion and sediment. Development in the upper portion of S-1 is currently underway. Erosion and sediment control plans have been prepared and implemented. Joint City of Lincoln and NRD education and enforcement efforts have increased citizen and developer awareness. Citizen and developer awareness has improved compliance with city, state, and federal erosion and sediment control regulations for development. Erosion and sediment control in the rest of the watershed will benefit from increased City of Lincoln and NRD staffing that will help education, compliance and enforcement activities required by the Municipal NPDES Permit.

Flooding Along Streams and Channels

The SEUSC Watershed is approximately 50% developed. New and pending developments near South 27th Street and Yankee Hill Road have been developed according to the 2000 Lincoln Drainage Criteria Manual (DCM), reducing the flood hazard to adjacent property.

The rest of the watershed has existing flood hazard concerns that will increase unless master plan components are built that mitigate the effects of projected development, see Table ES-4. Currently, nine houses and several empty lots are in or near the 100-year floodprone area. As the basin develops, flow rates will increase 40-45% for the 2-year, 15-20% for the 10-year, and 10-20% for the 100-year events if floodplain storage outside of the required minimum flood corridor is eliminated, unless the lost storage is mitigated elsewhere in the watershed. Without intervention by application of stormwater management practices, the mainstem surface profiles between the BNSF Railroad and 40th Street would increase by 3 to 5 ft, which could result in flood damage and significantly higher road and bridge replacement or upgrade costs. Channel velocities and depth of flow will also increase, aggravating existing or instigating new channel stability problems in affected reaches.

Most bridges and culverts in the watershed are undersized and do not meet current hydraulic design standards. However, recently constructed bridges and culverts on arterials such as Yankee Hill Road and South 56th Street are not undersized. Other structures should be prioritized and replaced as opportunity presents itself. The proposed road dams on Rokeby Road near 70th Street would reduce flow rates in the upper portion of S-2/S-3 enough to reduce the flood hazard to the ten houses, bring one culvert into hydraulic compliance and reduce replacement costs slightly on another culvert on the mainstem. Tables ES-1, ES-2, and ES-3 show the 2-, 10-, and 100-year peak flow rate values at selected locations for existing, projected, and conditions based upon implementation of the Southeast Upper Salt Creek Watershed Plan.

**Table ES-2
10-Year Peak Flow Rate Values at Selected Locations**

10-Year Peak Flow Rate Values at Selected Locations							
Mainstem							
Rokeyby Road	202	25,159	341	319	-6%	47	-86%
South 66 th Street	66TH	24,449	344	325	-6%	47	-86%
South 56 th Street	56THB	20,036	1,200	1,164	-3%	821	-32%
Cromwell Road	NODE62	17,440	1,557	1,525	-2%	1,209	-22%
South 40 th Street	40THB	12,655	2,216	2,286	3%	1,880	-15%
Tributary Confluence	NODE25	8,707	3,193	3,634	14%	2,989	-6%
Rokeyby Road	ROKEBY	6,395	3,387	4,039	19%	3,299	-3%
South 27 th Street	27THB	3,607	3,519	4,309	22%	3,430	-3%
BNSF Railroad	BNSF	2,600	3,500	4,311	23%	3,658	5%
Salt Creek	R6A	2,491	3,500	4,325	24%	3,648	4%
Northeast Tributary							
Rebel Drive	REBEL	9,430	612	612	0%	612	0%
South 56 th Street	56THA	8,265	609	609	0%	609	0%
South 53 rd Street	S53RD	7,195	533	533	0%	533	0%
Private Drive	R22	6,120	700	700	0%	700	0%
Private Drive	R22	5,670	700	700	0%	700	0%
Southwest Tributary							
South 40 th Street	S2T	500	471	766	63%	766	63%
Southcentral Trib.							
New Castle Road	CLV310	310	328	328	0%	328	0%
Southeast Tributary							
Rokeyby Road	201	464	506	461	-9%	251	-50%
Northwest Tributary							
Yankee Hill Road	YANKB	5,700	371	371	0%	371	0%
South 40 th Street	40THA	3,875	507	6	-99%	612	21%
Salt Creek							
Saltillo Road	SALTIL	1,466	1,445	2,151	49%	2,043	41%
So. 38 th St. (north)	S38TH	7,280	660	855	30%	786	19%
So. 38 th St. (south)	S5E	3,706	257	613	139%	188	-35%

**Table ES-1
2-Year Peak Flow Rate Values at Selected Locations**

Location	Node	2008		2009		Change	
		Flow (cfs)	Flow (cfs)	Flow (cfs)	Flow (cfs)	% Change	% Change
Mainstem							
Rokeby Road	202	25,159	177	157	-11%	42	-76%
South 66 th Street	66TH	24,449	169	150	-11%	41	-76%
South 56 th Street	56THB	20,036	545	489	-10%	352	-35%
Cromwell Road	NODE62	17,440	734	687	-6%	554	-25%
South 40 th Street	40THB	12,655	908	934	3%	739	-19%
Tributary Confluence	NODE25	8,707	1,249	1,748	40%	1,491	19%
Rokeby Road	ROKEBY	6,395	1,383	1,984	43%	1,674	21%
South 27 th Street	27THB	3,607	1,430	2,080	45%	1,648	15%
BNSF Railroad	BNSF	2,600	1,427	2,073	45%	1,827	28%
Salt Creek	R6A	2,491	1,427	2,057	44%	1,822	28%
Northeast Tributary							
Rebel Drive	REBEL	9,430	257	257	0%	257	0%
South 56 th Street	56THA	8,265	179	179	0%	179	0%
South 53 rd Street	S53RD	7,195	178	178	0%	178	0%
Private Drive	R22	6,120	275	275	0%	275	0%
Private Drive	R22	5,670	275	275	0%	275	0%
Southwest Tributary							
South 40 th Street	S2T	500	233	419	80%	419	80%
Southcentral Trib.							
New Castle Road	CLV310	310	164	164	0%	164	0%
Southeast Tributary							
Rokeby Road	201	464	243	206	-15%	134	-45%
Northwest Tributary							
Yankee Hill Road	YANKB	5,700	167	167	0%	167	0%
South 40 th Street	40THA	3,875	253	332	31%	332	31%
Saltillo Road	SALTIL	1,466	637	1,062	67%	1,037	63%
So. 38 th St. (north)	S38TH	7,280	322	428	33%	408	27%
So. 38 th St. (south)	S5E	3,706	120	203	69%	59	-51%

**Table ES-3
100-Year Peak Flow Rate Values at Selected Locations**

Mainstem							
Rokeby Road	202	25,159	537	517	-4%	51	-91%
South 66 th Street	66 TH	24,449	535	516	-4%	51	-90%
South 56 th Street	56THB	20,036	2,004	1,992	-1%	1,411	-30%
Cromwell Road	NODE62	17,440	2,668	2,639	-1%	2,050	-23%
South 40 th Street	40THB	12,655	3,933	4,031	2%	3,212	-18%
Tributary Confluence	NODE25	8,707	5,734	6,217	8%	5,138	-10%
Rokeby Road	ROKEBY	6,395	6,141	6,934	13%	5,667	-8%
South 27 th Street	27THB	3,607	6,468	7,564	17%	5,927	-8%
BNSF Railroad	BNSF	2,600	6,441	7,495	16%	5,328	-17%
Salt Creek	R6A	2,491	6,441	7,574	18%	5,307	-18%
Northeast Tributary							
Rebel Drive	REBEL	9,430	1,075	1,075	0%	1,075	0%
South 56 th Street	56THA	8,265	1,042	1,042	0%	1,042	0%
South 53 rd Street	S53RD	7,195	830	830	0%	830	0%
Private Drive	R22	6,120	1,136	1,136	0%	1,136	0%
Private Drive	R22	5,670	1,136	1,136	0%	1,136	0%
Southwest Tributary							
South 40 th Street	S2T	500	762	1,175	54%	1,175	54%
Southcentral Trib.							
New Castle Road	CLV310	310	488	488	0%	488	0%
Southeast Tributary							
Rokeby Road	201	464	827	796	-4%	796	-4%
Northwest Tributary							
Yankee Hill Road	YANKB	5,700	639	639	0%	639	0%
South 40 th Street	40THA	3,875	814	929	14%	929	14%
Saltillo Road	SALTIL	1,466	2,454	3,485	42%	3,281	34%
So. 38 th St. (north)	S38TH	7,280	1,140	1,481	30%	1,253	10%
So. 38 th St. (south)	S5E	3,706	428	613	43%	467	9%

SOUTHEAST UPPER SALT CREEK WATERSHED PLAN

The Southeast Upper Salt Creek Watershed Plan evolved from a public process that examined two alternative concept master plans. Concept Plan A can be categorized as preserving the existing 100-year floodplain, while Concept Plan B can be categorized as preserving a 400-ft flood corridor within the 100-year floodplain, supplemented by stormwater storage facilities. **The Southeast Upper Salt Creek Watershed Plan reflects Concept Plan A.**

Concept Plan A - Preserve Existing Floodplain - \$8,424,000

The components of Concept Plan A include preservation of the existing 100-year floodplain from below South 70th Street to the Salt Creek floodplain delineated limits, construction of three detention facilities, construction of water quality wetlands in the preserved floodplain at subbasin outlets, use of bioengineering approaches to improve stream stability, and replacement of undersized bridges and culverts (see Figure ES-1, "Concept Plan A Potential Component Locations"). Refer to Figures MP-22A through MP-22o in the master plan document for site details, and to Table ES-4 for opinions of probable cost for Concept Master Plan A. This concept plan would meet the stormwater management goals established for this watershed, and would require 405 acres of land rights acquisition.

Concept Plan B - Preserve a Flood Corridor with Regional Storage Facilities - \$12,082,000

The components of Concept Plan B include preservation of a flood corridor from below South 70th Street to the Salt Creek Floodplain delineated limits, a 400-ft flood corridor below South 40th Street, preserving the existing flood corridor along streams upstream of South 40th Street and on the tributaries, construction of a regional storage facility west of South 40th Street on a tributary, construction of four other detention facilities, construction of water quality wetlands outside the preserved floodplain at subbasin outlets, use of bioengineering approaches to improve stream stability, and replacement of undersized bridges and culverts (see Figure MP-21 "Concept Plan B Potential Component Locations" in the master plan document). Refer to Figures MP-22A through MP-22o in the master plan document for site details, and to Table MP-23 in the master plan document for opinions of probable cost for Concept Master Plan B. The combination of stormwater storage, 400-ft flood corridor, and proposed bridges would provide a 100-year water surface profile similar to the water surface profile for preservation of the existing 100-year floodplain. This concept plan would require land rights acquisition of 396 acres of Tier 1 area. The loss of 100-year floodplain areas outside the minimum flood corridor with this concept would require an additional \$3.7 million to meet the water quality goals established for this watershed. Thus, Concept B would only be acceptable if private development were to complete the water quality improvements needed to offset the impacts to water quality caused by development.

Both Concept Plan A and Concept Plan B would meet the goals to preserve stream bed and banks that are stable and improve stability of those at risk, reduce flood hazard to existing and future buildings and infrastructure, provide opportunities for multi-purpose use potential, and preserve or restore instream or riparian habitat. However, Concept Plan B would be significantly more expensive, estimated to cost \$3.7 million more than Concept Plan A to provide the same relative water quantity and quality benefits. Concept Plan A allows for protection of the 100-year floodplain and the construction of water quality wetlands in the lower portion of the subbasins. In doing so, Concept Plan A meets all of the stormwater management goals established for this watershed at a significantly lower cost than the alternative plan; thus, was the alternative recommended for the SEUSC Watershed Master Plan.

Capital project components identified in the master plan are generally included in order to meet City of Lincoln design standards and/or to accommodate future urban growth projected for the basins in the SEUSC Watershed. In some cases, the magnitude of the project also reflects the results of more detailed hydrologic and hydraulic modeling completed with HEC-1 and HEC-RAS. It is recognized that prior to areas within the watershed being annexed to the City, the county may have a need to construct improvements in these locations, and that these locations may not reflect the standards identified in the master plan. In these cases, it is anticipated that such components would be upgraded in the future by the City of Lincoln.

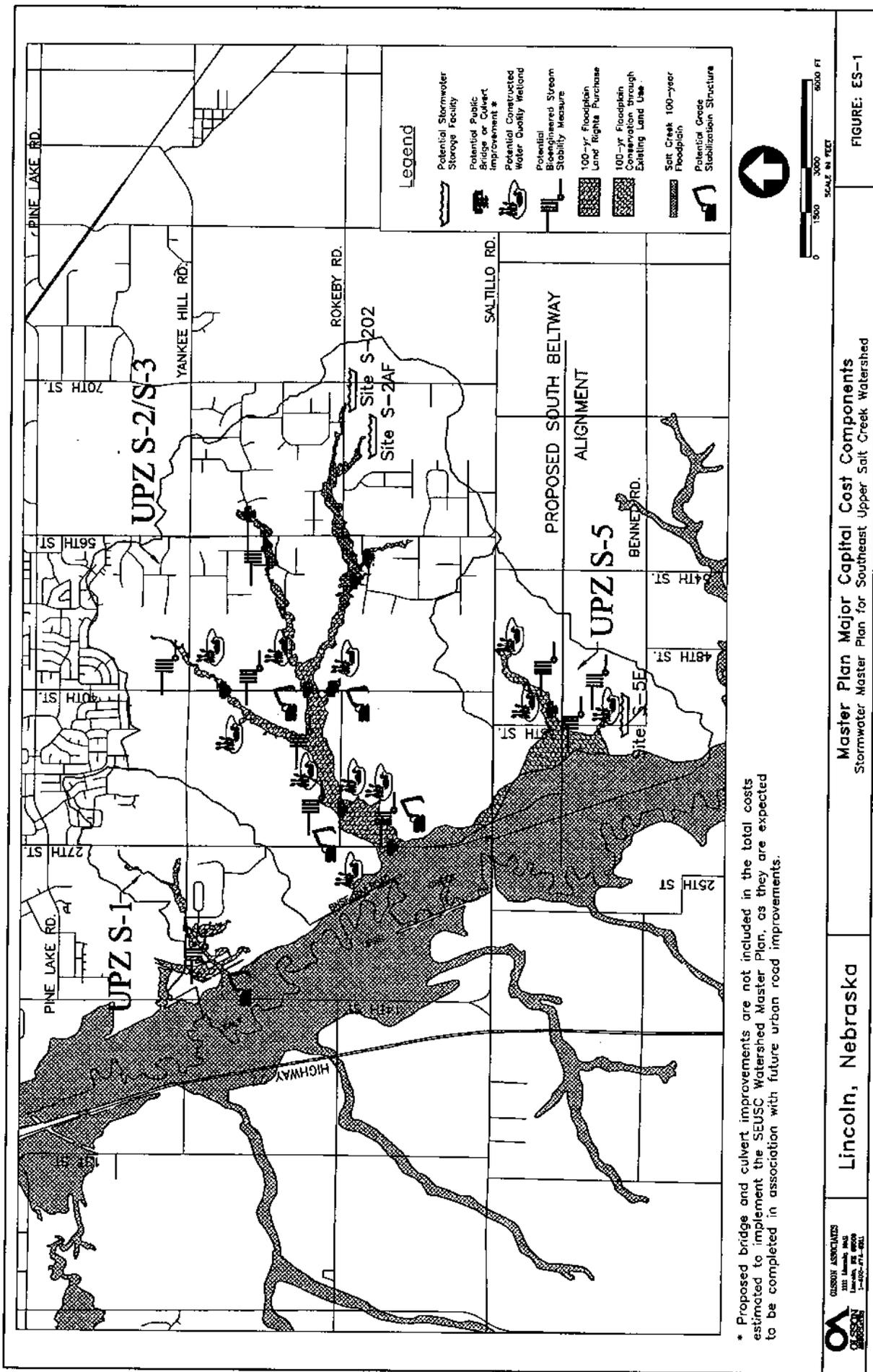
Estimated costs for potential bridge and culvert improvements are not included within the total costs estimated to implement the SEUSC Watershed Master Plan. Drainage improvements associated with arterial streets are anticipated to be completed with road projects as urban standards are met when these streets are improved from a rural to an urban cross-section in the future. Likewise, improvements associated with local streets within existing acreage developments are expected to occur when street improvements are made to these areas in the future. For information purposes, estimated costs for bridge and culvert improvements are included in Table MP-15 on pages 108-109, but these costs are not included within total costs listed in the SEUSC Master Plan Performance Matrix on page ES-5 and page 125.

Those areas identified as Low Density Residential in the Future Land Use Plan are already developed, and are expected to remain low density residential even beyond the 25-year planning period. While there may be individual 3-acre parcels in this area which are subdivided in the future, no significant redevelopment of this area into urban land use is anticipated. The Master Plan assumes that the 100-year floodplain within Low Density Residential areas is at low risk of being impacted by future land subdivisions, which would be anticipated to be generally compatible with continued preservation of the floodplain. Thus, costs for acquisition of 100-year floodplain within Low Density Residential areas is not included within the costs identified for implementation of the Master Plan. A more detailed comparison of Concept Plans A and B can be found in the Concept Master Plan Alternatives section, which begins on page 120.

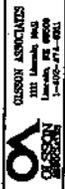
**Table ES-4
SEUSC Master Plan Performance Matrix**

Objective	Master Plan Component	Recommended Plan			
		Performance			Cost
		High	Med	Low	
Stream Stability					
Maintain existing flood profiles	Preserve floodplain to limits of existing 100-year flood	X			n/a
Preserve stream geomorphology	Preserve floodplain to limits of existing 100-year flood	X			n/a
Increase stream bed and bank stability	Apply bioengineering approach for stream bed and bank stability measures	X			\$2,633,000
Subtotal					\$2,633,000
Flood Hazard Reduction					
Determine flood hazard and reduce hazard for existing development	Build sites S-202, S-2AF and S-5E	X			\$1,604,000
	Build on-site detention				\$0
Reduce hazard to future development	Preserve floodplain to limits of existing 100-year flood	X			\$3,420,000
Reduce public responsibility for flood damage repair	Encourage flood hazard insurance for homes and buildings in the 100-year floodprone area		X		
Determine incremental impact of subdivisions	Require submittal of hydrologic and hydraulic analysis in a consistent format for use by PW&U	X			\$0
Subtotal					\$5,024,000
Multi-Purpose Use Potential					
Provide components that facilitate multiple use	Preserve a corridor wide enough to accommodate hiker/biker paths and provide opportunity for riparian wildlife habitat	X			n/a
Subtotal					\$0
Water Quality Improvement					
Remove urban pollutants	Construct water quality wetlands	X			\$767,000
Restore stream to pre-agricultural alignment	Provides adequate room if desired for restoration	X			
Improve instream habitat		X			
Loss of riparian habitat due to development in the floodplain	Preserve a corridor wide enough to provide opportunity for riparian wildlife habitat	X			
Subtotal					\$767,000
Funding					
Provide components that enhance likelihood of funding	Water quality wetlands and preserving existing 100-year floodplain enhance NET Fund and NDEQ § 319 Fund eligibility	X			
Total Master Plan Opinion of Probable Costs					\$8,424,000

Estimated costs for potential bridge and culvert improvements are not included within the total costs estimated to implement the SEUSC Watershed Master Plan. Drainage Improvements associated with arterial streets are anticipated to be completed with road projects as urban standards are met when these streets are improved from a rural to an urban cross-section in the future. Likewise, improvements associated with local streets within existing acreage developments are expected to occur when street improvements are made to these areas in the future. For information purposes, estimated costs for bridge and culvert improvements are included in Table MP-15 on pages 108-109, but these costs are not included within total costs listed in the SEUSC Master Plan Performance Matrix on page ES-5 and page 125.



* Proposed bridge and culvert improvements are not included in the total costs estimated to implement the SEUSC Watershed Master Plan, as they are expected to be completed in association with future urban road improvements.



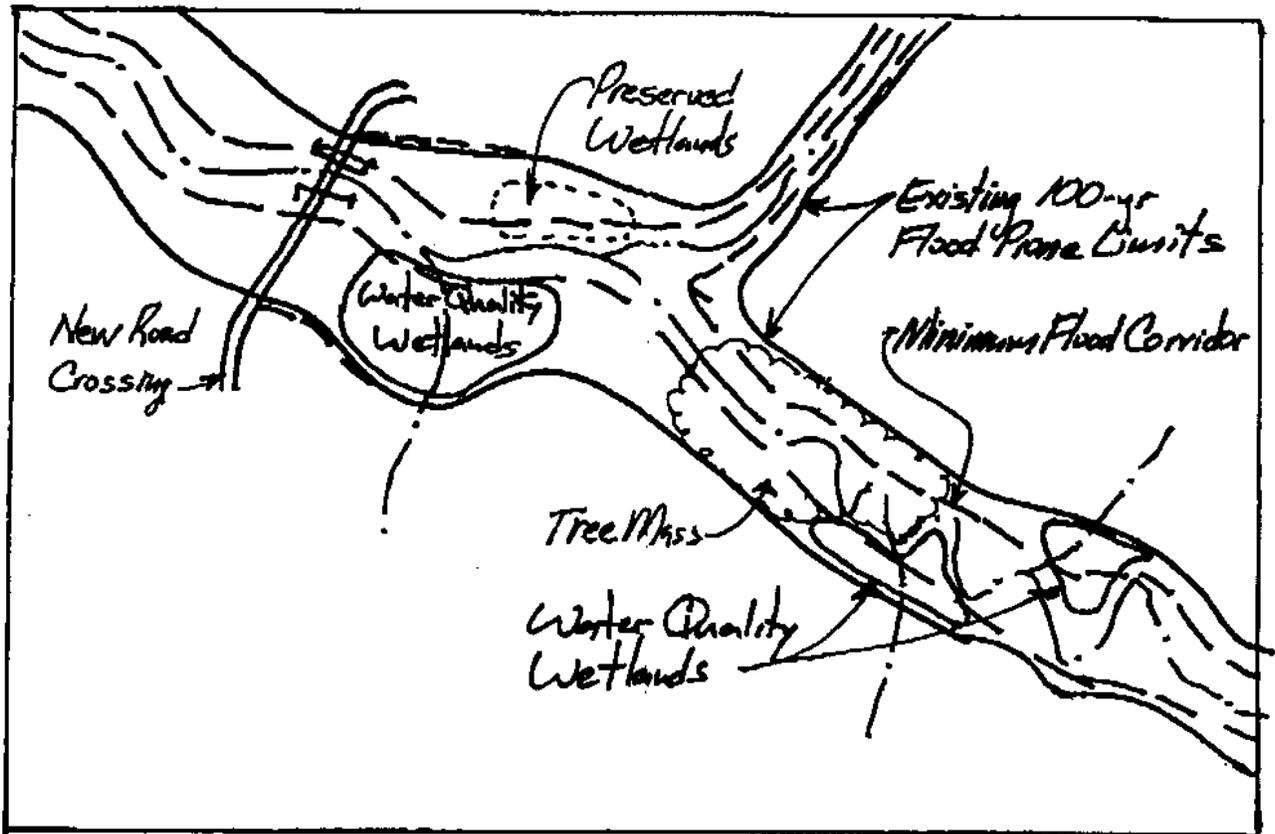
Lincoln, Nebraska

Master Plan Major Capital Cost Components
Stormwater Master Plan for Southeast Upper Salt Creek Watershed

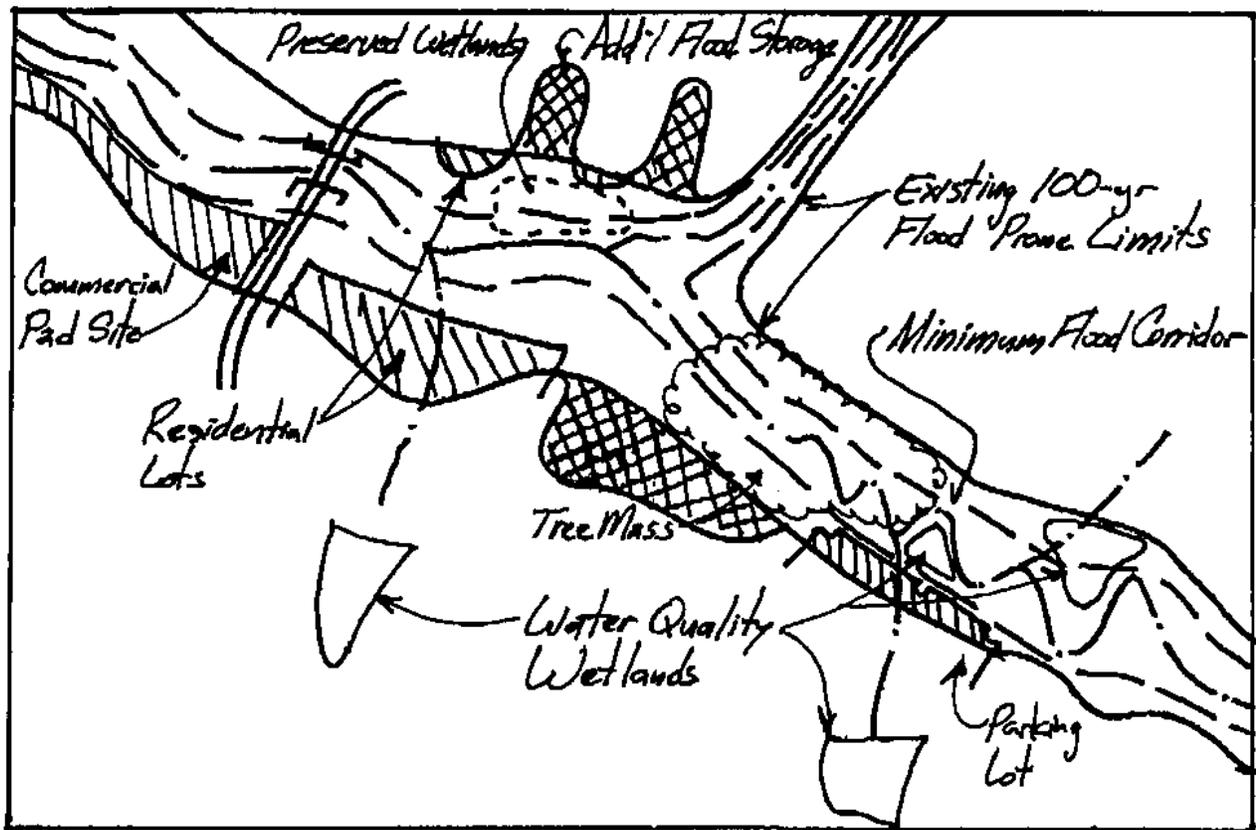
FIGURE: ES-1

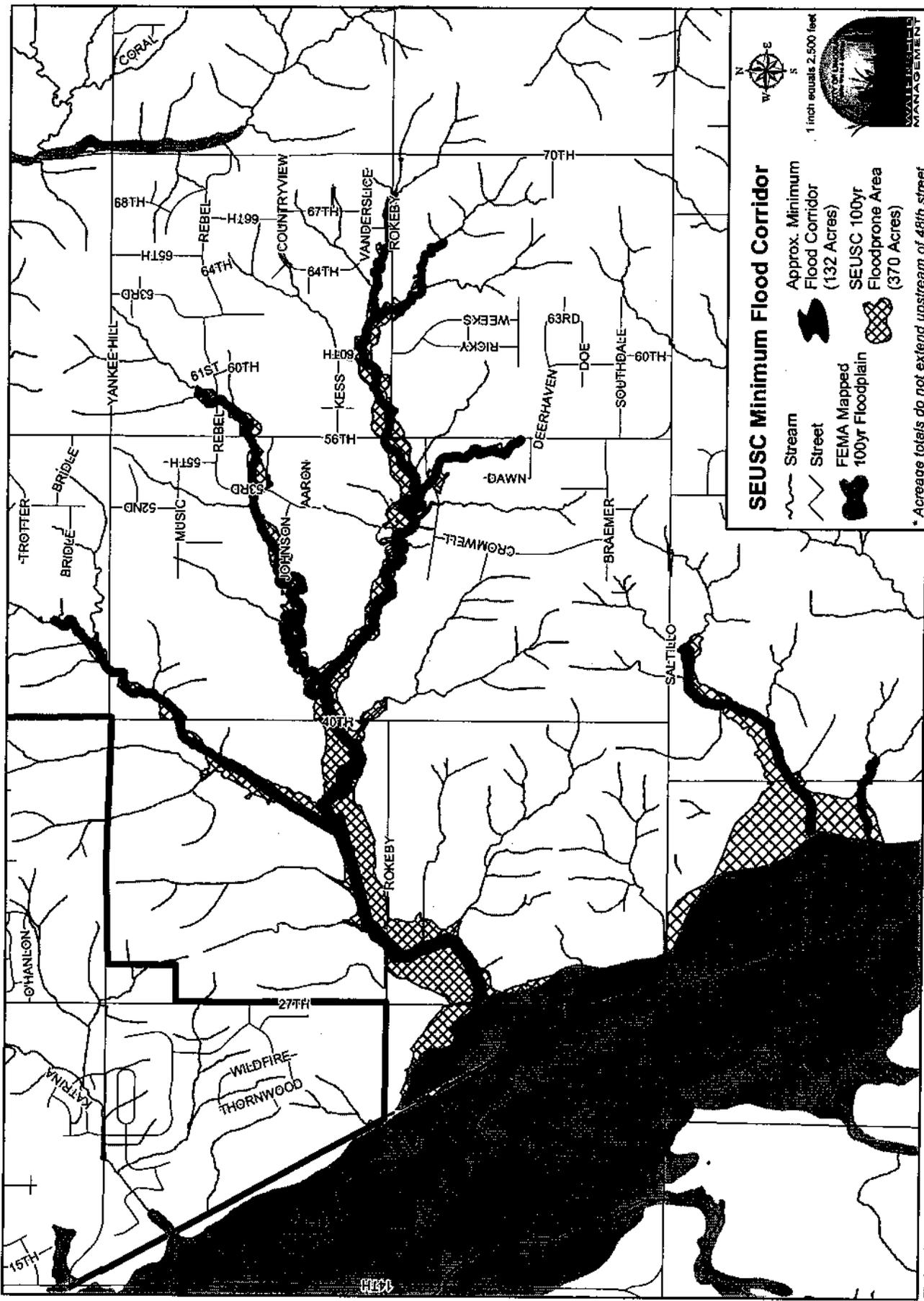
-ES6-

Master Plan 'A'



Master Plan 'C'





File Location: N:\WSMG\SWMS\DLR\SEUSC

**PUBLIC WORKS AND
UTILITIES DEPARTMENT**



MEMORANDUM

Date: June 11, 2003

To: Planning Commission

From: Nicole Fleck-Tooze 

Subject: *Southeast Upper Salt Creek Watershed Master Plan
Comprehensive Plan Proposed Amendment #4*

cc: Allan Abbott, Ben Higgins, Devin Biesecker - PW/U Dept.
Marvin Krout, Kent Morgan, Steve Henrichsen - Planning Dept.
Rick Peo - Law Dept.
Glenn Johnson - Lower Platte South NRD
John Cambridge - HDR
Daryoush Razavian - Olsson Associates
Mark Hunzeker - Pierson Fitchett
Brian Carstens - Carstens and Associates
Mike Rierden - Rierden Law Offices

As a result of conversations with multiple landowners in the Southeast Upper Salt Creek (SEUSC) Watershed, the Public Works and Utilities Department and Lower Platte South NRD propose a revision to the Executive Summary of the SEUSC Master Plan, by adding the following additional paragraph to the end of page ES4:

Concept Plan A, as reflected in the components of the Southeast Upper Salt Creek Watershed Plan, is intended to be a goal to provide guidance for future development and capital projects in the SEUSC watershed. Specific Master Plan components are identified to address the impacts of future development upon water quality, stream stability, and flood hazards. As the basin develops, individual sites are expected to utilize the Master Plan as a guide and to be in general conformance with the Plan. It is anticipated that encroachments into the floodplain may occur, as evaluated on a case by case basis, if the developer meets the spirit and intent of the Master Plan. This would include offsetting impacts of the development upon flood storage and conveyance, water quality, and stream stability.

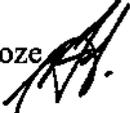
**PUBLIC WORKS AND
UTILITIES DEPARTMENT**



MEMORANDUM

Date: July 23, 2003

To: Planning Commission

From: Nicole Fleck-Tooze 

Subject: *Comprehensive Plan Amendment No. 03004
SE Upper Salt Creek Watershed Master Plan*

cc: Allan Abbott, Ben Higgins - PW/U Dept.
Daryoush Razavian - Olsson Associates
John Cambridge - HDR
Pierson Fitchett and Clients via Electronic Mail

Attached is a *work-in-progress* draft of revised text for the Executive Summary for the SE Upper Salt Creek (SEUSC) Watershed Master Plan, together with additional revisions proposed by Mark Hunzeker on behalf of landowners in the basin. This is being provided as an update for the Planning Commission. We are in the process of discussions with landowners regarding an alternative, "Concept C" approach for the Master Plan, but are still trying to reach some resolution on a couple of issues and the language to be used in the document.

We request a 2-week delay with continued public hearing on August 6th. Our expectation is to reach an agreement on the proposed revisions within the next two weeks and to ask that action be taken at the August 6th meeting.

SOUTHEAST UPPER SALT CREEK WATERSHED PLAN

The Southeast Upper Salt Creek Watershed Plan evolved from a public process during 2001 and 2002 which established goals and objectives and that examined two alternative concept master plans. Concept Plan A can be categorized as preserving the existing 100-year floodplain 100-year flood prone area, while Concept Plan B can be categorized as preserving a 400-ft flood corridor within the 100-year floodplain 100-year flood prone area, supplemented by stormwater storage facilities. **The Southeast Upper Salt Creek Watershed Plan reflects Concept Plan A.**

Concept Plan A - Preserve Existing Floodplain - \$8,424,000

The components of Concept Plan A include preservation of the existing 100-year floodplain 100-year flood prone area from below South 70th Street to the Salt Creek floodplain delineated limits, construction of three detention facilities, construction of water quality wetlands in the preserved floodplain at subbasin outlets, use of bioengineering approaches to improve stream stability, and replacement of undersized bridges and culverts (see Figure ES-1, "Concept Plan A Potential Component Locations"). Refer to Figures MP-22A through MP-22c in the master plan document for site details, and to Table ES-4 for opinions of probable cost for Concept Master Plan A. This concept plan would meet the stormwater management goals established for this watershed, and would require 405 acres of land rights acquisition.

Concept Plan B - Preserve a Flood Corridor with Regional Storage Facilities - \$12,082,000

The components of Concept Plan B include preservation of a flood corridor from below South 70th Street to the Salt Creek Floodplain delineated limits, a 400-ft flood corridor below South 40th Street, preserving the existing flood corridor along streams upstream of South 40th Street and on the tributaries, construction of a regional storage facility west of South 40th Street on a tributary, construction of four other detention facilities, construction of water quality wetlands outside the preserved floodplain at subbasin outlets, use of bioengineering approaches to improve stream stability, and replacement of undersized bridges and culverts (see Figure MP-21 "Concept Plan B Potential Component Locations" in the master plan document). Refer to Figures MP-22A through MP-22c in the master plan document for site details, and to Table MP-23 in the master plan document for opinions of probable cost for Concept Master Plan B. The combination of stormwater storage, 400-ft flood corridor, and proposed bridges would provide a 100-year water surface profile similar to the water surface profile for preservation of the existing 100-year floodplain 100-year flood prone area. This concept plan would require land rights acquisition of 396 acres of Tier 1 area. The loss of 100-year floodplain 100-year flood prone area areas outside the minimum flood corridor with this concept would require an additional \$3.7 million to meet the water quality goals established for this watershed. Thus, Concept B would only be acceptable if private development were to complete the water quality improvements needed to offset the impacts to water quality caused by development.

Both Concept Plan A and Concept Plan B would meet the goals to preserve stream bed and banks that are stable and improve stability of those at risk, reduce flood hazard to existing and future buildings and infrastructure, provide opportunities for multi-purpose use potential, and preserve or restore instream or riparian habitat. However, Concept Plan B would be significantly more expensive, estimated to cost \$3.7 million more than Concept Plan A to provide the same relative

water quantity and quality benefits. Concept Plan A allows for protection of the 100-year floodplain 100-year flood prone area and the construction of water quality wetlands in the lower portion of the subbasins. In doing so, Concept Plan A meets all of the stormwater management goals established for this watershed at a significantly lower cost than the alternative plan; thus, was the alternative recommended for the SEUSC Watershed Master Plan.

Following further discussion and negotiation with property owners in the watershed during the Spring/Summer of 2003, the Southeast Upper Salt Creek Watershed Plan was revised to include a new, alternative concept: Concept Plan C.

Concept Plan C is generally based upon implementation of the goals and components embodied by Concept Plan A. However, Concept C is also intended to provide an alternative approach to provide greater flexibility to development. Thus, Concept C allows for areas of encroachment into the 100-year floodplain 100-year flood prone area (outside of the required minimum flood corridor) if the spirit and the intent of the Master Plan is met and if floodplain encroachments are offset by measures to address impacts to flood storage and conveyance, water quality, and stream stability. The items below outline criteria for meeting these goals and objectives:

1. Flood Storage and Conveyance. Any development within the 100-year floodplain 100-year flood prone area is expected to offset impacts to both flood storage and conveyance.

Retention of flood storage means that encroachments into the 100-year floodplain 100-year flood prone area which cause a loss of flood storage and loss of attenuation are offset by providing a hydrologically equivalent volume of storage elsewhere in the watershed. This should be demonstrated using the HEC-H hydrologic model developed by the City and NRD for the Master Plan for the 2-, 10-, and 100-year storm events.

Retention of flood conveyance means that it is demonstrated that the development will cause no increase in the water surface elevation of the 100-year flood greater than five hundredths of a foot (0.05'). This should be demonstrated using the HEC-RAS hydraulic model developed by the City and NRD for the Master Plan for the 2-, 10-, and 100-year storm events.

Hydrologic and hydraulic conditions both upstream and downstream of the project area should be evaluated along the channel to the point where water surface profiles and stream flows consistently meet the existing conditions.

2. Water Quality. Encroachments into the 100-year floodplain 100-year flood prone area generally increase impervious surface area and decrease vegetation that acts as a filter for pollutants. Encroachments into the 100-year floodplain 100-year flood prone area also reduce the number of potential wetland sites. Water quality wetlands located outside the 100-year floodplain 100-year flood prone area are expected to capture and filter a smaller drainage area since the wetlands would be located further up the watershed, and site constraints are likely to reduce pollutant removal efficiencies. The costs to achieve the same water quality benefits that would be facilitated by preservation of the 100-year floodplain 100-year flood prone area (Concept Plan A) are expected to be up to \$1.9 million more than the cost to implement Plan A.

Impacts to water quality from encroachments into the 100-year floodplain 100-year flood prone area should be mitigated by construction of wetlands, or an alternative Best Management Practice where similar water quality functions can be demonstrated. Wetland surface areas should be designed and constructed based upon 1.5% to 3% of the watershed area and should capture runoff volume of 0.5 inches from impervious surfaces. Design of the wetland, including plant selection, residence time, depth, and sediment trapping efficiency, should be based upon the guidelines of the Master Plan and the Lincoln Drainage Criteria Manual for maximum pollutant removal.

3. **Stream Stability.** Impacts to stream stability and geomorphology caused by encroachment into the 100-year floodplain 100-year flood prone area and resulting increases in velocity, flow, or duration of flow should be offset. Impacts to stream stability caused by encroachments into the 100-year floodplain 100-year flood prone area should be evaluated for the 1-, 2-, and 5-year storm events based upon the erosion forecast due to the action of water, as outlined in the Master Plan. Figure MP-1, "Allowable Velocities," should be utilized in conjunction with soil information from the Lancaster County Soil Survey to select correction factors for flow depth, sediment concentration, flow frequency, channel curvature, bank slope, and channel boundary soil properties. Selection of stream management alternatives to mitigate impacts to stream stability should be guided by the use of professionally accepted and widely used stream classification and restoration methods such as the Rosgen and NRCS methods outlined in the Master Plan.

Watershed projects are prioritized within and between master plans for individual basins. Available master plan funding identified for the implementation of Concept A components of this master plan may be considered on a case by case basis for utilization on alternative measures developed through Concept C. Public funding for alternative Concept C measures would be possible when those measures are deemed to be in the public interest, provide beneficial functions similar to Concept A measures, and when the cost, when considered on a watershed basis, does not exceed the cost to implement Concept A.

Capital project components identified in the master plan are generally included in order to meet City of Lincoln design standards and/or to accommodate future urban growth projected for the basins in the SEUSC Watershed. In some cases, the magnitude of the project also reflects the results of more detailed hydrologic and hydraulic modeling completed with HEC-1 and HEC-RAS. It is recognized that prior to areas within the watershed being annexed to the City, the county may have a need to construct improvements in these locations, and that these locations may not reflect the standards identified in the master plan. In these cases, it is anticipated that such components would be upgraded in the future by the City of Lincoln.

Estimated costs for potential bridge and culvert improvements are not included within the total costs estimated to implement the SEUSC Watershed Master Plan. Drainage improvements associated with arterial streets are anticipated to be completed with road projects as urban standards are met when these streets are improved from a rural to an urban cross-section in the future. Likewise, improvements associated with local streets within existing acreage developments are expected to occur when street improvements are made to these areas in the future. For information purposes, estimated costs for bridge and culvert improvements are included in Table MP-15 on pages 108-

109, but these costs are not included within total costs listed in the SEUSC Master Plan Performance Matrix on page ES-5 and page 125.

Those areas identified as Low Density Residential in the Future Land Use Plan are already developed, and are expected to remain low density residential even beyond the 25-year planning period. While there may be individual 3-acre parcels in this area which are subdivided in the future, no significant redevelopment of this area into urban land use is anticipated. The Master Plan assumes that the ~~400-year floodplain~~ 100-year flood prone area within Low Density Residential areas is at low risk of being impacted by future land subdivisions, which would be anticipated to be generally compatible with continued preservation of the floodplain. Thus, costs for acquisition of ~~400-year floodplain~~ 100-year flood prone area within Low Density Residential areas is not included within the costs identified for implementation of the Master Plan. A more detailed comparison of Concept Plans A and B can be found in the Concept Master Plan Alternatives section which begins on page 120.

**Text Submitted by Mark Hunzeker 7/21/03
Replace Para Following Exec Summ Item 3
SE Upper Salt Creek Master Plan**

Concept Plan C is intended to provide flexibility to landowners and developers. Its general purpose is to allow those who wish to minimize the land area which would be left vacant under Concept A to implement the goals of the Master Plan through alternative means.

Concept Plan C will permit placement of fill within areas identified as "flood prone" to the extent it can be accomplished without increasing the water elevation of a 1% frequency storm either upstream or downstream of the project area. Wetlands which are within the jurisdiction of the U.S. Army Corp of Engineers will remain subject to §404(b) permitting, and new water-quality enhancement wetlands contemplated by the Master Plan will be calculated sub-basin by sub-basin. Existing wetlands which are not filled will be counted toward the goal of 1.5 to 3 % of each sub-basin being dedicated to wetlands.

City funds identified for implementation of the Master Plan, whether for acquisition of conservation easements or establishment of water quality wetlands, will be made available to landowners to assist in the implementation of Concept Plan C, upon presentation and approval of a stormwater management plan for a project. It is understood that to the extent City funding is not available, some goals of the Master Plan may not be attained; however, all projects will be subject to the City's Stormwater Criteria Manual.

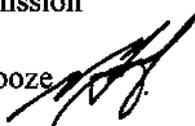
**PUBLIC WORKS AND
UTILITIES DEPARTMENT**



MEMORANDUM

Date: August 6, 2003

To: Planning Commission

From: Nicole Fleck-Tooze 

Subject: *Comprehensive Plan Amendment No. 03004
SE Upper Salt Creek Watershed Plan*

cc: Allan Abbott, Ben Higgins - Public Works & Utilities Dept.
Steve Henrichsen - Planning Dept.
Daryoush Razavian - Olsson Associates
John Cambridge - HDR
Pierson Fitchett and Clients via Electronic Mail

Attached is a draft of revised text for the Executive Summary for the SE Upper Salt Creek Watershed Master Plan based upon further discussion with Mark Hunzeker and Peter Katt representing landowners in the basin. We are hopeful that this represents an agreement regarding language to provide flexibility through an alternative 'Concept C' approach, though we have not received confirmation that there is a consensus among the parties represented.

This language was provided on July 31st to property owners in response to discussions held since the July 23rd Planning Commission meeting. **We are requesting a 2-week delay with continued public hearing on August 20th** in order to provide additional time to all parties and members of the public to review and comment on the proposed language.

EXECUTIVE SUMMARY

(DRAFT revisions to text of Executive Summary - SE Upper Salt Creek Watershed Plan)

Urban Planning Zones S-1, S-2, S-3 and a portion of S-5 have been identified as part of the Tier I growth area by the Lincoln-Lancaster County Comprehensive Plan. This means they are expected to become developed within the next 25 years. These Urban Planning Zones are called the Southeast Upper Salt Creek Watershed.

GOALS AND OBJECTIVES

Successful master planning for stormwater management involves identifying issues, establishing goals, and preparing a plan to meet those goals. Public involvement in each of these areas is key to developing support for the Master Plan. Recognizing this, four open houses were held by the City of Lincoln Public Works and Utilities Department and the Lower Platte South Natural Resources District. The purpose of these forums was to gather public input on existing conditions, present study findings on existing and projected conditions, present and receive feedback on potential proposed concept components, determine the degree of public support for those concepts, present opinions of probable costs and relative benefits of two concept master plan alternatives, and determine the preferred alternative.

Some of the key issues that were identified through the watershed master planning process follow:

- Stream stability and management of increased volume and runoff due to urbanization and development in the watershed
- Increased flood hazard and risk due to development in the floodplain
- Evaluation of runoff quantity and quality on wetlands and other environmental resources
- Road crossings, existing development in the floodplain and private property rights
- Funding and coordination with floodplain regulation review
- Evaluating and improving upland land use and water quality during and after development
- Management of runoff and drainage into Wilderness Park
- Lack of delineated floodplain in the watershed

The following goals were identified through the public involvement process:

- Preserve stream bed and banks that are stable, and improve stability of those at risk
- Reduce flood hazard to existing and future buildings and to infrastructure
- Coordinate components to provide multi-purpose use potential
- Improve water quality and preserve or restore instream and riparian habitat
- Identify funding opportunities

The recommended master plan components discussed in this report have been selected to attain those goals. They have been analyzed to determine the degree to which they attain the goals and solve the problems, or take advantage of the opportunities presented in the Southeast Upper Salt Creek (SEUSC) Watershed.

EVALUATION

Stormwater Quality

Current threats to stormwater quality in the SEUSC Watershed are runoff from adjacent crop ground, sediment from stream bed bank erosion, and potential runoff from failed or poorly maintained individual sanitary septic systems. Projected conditions will exacerbate the water quality threats from adjacent land uses and increase stream bank erosion unless sufficient riparian buffers are established or preserved to filter pollutants from adjacent land uses and flow increases are mitigated. This could be accomplished by preserving the existing 100-year flood prone area or through a combination of regional detention and preserving a portion of the floodplain.

Stream Stability

Some channel bed erosion and bank sloughing is occurring near the mouth of the S-1 watershed west of 14th Street, and is evident in S-5 in the two artificial channels between South 38th Street and the BNSF Railroad ditch. The channel has scoured several feet in the southern channel. Stream velocities are at or above erosive velocities for existing and projected conditions. Development, to date, in the S-3 watershed has not caused significant stormwater impacts on downstream reaches because of the low density and low percent impervious area associated with large lot acreages. Some channel bed erosion and bank sloughing is occurring near the mouth of the S-2 watershed west of the BNSF Railroad.

Erosion caused by increased flow rates, and increased occurrence of bankfull conditions due to projected development, will increase if not adequately addressed. Land disturbance activities associated with projected development could also adversely affect surface water quality if appropriate Best Management Practices (BMPs) are not installed and maintained. A bioengineering approach is the preferred solution. If properly designed, it would be appropriate for most channel reaches.

Construction sites in the basin can be a significant source of erosion and sediment. Development in the upper portion of S-1 is currently underway. Erosion and sediment control plans have been prepared and implemented. Joint City of Lincoln and NRD education and enforcement efforts have increased citizen and developer awareness. Citizen and developer awareness has improved compliance with city, state, and federal erosion and sediment control regulations for development. Erosion and sediment control in the rest of the watershed will benefit from increased City of Lincoln and NRD staffing that will help education, compliance and enforcement activities required by the Municipal NPDES Permit.

Flooding Along Streams and Channels

The SEUSC Watershed is approximately 50% developed. New and pending developments near South 27th Street and Yankee Hill Road have been developed according to the 2000 Lincoln Drainage Criteria Manual (DCM), reducing the flood hazard to adjacent property.

The rest of the watershed has existing flood hazard concerns that will increase unless master plan components are built that mitigate the effects of projected development, see Table ES-4. Currently, nine houses and several empty lots are in or near the 100-year flood prone area. As the basin

develops, flow rates will increase 40-45% for the 2-year, 15-20% for the 10-year, and 10-20% for the 100-year events if floodplain storage outside of the required minimum flood corridor is eliminated, unless the lost storage is mitigated elsewhere in the watershed. Without intervention by application of stormwater management practices, the mainstem surface profiles between the BNSF Railroad and 40th Street would increase be 3 to 5 ft, which could result in flood damage and significantly higher road and bridge replacement or upgrade costs. Channel velocities and depth of flow will also increase, aggravating existing or instigating new channel stability problems in affected reaches.

Most bridges and culverts in the watershed are undersized and do not meet current hydraulic design standards. However, recently constructed bridges and culverts on arterials such as Yankee Hill Road and South 56th Street are not undersized. Other structures should be prioritized and replaced as opportunity presents itself. The proposed road dams on Rokeby Road near 70th Street would reduce flow rates in the upper portion of S-2/S-3 enough to reduce the flood hazard to the ten houses, bring one culvert into hydraulic compliance and reduce replacement costs slightly on another culvert on the mainstem. Tables ES-1, ES-2, and ES-3 show the 2-, 10-, and 100-year peak flow rate values at selected locations for existing, projected, and conditions based upon implementation of the Southeast Upper Salt Creek Watershed Plan.

The Southeast Upper Salt Creek Watershed Plan evolved from a public process during 2001 and 2002 which established goals and objectives and that examined two alternative concept master plans. Concept Plan A can be categorized as preserving the existing 100-year floodplain 100-year flood prone area, while Concept Plan B can be categorized as preserving a 400-ft flood corridor within the 100-year floodplain 100-year flood prone area, supplemented by stormwater storage facilities. **The Southeast Upper Salt Creek Watershed Plan reflects Concept Plan A.**

Concept Plan A - Preserve Existing Floodplain - \$8,424,000

The components of Concept Plan A include preservation of the existing 100-year floodplain 100-year flood prone area from below South 70th Street to the Salt Creek floodplain delineated limits, construction of three detention facilities, construction of water quality wetlands in the preserved floodplain at subbasin outlets, use of bioengineering approaches to improve stream stability, and replacement of undersized bridges and culverts (see Figure ES-1, "Concept Plan A Potential Component Locations"). Refer to Figures MP-22A through MP-22o in the master plan document for site details, and to Table ES-4 for opinions of probable cost for Concept Master Plan A. This concept plan would meet the stormwater management goals established for this watershed, and would require 405 acres of land rights acquisition.

Concept Plan B - Preserve a Flood Corridor with Regional Storage Facilities - \$12,082,000

The components of Concept Plan B include preservation of a flood corridor from below South 70th Street to the Salt Creek Floodplain delineated limits, a 400-ft flood corridor below South 40th Street, preserving the existing flood corridor along streams upstream of South 40th Street and on the tributaries, construction of a regional storage facility west of South 40th Street on a tributary, construction of four other detention facilities, construction of water quality wetlands outside the preserved floodplain at subbasin outlets, use of bioengineering approaches to improve stream stability, and replacement of undersized bridges and culverts (see Figure MP-21 "Concept Plan B Potential Component Locations" in the master plan document). Refer to Figures MP-22A through

MP-22o in the master plan document for site details, and to Table MP-23 in the master plan document for opinions of probable cost for Concept Master Plan B. The combination of stormwater storage, 400-ft flood corridor, and proposed bridges would provide a 100-year water surface profile similar to the water surface profile for preservation of the existing ~~400-year floodplain~~ 100-year flood prone area. This concept plan would require land rights acquisition of 396 acres of Tier 1 area. The loss of ~~400-year floodplain~~ 100-year flood prone area areas outside the minimum flood corridor with this concept would require an additional \$3.7 million to meet the water quality goals established for this watershed. Thus, Concept B would only be acceptable if private development were to complete the water quality improvements needed to offset the impacts to water quality caused by development.

Both Concept Plan A and Concept Plan B would meet the goals to preserve stream bed and banks that are stable and improve stability of those at risk, reduce flood hazard to existing and future buildings and infrastructure, provide opportunities for multi-purpose use potential, and preserve or restore instream or riparian habitat. However, Concept Plan B would be significantly more expensive, estimated to cost \$3.7 million more than Concept Plan A to provide the same relative water quantity and quality benefits. Concept Plan A allows for protection of the ~~400-year floodplain~~ 100-year flood prone area and the construction of water quality wetlands in the lower portion of the subbasins. In doing so, Concept Plan A meets all of the stormwater management goals established for this watershed at a significantly lower cost than the alternative plan; thus, was the alternative recommended for the SEUSC Watershed Master Plan.

Following further discussion and negotiation with property owners in the watershed during the Spring/Summer of 2003, the Southeast Upper Salt Creek Watershed Plan was revised to include a new, alternative concept: Concept Plan C.

Concept Plan C is generally based upon implementation of the goals and components embodied by Concept Plan A. However, Concept C is also intended to provide an alternative approach to provide greater flexibility to development. Thus, Concept C allows for areas of encroachment into the 100-year flood prone area (outside of the required minimum flood corridor) if the spirit and the intent of the Master Plan is met and if floodplain encroachments are offset by measures to address impacts to flood storage and conveyance, water quality, stream stability, multi-use/open space potential and riparian habitat as they relate to the Master Plan goals identified on Page ES1. The items below outline criteria for meeting these objectives:

- 1. Flood Storage and Conveyance.** Any development within the 100-year flood prone area is expected to offset impacts to both flood storage and conveyance.

Retention of flood storage means that encroachments into the 100-year flood prone area which cause a loss of flood storage and loss of attenuation are offset by providing a hydrologically equivalent volume of storage elsewhere in the watershed. This should be demonstrated using the HEC-1 hydrologic model developed by the City and NRD for the Master Plan for the 2-, 10-, and 100-year storm events.

Retention of flood conveyance means that it is demonstrated that the development will cause no increase in the water surface elevation of the 100-year flood greater than five

hundredths of a foot (0.05'). This should be demonstrated using the HEC-RAS hydraulic model developed by the City and NRD for the Master Plan for the 2-, 10-, and 100-year storm events.

Hydrologic and hydraulic conditions both upstream and downstream of the project area should be evaluated along the channel to the point where water surface profiles and stream flows consistently meet the existing conditions.

- 2. Water Quality.** Encroachments into the 100-year flood prone area generally increase impervious surface area and decrease vegetation that acts as a filter for pollutants. Encroachments into the 100-year flood prone area also reduce the number of potential wetland sites. Water quality wetlands located outside the 100-year flood prone area are expected to capture and filter a smaller drainage area since the wetlands would be located further up the watershed, and site constraints are likely to reduce pollutant removal efficiencies. The costs to achieve the same water quality benefits that would be facilitated by preservation of the 100-year flood prone area (Concept Plan A) are expected to be up to \$1.9 million more than the cost to implement Plan A.

Impacts to water quality from encroachments into the 100-year flood prone area should be mitigated by construction of wetlands, or an alternative Best Management Practice (BMP) where similar water quality functions can be demonstrated. Wetland or BMP surface areas should be designed and constructed based upon the watershed area draining to the encroached flood prone area and should capture runoff volume of 0.5 inches from impervious surfaces. Design of the wetland or BMP, including plant selection, residence time, depth, and sediment trapping efficiency, should be based upon the guidelines of the Master Plan and the Lincoln Drainage Criteria Manual for maximum pollutant removal. These water quality measures are specifically intended to offset encroachments to the 100-year flood prone area and are in addition to water quality wetlands identified as Master Plan Major Capital Components on Figure ES-1.

- 3. Stream Stability.** Impacts to stream stability and geomorphology caused by encroachment into the 100-year flood prone area and resulting increases in velocity, flow, or duration of flow should be offset. Impacts to stream stability caused by encroachments into the 100-year flood prone area should be evaluated for the 1-, 2-, and 5-year storm events based upon the erosion forecast due to the action of water, as outlined in the Master Plan. Figure MP-1 "Allowable Velocities," should be utilized in conjunction with soil information from the Lancaster County Soil Survey to select correction factors for flow depth, sediment concentration, flow frequency, channel curvature, bank slope, and channel boundary soil properties. Selection of stream management alternatives to mitigate impacts to stream stability should be guided by the use of professionally accepted and widely use stream classification and restoration methods such as the Rosgen and NRCS methods outlined in the Master Plan.
- 4. Multi-Use/Open Space Potential and Riparian Habitat.** The Master Plan recognizes the opportunity provided by the continuous, linear nature of the flood prone areas to conserve and enhance riparian habitat, open space, and recreation. Open space/riparian areas may be public or private, and may include such uses as stormwater

detention or flood storage, active or passive recreation, commercial setbacks, riparian buffers, trails, and habitat corridors. Encroachments into the 100-year flood prone area should be balanced with conservation or enhancement of other flood prone areas for riparian habitat and open space uses.

Concept Plan C is intended to provide flexibility to landowners and developers. Its general purpose is to allow those who wish to minimize the land area which would be left undeveloped under Concept A to implement the goals of the Master Plan through alterative means.

Concept Plan C will permit placement of fill within areas identified as "flood prone" to the extent it can be accomplished without increasing the water surface elevation and the water flow of the 2-, 10-, or 100-year storm either upstream or downstream of the project area and can address water quality and stream stability impacts. Wetlands which are within the jurisdiction of the U.S. Army Corps of Engineers will remain subject to §404(b) permitting, and new water-quality enhancement wetlands contemplated by the Master Plan will be calculated sub-basin by sub-basin. The goal for implementing water quality wetlands identified on Figure ES-1 is expected to be met by distributing wetlands throughout the watershed so that the area of wetlands is, as much as possible, proportionate to that portion of the watershed within any single ownership. Existing wetlands which are not filled will be counted toward the goal of 1.5 to 3% of each sub-basin being dedicated to wetlands to the degree it is demonstrated they provide the same level of function as the water quality wetland projects identified in the Master Plan with regard to pollutant removal.

Public funds identified for implementation of the Master Plan, whether for acquisition of conservation easements, or establishment of water quality or stream stability measures, will be utilized to assist in the implementation of Concept Plans A or C. Consideration for public funding of alternative measures will be based upon the degree to which efforts are also made to balance flood prone area encroachments with the goals of the Master Plan.

Capital project components identified in the master plan are generally included in order to meet City of Lincoln design standards and/or to accommodate future urban growth projected for the basins in the SEUSC Watershed. In some cases, the magnitude of the project also reflects the results of more detailed hydrologic and hydraulic modeling completed with HEC-1 and HEC-RAS. It is recognized that prior to areas within the watershed being annexed to the City, the county may have a need to construct improvements in these locations, and that these locations may not reflect the standards identified in the master plan. In these cases, it is anticipated that such components would be upgraded in the future by the City of Lincoln.

Estimated costs for potential bridge and culvert improvements are not included within the total costs estimated to implement the SEUSC Watershed Master Plan. Drainage improvements associated with arterial streets are anticipated to be completed with road projects as urban standards are met when these streets are improved from a rural to an urban cross-section in the future. Likewise, improvements associated with local streets within existing acreage developments are expected to occur when street improvements are made to these areas in the future. For information purposes, estimated costs for bridge and culvert improvements are included in Table MP-15 on pages 108-109, but these costs are not included within total costs listed in the SEUSC Master Plan Performance Matrix on page ES-5 and page 125.

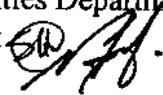
Those areas identified as Low Density Residential in the Future Land Use Plan are already developed, and are expected to remain low density residential even beyond the 25-year planning period. While there may be individual 3-acre parcels in this area which are subdivided in the future, no significant redevelopment of this area into urban land use is anticipated. The Master Plan assumes that the ~~400-year floodplain~~ 100-year flood prone area within Low Density Residential areas is at low risk of being impacted by future land subdivisions, which would be anticipated to be generally compatible with continued preservation of the floodplain. Thus, costs for acquisition of ~~400-year floodplain~~ 100-year flood prone area within Low Density Residential areas is not included within the costs identified for implementation of the Master Plan. A more detailed comparison of Concept Plans A and B can be found in the Concept Master Plan Alternatives section, which begins on page 120.



MEMORANDUM

Date: August 20, 2003

To: Planning Commission

From: Nicole Fleck-Tooze, Public Works & Utilities Department
Stephen Henrichsen, Planning Department 

Subject: *Comprehensive Plan Amendment No. 03004*
SE Upper Salt Creek Watershed Plan

cc: Allan Abbott, Ben Higgins - Public Works & Utilities Dept.
Glenn Johnson, Lower Platte South NRD
Daryoush Razavian - Olsson Associates
John Cambridge - HDR
Pierson Fitchett and Clients via Electronic Mail

Attached are the following items in regards to Southeast Upper Salt Creek Watershed Master Plan:

- 1) Revised staff report and recommendations:
- 2) Revised text for the Executive Summary for the SE Upper Salt Creek Watershed Master Plan

The revised text for the Executive summary is basically unchanged from the language that was provided to Planning Commission at your August 6th meeting. This draft has been under review by property owners and the public for a number of weeks. One minor change was made on page 5 of the draft in order to clarify the potential costs related to water quality measures associated with Concept C.

**Southeast Upper Salt Creek
Watershed Master Plan**

Applicant	Location	Proposal
Public Works and Utilities Department and Lower Platte South Natural Resources District	Generally the area between Salt Creek and S. 70 th Street, from Yankee Hill Road to south of Saltillo Road	(1) Adoption of the Southeast Upper Salt Creek Watershed Master Plan and (2) Amend Land Use Plan to designate land as Green Space along the 100 year flood prone corridor
<p>Recommendation: Approval <u>as Amended</u> The Southeast Upper Salt Creek Watershed Master Plan will provide guidance for future development in this area and will aid in protecting future land uses from storm damage. The <u>Master Plan amendment to the Land Use Plan</u> will provide guidance to future development as to the location of the area subject to a 100 year flood event that should be preserved <u>and measures to address the impact of any development within the 100 year flood prone area.</u></p>		

Status/Description

This amendment has two related parts proposed by the Public Works and Utilities Department and the Lower Platte South Natural Resources District (NRD):

- (1) Adoption of the **Southeast Upper Salt Creek Watershed Master Plan (SEUSC)** as an approved subarea plan of the Comprehensive Plan,
- ~~(2) Amend the Land Use Plan to change the designation of various properties shown as Urban Residential, Low Density Residential or Industrial to Green Space or Agricultural Stream Corridor to reflect the location of the 100 year flood prone area as identified in the SEUSC master plan.~~

This amendment would designate that area as "Green Space" or "Agricultural Stream Corridor" in order to encourage this area to remain predominately in open space uses in order to preserve the flood storage, flood conveyance and water quality benefits. Currently, the Plan notes the location of the streams and drainage ways in this subarea, but does not identify the floodplain area, since it had not been previously mapped by the Federal Emergency Management Agency (FEMA). The mapped 100 year flood prone area in the SEUSC is comparable to the FEMA 100 floodplain. The flood prone area will not officially be designated by FEMA as floodplain, though, until an official request for map revision has been filed, reviewed and approved by FEMA. One of the Floodplain Task Force recommendations is that floodplain information from watershed plans be consistently used in the administration of floodplain regulations.

Amended August 20, 2003

The "Green Space" is defined in the Plan on Page F-22 as an area that may have passive recreation uses but is predominately for active recreational uses, such as parks, golf courses or trails. It can be either public or privately owned. As implemented in this urban subarea, the green space could include passive open space, drainage ways, tree masses, yards, use as setback adjacent to commercial uses or in some circumstances, potentially even parking.

Comprehensive Plan Implications

On Page F 79-80, the Comprehensive Plan includes the following strategies:

"Develop a Watershed Management Master Plan for Lincoln and its future growth areas. Integrate existing neighborhoods and growth areas into watershed planning.

Utilize basin master plan **recommendations and components as analysis tools** to be referenced and compared with proposed development within the basin, and as a guide in the preparation of future capital improvement projects.

Future master planning efforts for largely undeveloped basins will rely more heavily on pro-active better management practice (BMP) measures and the **conservation of existing natural drainage features** to most effectively manage stormwater and floodplains. Designs of human made features should **seek to utilize bioengineering and other naturalized techniques**, incorporating trail systems and other linear park features where possible."

The SEUSC Master Plan covers the urban planning zones designated S-1, S-2, S-3, and a portion of S-5. The completion of the SEUSC Master Plan is the second step toward the development of a Watershed Management Master Plan for Lincoln and its future growth areas. This is a phased, multi-year project which is being completed basin by basin, and will ultimately be integrated into a comprehensive, unified Master Plan. The first step in the process was the completion and adoption of the Beal Slough Stormwater Master Plan, which is now identified as an approved subarea plan of the Comprehensive Plan.

Watershed master planning is important to identify needs for stormwater and floodplain management prior to future development, to provide a database of watershed information and a computer modeling system to be used as analysis tools, and to identify capital projects needed to address flood control, water quality, or stream stability issues in the watershed. Project components and recommendations are intended to be referenced during the review of development proposals and evaluated relative to their impact on the watershed. Master planning provides the opportunity to identify and reserve regional detention sites during early planning stages in advance of development. Master planning and the performance and adequacy of stormwater storage basins to prevent increases in peak flows will require continued assessment with the growth of the City, and upstream flood storage is critical to preventing further increases to the floodplain.

The SEUSC Master Plan watershed master plan evolved from a public process led by the City of Lincoln Public Works and Utilities Department and the Lower Platte South Natural Resource District. This process included four open houses and multiple meetings with land owners that were used to present findings, gather input, and receive feedback on proposed master plan components. Open houses were held on March 26, 2001; June 4, 2002; July 25, 2002; and October 10, 2002. Water quality, stream stability,

and flooding were three of the major topics addressed in the analysis and at the public meetings:

Stormwater Quality

The City is responsible for developing programs and projects to protect the quality of stormwater runoff and meet federal regulations for water quality under the National Pollutant Elimination System (NPDES) Permit issued to the City by the State of Nebraska. Projected pollutants from future urban runoff in this part of the watershed include sediment, nutrients such as nitrogen and phosphorus, heavy metals, and bacteria. Future conditions also project increased stream bank erosion unless sufficient riparian buffers are established or preserved to filter pollutants from adjacent land uses and flow increases are mitigated.

Stream Stability

Some channel bed erosion and bank sloughing is evident in selected locations within the watershed. However, erosion caused by increased flow rates and occurrence of bankfull conditions due to projected development is projected to increase if not adequately addressed. Channel velocities and depth of flow are projected to increase with loss of floodplain storage, aggravating or instigating new channel stability problems in affected reaches.

Flooding Along Streams and Channels

There are flood hazard concerns that will increase in the watershed unless master plan components are implemented that mitigate the effects of projected development. Currently, nine houses and several empty lots are in or near the 100-year floodprone area. As the basin develops, flow rates will increase for major storm events if floodplain storage is lost, increasing flood heights by 3-5 feet in the area between the BNSF Railroad and 40th Street.

Evaluation of Alternative Concepts

The SEUSC Watershed Master Plan examined two alternative concepts to address stormwater quality, stream stability, and flooding along streams:

Concept Plan A

Concept Plan A, which is reflected in the master plan and is the preferred concept, includes the preservation of the 100 year floodplain through the purchase of conservation easements below South 70th Street to Salt Creek. This concept also includes constructed wetlands to remove urban pollutants, detention facilities, and the use of bioengineering approaches to improve stream stability. Concept Plan A is estimated to cost \$8,425,000 to implement.

Concept Plan B

Concept Plan B was considered as an alternative during the evaluation process. It is not recommended for adoption in the master plan due to the cost and loss of water quality improvements. It included the preservation of a smaller flood corridor and the construction of a regional detention facility west of South 40th Street. The plan also included other detention facilities, water quality wetlands, and bioengineering approaches to improve stream stability. Concept Plan B was estimated to cost \$12,082,000 to implement. The loss of 100-year floodplain areas outside of a 400-foot flood corridor identified with this concept would require an additional \$3.7 million to meet the water quality goals established for this watershed as well as other measures to offset the storage lost outside the 400-foot flood corridor. Thus, **Concept Plan B would only be acceptable**

if private development were to complete the water quality improvements needed to offset the impacts to water quality caused by development.

The SEUSC Watershed Master Plan recommended for adoption reflects Concept Plan A and as amended, includes use of a new Concept C. While the cost of implementing the Master Plan will be significant, the up-front costs are much less than the future costs of stream degradation, increased flooding, and water quality degradation if the measures identified in the Plan are not taken. Also if Master Plan components are not completed up-front, there will be increased flooding, stream stability problems, and water quality degradation that will be unrecoverable.

Following further discussion and negotiation with property owners in the watershed during the Spring/Summer of 2003, the Southeast Upper Salt Creek Watershed Plan was revised to include a new, alternative concept: Concept Plan C.

The revised Watershed Study states that "Concept Plan C is generally based upon implementation of the goals and components embodied by Concept Plan A. However, Concept C is also intended to provide an alternative approach to provide greater flexibility to development. Thus, Concept C allows for areas of encroachment into the 100-year flood prone area (outside of the required minimum flood corridor) if the spirit and the intent of the Master Plan is met and if floodplain encroachments are offset by measures to address impacts to flood storage and conveyance, water quality, stream stability, multi-use/open space potential and riparian habitat as they relate to the Master Plan goals identified on Page ES1."

Conclusion

The goal of the proposed Master Plan is to protect the 100-year floodplain and to construct water quality wetlands in the lower portion of the sub-basin to improve water quality. These goals can be met by either Concept A or C. Concept C provides an alternative that can be used in some circumstances. Implementation of Concept C is compatible with the goals of the overall watershed study. The public costs of Concept A and C should be equal. In doing so, the proposed Plan meets all of the stormwater management goals established for this watershed at a significantly lower cost than the alternative concept B. The adoption of the SEUSC Watershed Master Plan as an approved component of the subarea plan is an important first step in its implementation. The Plan is anticipated to be implemented over a period of time with a combination of local funding (City and NRD), public/private partnerships, as well as state, federal and other grant resources. An approved Master Plan is the foundation needed to advance with funding alternatives.

Subarea plans in the Comprehensive Plan "offer greater details about the intended future of an area of the community — including land uses, infrastructure requirements, and development policies and standards." The SEUSC will provide guidance to future zoning and subdivision decisions.

~~This amendment would designate the 100 year flood prone area as "Green Space" in order to encourage this area to remain predominately in open space uses in order to preserve the flood storage capacity of the drainage way. The Green Space designation does remove some urban residential and potential industrial land from development. Initially, an amendment to the Land Use Plan was included in order to implement Concept A. In Concept A the primary land use in the 100 year flood prone area would be open space since this area would be subject to conservation easements. The change to the Land Use plan~~

has been deleted, since both Concept A and C are proposed for adoption. Under Concept C, some areas of the flood prone area might be developed, but in a manner that ~~However, it is important to~~ preserves the flood storage capacity of the 100 year flood prone area, as well as meeting the other goals of the master plan.

Amend the Comprehensive Plan as follows:

- ~~1. Amend the "Lincoln/Lancaster County Land Use Plan", figure on pages F23 and F25, to designate as "Green Space" and "Agricultural Stream Corridor" the 100 year flood prone area as shown on the attached map.~~
- ~~2-1.~~ Add the "Southeast Upper Salt Creek Watershed Master Plan, 2003" to the list of approved subarea plans on Page F 156.
- ~~3-2.~~ Add a new section to the end of the Watershed Management section on page F 80 as follows:

"The following watershed studies are adopted in order to provide guidance to watershed management activities within the basin:

- Stevens Creek Watershed Study and Flood Management Plan, 1998 (for rural watershed)
- Beal Slough Stormwater Master Plan, May 2000
- Southeast Upper Salt Creek Watershed Master Plan, 2003"

EXECUTIVE SUMMARY

Urban Planning Zones S-1, S-2, S-3 and a portion of S-5 have been identified as part of the Tier I growth area by the Lincoln-Lancaster County Comprehensive Plan. This means they are expected to become developed within the next 25 years. These Urban Planning Zones are called the Southeast Upper Salt Creek Watershed.

GOALS AND OBJECTIVES

Successful master planning for stormwater management involves identifying issues, establishing goals, and preparing a plan to meet those goals. Public involvement in each of these areas is key to developing support for the Master Plan. Recognizing this, four open houses were held by the City of Lincoln Public Works and Utilities Department and the Lower Platte South Natural Resources District. The purpose of these forums was to gather public input on existing conditions, present study findings on existing and projected conditions, present and receive feedback on potential proposed concept components, determine the degree of public support for those concepts, present opinions of probable costs and relative benefits of two concept master plan alternatives, and determine the preferred alternative.

Some of the key issues that were identified through the watershed master planning process follow:

- Stream stability and management of increased volume and runoff due to urbanization and development in the watershed
- Increased flood hazard and risk due to development in the floodplain
- Evaluation of runoff quantity and quality on wetlands and other environmental resources
- Road crossings, existing development in the floodplain and private property rights
- Funding and coordination with floodplain regulation review
- Evaluating and improving upland land use and water quality during and after development
- Management of runoff and drainage into Wilderness Park
- Lack of delineated floodplain in the watershed

The following goals were identified through the public involvement process:

- Preserve stream bed and banks that are stable, and improve stability of those at risk
- Reduce flood hazard to existing and future buildings and to infrastructure
- Coordinate components to provide multi-purpose use potential
- Improve water quality and preserve or restore instream and riparian habitat
- Identify funding opportunities

The recommended master plan components discussed in this report have been selected to attain those goals. They have been analyzed to determine the degree to which they attain the goals and solve the problems, or take advantage of the opportunities presented in the Southeast Upper Salt Creek (SEUSC) Watershed.

EVALUATION

Stormwater Quality

Current threats to stormwater quality in the SEUSC Watershed are runoff from adjacent crop ground, sediment from stream bed bank erosion, and potential runoff from failed or poorly maintained individual sanitary septic systems. Projected conditions will exacerbate the water quality threats from adjacent land uses and increase stream bank erosion unless sufficient riparian buffers are established or preserved to filter pollutants from adjacent land uses and flow increases are mitigated. This could be accomplished by preserving the existing 100-year flood prone area or through a combination of regional detention and preserving a portion of the floodplain.

Stream Stability

Some channel bed erosion and bank sloughing is occurring near the mouth of the S-1 watershed west of 14th Street, and is evident in S-5 in the two artificial channels between South 38th Street and the BNSF Railroad ditch. The channel has scoured several feet in the southern channel. Stream velocities are at or above erosive velocities for existing and projected conditions. Development, to date, in the S-3 watershed has not caused significant stormwater impacts on downstream reaches because of the low density and low percent impervious area associated with large lot acreages. Some channel bed erosion and bank sloughing is occurring near the mouth of the S-2 watershed west of the BNSF Railroad.

Erosion caused by increased flow rates, and increased occurrence of bankfull conditions due to projected development, will increase if not adequately addressed. Land disturbance activities associated with projected development could also adversely affect surface water quality if appropriate Best Management Practices (BMPs) are not installed and maintained. A bioengineering approach is the preferred solution. If properly designed, it would be appropriate for most channel reaches.

Construction sites in the basin can be a significant source of erosion and sediment. Development in the upper portion of S-1 is currently underway. Erosion and sediment control plans have been prepared and implemented. Joint City of Lincoln and NRD education and enforcement efforts have increased citizen and developer awareness. Citizen and developer awareness has improved compliance with city, state, and federal erosion and sediment control regulations for development. Erosion and sediment control in the rest of the watershed will benefit from increased City of Lincoln and NRD staffing that will help education, compliance and enforcement activities required by the Municipal NPDES Permit.

Flooding Along Streams and Channels

The SEUSC Watershed is approximately 50% developed. New and pending developments near South 27th Street and Yankee Hill Road have been developed according to the 2000 Lincoln Drainage Criteria Manual (DCM), reducing the flood hazard to adjacent property.

The rest of the watershed has existing flood hazard concerns that will increase unless master plan components are built that mitigate the effects of projected development, see Table ES-4. Currently, nine houses and several empty lots are in or near the 100-year flood prone area. As the basin

develops, flow rates will increase 40-45% for the 2-year, 15-20% for the 10-year, and 10-20% for the 100-year events if floodplain storage outside of the required minimum flood corridor is eliminated, unless the lost storage is mitigated elsewhere in the watershed. Without intervention by application of stormwater management practices, the mainstem surface profiles between the BNSF Railroad and 40th Street would increase be 3 to 5 ft, which could result in flood damage and significantly higher road and bridge replacement or upgrade costs. Channel velocities and depth of flow will also increase, aggravating existing or instigating new channel stability problems in affected reaches.

Most bridges and culverts in the watershed are undersized and do not meet current hydraulic design standards. However, recently constructed bridges and culverts on arterials such as Yankee Hill Road and South 56th Street are not undersized. Other structures should be prioritized and replaced as opportunity presents itself. The proposed road dams on Rokeby Road near 70th Street would reduce flow rates in the upper portion of S-2/S-3 enough to reduce the flood hazard to the ten houses, bring one culvert into hydraulic compliance and reduce replacement costs slightly on another culvert on the mainstem. Tables ES-1, ES-2, and ES-3 show the 2-, 10-, and 100-year peak flow rate values at selected locations for existing, projected, and conditions based upon implementation of the Southeast Upper Salt Creek Watershed Plan.

The Southeast Upper Salt Creek Watershed Plan evolved from a public process during 2001 and 2002 which established goals and objectives and that examined two alternative concept master plans. Concept Plan A can be categorized as preserving the existing ~~400-year floodplain~~ 100-year flood prone area, while Concept Plan B can be categorized as preserving a 400-ft flood corridor within the ~~400-year floodplain~~ 100-year flood prone area, supplemented by stormwater storage facilities. **The Southeast Upper Salt Creek Watershed Plan reflects Concept Plan A.**

Concept Plan A - Preserve Existing Floodplain - \$8,424,000

The components of Concept Plan A include preservation of the existing ~~400-year floodplain~~ 100-year flood prone area from below South 70th Street to the Salt Creek floodplain delineated limits, construction of three detention facilities, construction of water quality wetlands in the preserved floodplain at subbasin outlets, use of bioengineering approaches to improve stream stability, and replacement of undersized bridges and culverts (see Figure ES-1, "Concept Plan A Potential Component Locations"). Refer to Figures MP-22A through MP-22o in the master plan document for site details, and to Table ES-4 for opinions of probable cost for Concept Master Plan A. This concept plan would meet the stormwater management goals established for this watershed, and would require 405 acres of land rights acquisition.

Concept Plan B - Preserve a Flood Corridor with Regional Storage Facilities - \$12,082,000

The components of Concept Plan B include preservation of a flood corridor from below South 70th Street to the Salt Creek Floodplain delineated limits, a 400-ft flood corridor below South 40th Street, preserving the existing flood corridor along streams upstream of South 40th Street and on the tributaries, construction of a regional storage facility west of South 40th Street on a tributary, construction of four other detention facilities, construction of water quality wetlands outside the preserved floodplain at subbasin outlets, use of bioengineering approaches to improve stream stability, and replacement of undersized bridges and culverts (see Figure MP-21 "Concept Plan B Potential Component Locations" in the master plan document). Refer to Figures MP-22A through

MP-22o in the master plan document for site details, and to Table MP-23 in the master plan document for opinions of probable cost for Concept Master Plan B. The combination of stormwater storage, 400-ft flood corridor, and proposed bridges would provide a 100-year water surface profile similar to the water surface profile for preservation of the existing ~~100-year floodplain~~ 100-year flood prone area. This concept plan would require land rights acquisition of 396 acres of Tier 1 area. The loss of ~~100-year floodplain~~ 100-year flood prone area areas outside the minimum flood corridor with this concept would require an additional \$3.7 million to meet the water quality goals established for this watershed. Thus, Concept B would only be acceptable if private development were to complete the water quality improvements needed to offset the impacts to water quality caused by development.

Both Concept Plan A and Concept Plan B would meet the goals to preserve stream bed and banks that are stable and improve stability of those at risk, reduce flood hazard to existing and future buildings and infrastructure, provide opportunities for multi-purpose use potential, and preserve or restore instream or riparian habitat. However, Concept Plan B would be significantly more expensive, estimated to cost \$3.7 million more than Concept Plan A to provide the same relative water quantity and quality benefits. Concept Plan A allows for protection of the ~~100-year floodplain~~ 100-year flood prone area and the construction of water quality wetlands in the lower portion of the subbasins. In doing so, Concept Plan A meets all of the stormwater management goals established for this watershed at a significantly lower cost than the alternative plan; thus, was the alternative recommended for the SEUSC Watershed Master Plan.

Following further discussion and negotiation with property owners in the watershed during the Spring/Summer of 2003, the Southeast Upper Salt Creek Watershed Plan was revised to include a new, alternative concept: Concept Plan C.

Concept Plan C is generally based upon implementation of the goals and components embodied by Concept Plan A. However, Concept C is also intended to provide an alternative approach to provide greater flexibility to development. Thus, Concept C allows for areas of encroachment into the 100-year flood prone area (outside of the required minimum flood corridor) if the spirit and the intent of the Master Plan is met and if floodplain encroachments are offset by measures to address impacts to flood storage and conveyance, water quality, stream stability, multi-use/open space potential and riparian habitat as they relate to the Master Plan goals identified on Page ES1. The items below outline criteria for meeting these objectives:

- 1. Flood Storage and Conveyance.** Any development within the 100-year flood prone area is expected to offset impacts to both flood storage and conveyance.

Retention of flood storage means that encroachments into the 100-year flood prone area which cause a loss of flood storage and loss of attenuation are offset by providing a hydrologically equivalent volume of storage elsewhere in the watershed. This should be demonstrated using the HEC-1 hydrologic model developed by the City and NRD for the Master Plan for the 2-, 10-, and 100-year storm events.

Retention of flood conveyance means that it is demonstrated that the development will cause no increase in the water surface elevation of the 100-year flood greater than five