Section 3
Hydrologic Model Development

3.1 Introduction

The Hydrologic Investigation presents the methodology used to develop peak runoff rates for sub-basins within the City of Lincoln, Nebraska's (the City) future growth limits. For the South Salt Creek Watershed, the City's future growth limits were used to define the outer boundary of the hydrologic study area. The runoff rates developed are intended to provide developers with the pre-development flowrates. This section provides a brief description of the basin; the methodology used to determine the peak flowrate for each sub-basin; followed by the model results. The methodology section also presents the process used for basin delineation, the design rainfall and the determination of rainfall excess (runoff).

This section also presents the methodology and findings of a culvert analysis for selected culverts located within the Watershed. More information on the Hydrologic Model and culvert analysis is found in Appendix C.

3.2 Methodology

3.2.1 Sub-basin Delineation

The South Salt Creek Watershed, to the bounds of the future growth limits, was delineated into 90 sub-basins with an average area of 96.2 acres. Wagon Train Watershed adds an additional 14 sub-basins with an average area of 106.8 acres. A map showing the sub-basin boundaries is shown in Figure 3-1, with a more detailed breakdown following in Figure 3-2 through Figure 3-6. The sub-basin delineation was performed using ArcView, HEC-GeoHMS, and the digital elevation model (DEM) provided by the City. The HEC-GeoHMS tool is an extension within ArcView and uses the DEM to delineate sub-basins and to determine the overland flow path for each sub-basin.

Using the HEC-GeoHMS tool, the approximate locations for sub-basin outlets such as stream crossings, tributaries, and major lakes/ ponds were located using ArcView and available GIS data. The HEC-GeoHMS tool uses these points to automatically delineate the sub-basin boundaries based on the DEM. The automated process was then checked against contours and drainage structure locations.

Sub-basins within the South Salt Creek Watershed were given a unique alphanumeric name with the format SCBBB and within Wagon Train with the format WTBBB. "SC" is the two letter code for the South Salt Creek Watershed while "WT" is the two letter code for the Wagon Train Watershed. "BBB" is a three-digit sub-basin number.

Note: Several sub-basins are not located within the boundaries of South Salt Creek Watershed but were included in the report due to having portions of the South Salt area of interest within their basins. This is primarily small portions at the borders, but also includes a large portion at the northern edge of the watershed.

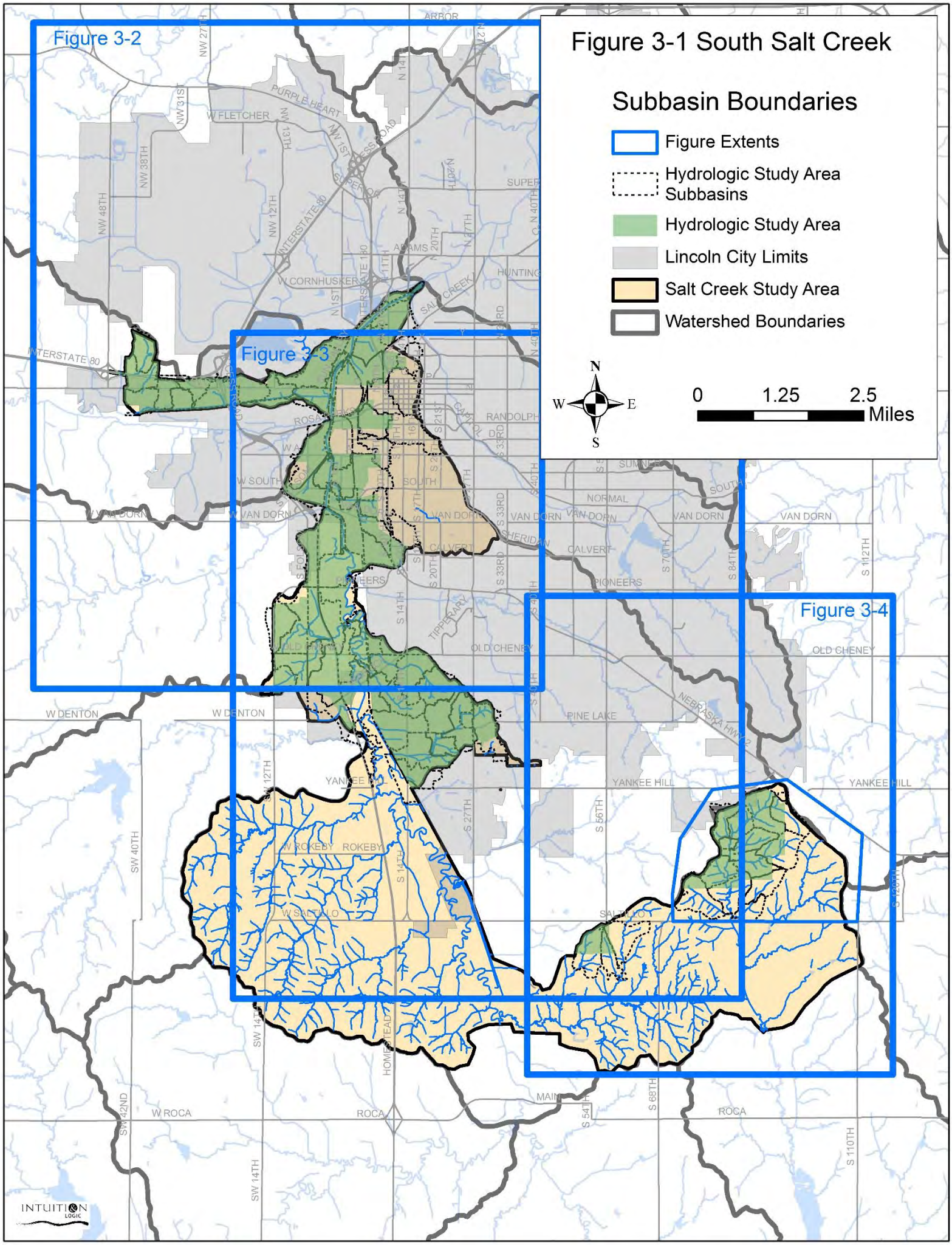
Figure 3-1 South Salt Creek
Subbasin Boundaries
Figure Extents
Hydrologic Study Area Subbasins
Hydrologic Study Area
Lincoln City Limits
Salt Creek Study Area
Watershed Boundaries
N
W
E
S
0
1.25
2.5
Miles
Figure 3-2
Figure 3-3
Figure 3-4
INTERSTATE 80
W FLETCHER
PURPLE HEART
W CORNHUSKER
SALT CREEK
RANDOLPH
W SOUTH
W VAN DORN
VAN DORN
NORMAL
CALVERT
PIONEERS
OLD CHENEY
W DENTON
PINE LAKE
NEBRASKA HWY 2
YANKEE HILL
W ROKEBY
ROKEBY
W SALTILLO
SALTILLO
W ROCA
ROCA
MAIN
INTUITION LOGIC

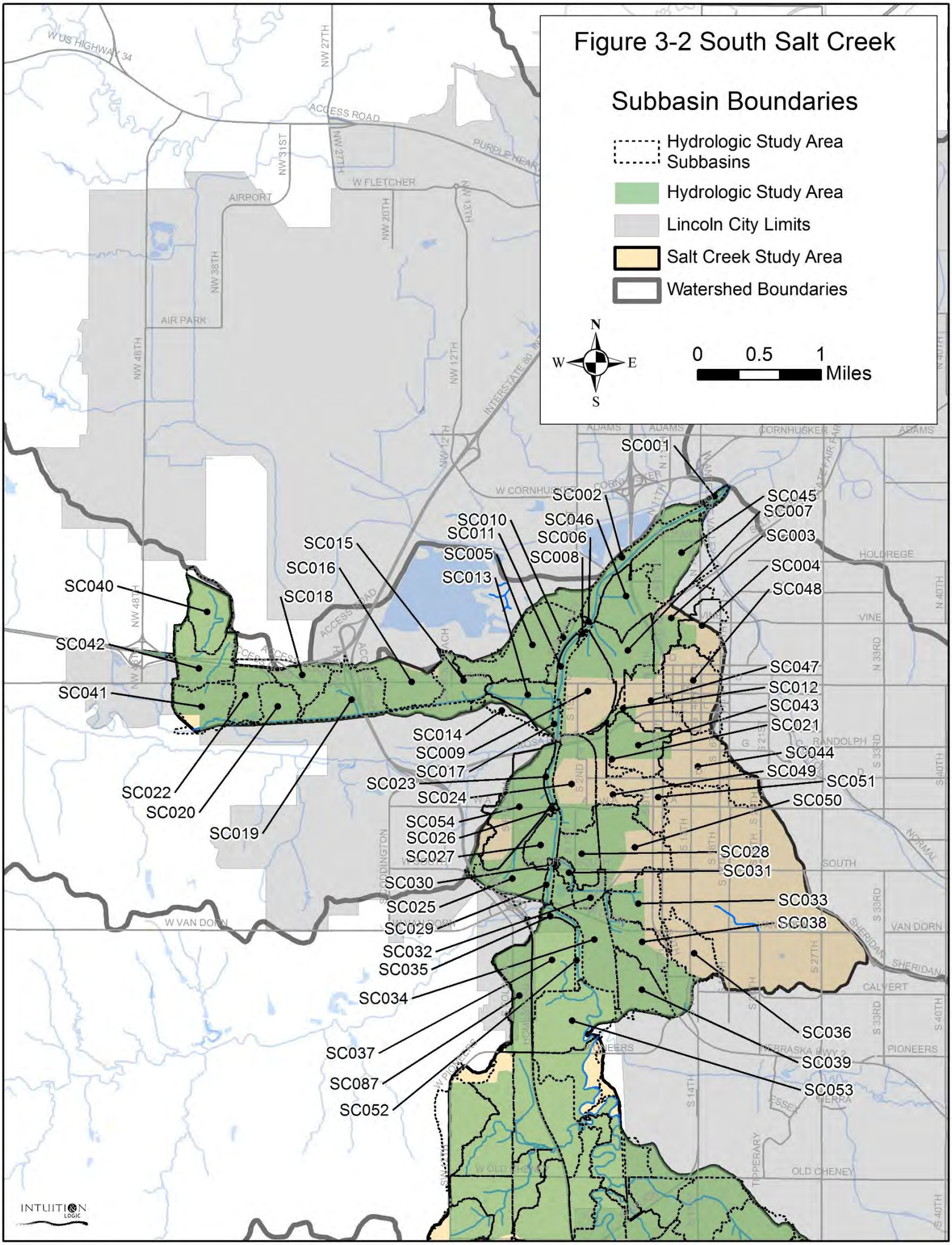
Figure 3-2 South Salt Creek
Subbasin Boundaries
Hydrologic Study Area Subbasins
Hydrologic Study Area
Lincoln City Limits
Salt Creek Study Area
Watershed Boundaries
N
W
E
S
0
0.5
1
Miles
SC001
SC002
SC003
SC004
SC005
SC006
SC007
SC008
SC009
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SC011
SC012
SC013
SC014
SC015
SC016
SC017
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SC042
SC043
SC044
SC045
SC046
SC047
SC048
SC049
SC050
SC051
SC052
SC053
SC054
SC087
W US HIGHWAY 34
ACCESS ROAD
PURPLE HEART
W FLETCHER
AIRPORT
AIR PARK
INTERSTATE 80
W CORNHUSKER
ADAMS
CORNHUSKER
HOLDREGE
VINE
RANDOLPH
SOUTH
VAN DORN
CALVERT
PIONEERS
OLD CHENEY
W VAN DORN
W OLD CHENEY
INTUITION LOGIC

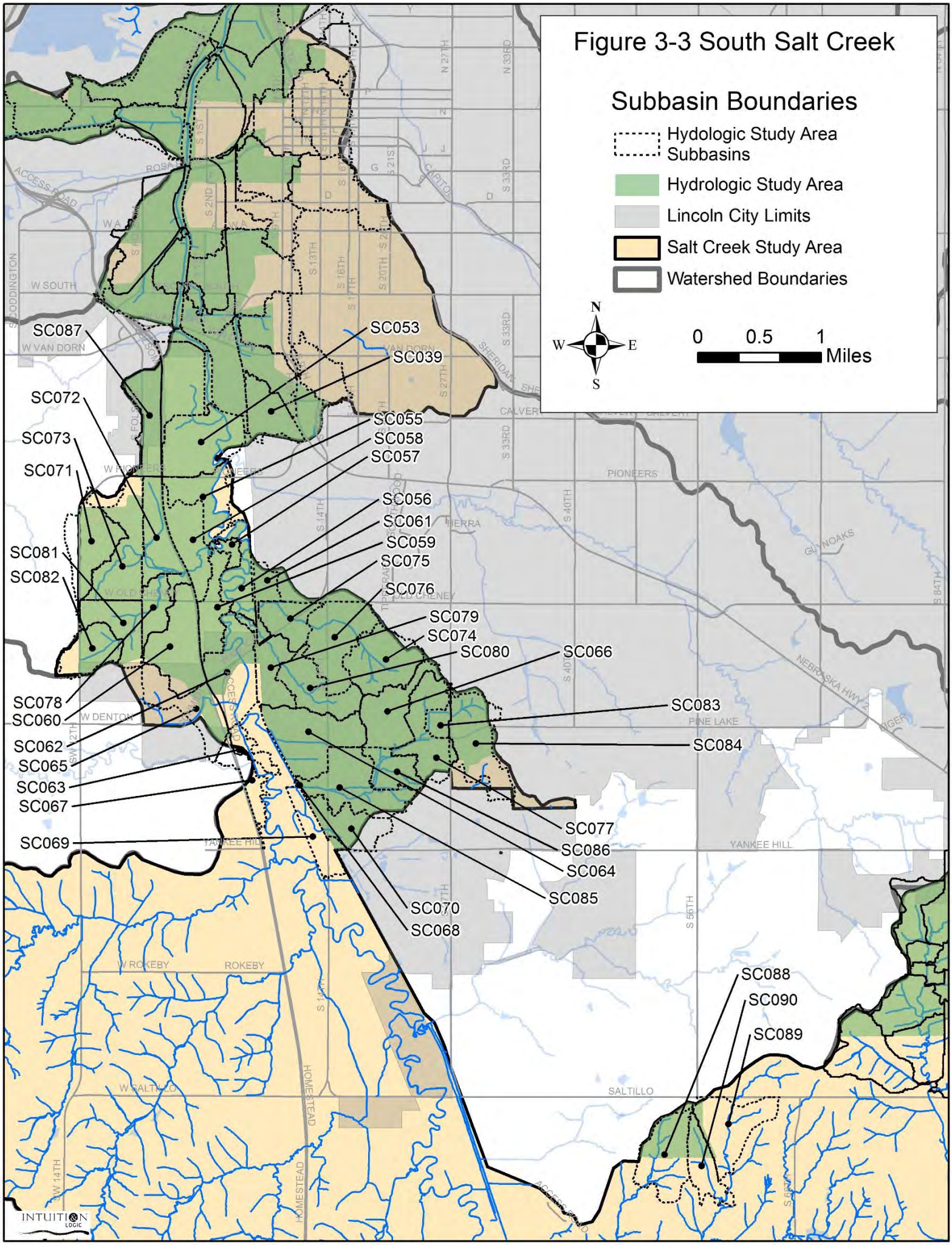
Figure 3-3 South Salt Creek
Subbasin Boundaries
Hydologic Study Area Subbasins
Hydrologic Study Area
Lincoln City Limits
Salt Creek Study Area
Watershed Boundaries
N
W
E
S
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1
Miles
SC087
SC053
SC039
SC072
SC055
SC073
SC058
SC057
SC071
SC056
SC061
SC059
SC081
SC075
SC082
SC076
SC079
SC074
SC080
SC066
SC078
SC083
SC060
SC084
SC062
SC065
SC063
SC067
SC077
SC069
SC086
SC064
SC085
SC070
SC068
SC088
SC090
SC089
W SOUTH
W VAN DORN
VAN DORN
PIONEERS
W PIONEERS
TIERRA
OLD CHENEY
W DENTON
PINE LAKE
YANKEE HILL
W ROKEBY
ROKEBY
W SALTILLO
SALTILLO
HOMESTEAD
ACCESS ROAD
NEBRASKA HWY 2
INTUITION LOGIC

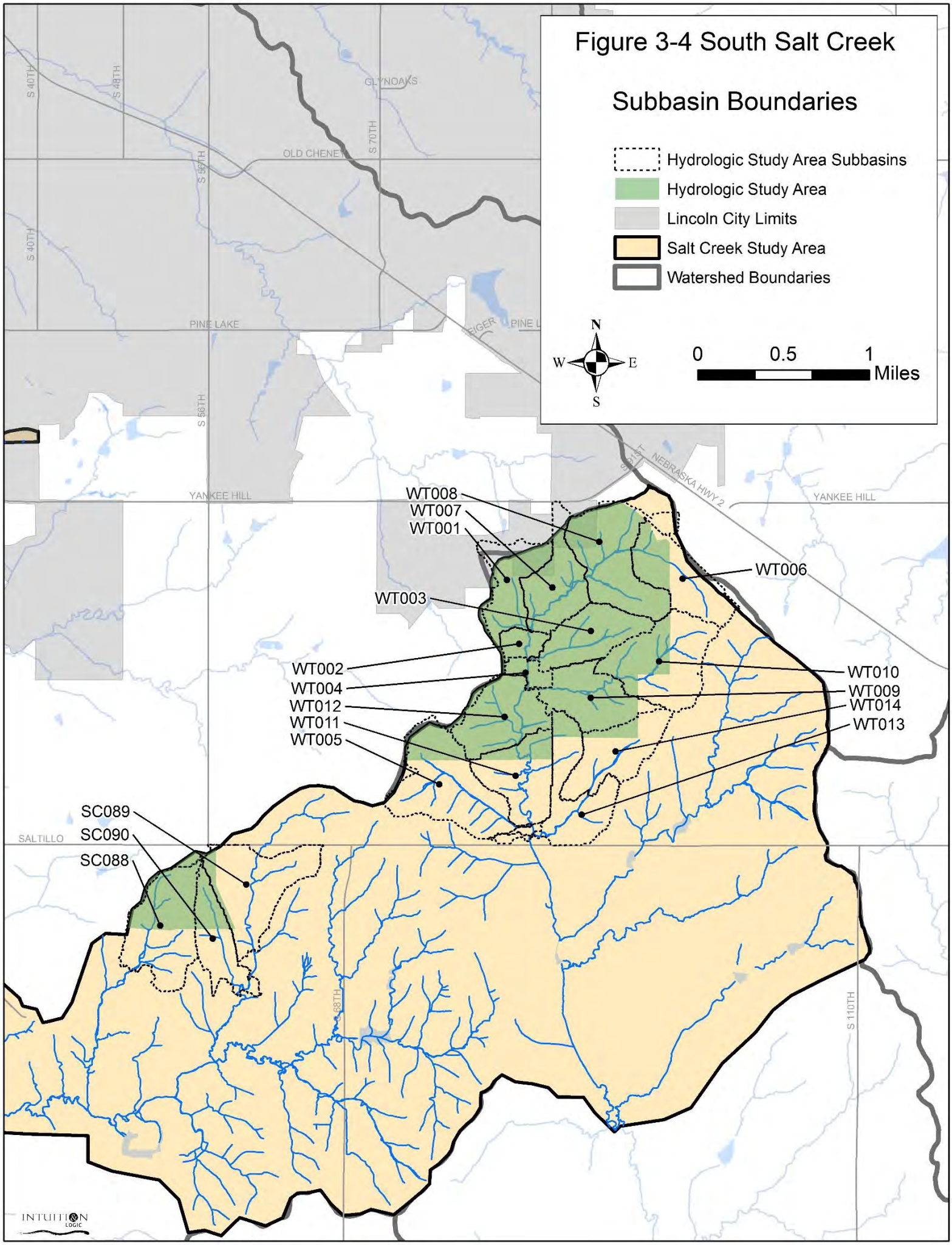
Figure 3-4 South Salt Creek
Subbasin Boundaries
Hydrologic Study Area Subbasins
Hydrologic Study Area
Lincoln City Limits
Salt Creek Study Area
Watershed Boundaries
N
W
E
S
0
0.5
1
Miles
GLYNOAKS
OLD CHENEY
PINE LAKE
YANKEE HILL
SALTILLO
NEBRASKA HWY 2
S 40TH
S 48TH
S 56TH
S 70TH
S 110TH
WT008
WT007
WT001
WT006
WT003
WT002
WT004
WT012
WT011
WT005
WT010
WT009
WT014
WT013
SC089
SC090
SC088
INTUITION LOGIC

3.2.2 Rainfall

The SCS Type II storm distribution was used to develop the 24-hr events of the 2-, 5-, 10-, 25-, 50-, 100-, and 500-yr storm events. Rainfall depths corresponding to these return periods were taken from the City's Drainage Criteria Manual (Rev May 10, 2004 edition) and are listed in Table 3.1 below. The 500 year rainfall depth is interpolated.

Table 3.1 Rainfall Depths

Return Period	Depth (in)
2-yr	3.00
5-yr	3.93
10-yr	4.69
25-yr	5.37
50-yr	6.00
100-yr	6.68
500-yr	8.17

3.2.3 Runoff Volume

The SCS Curve Number Loss method was used to calculate the volume of the runoff resulting from the corresponding design storms. The major factors that determine the runoff curve number (CN) are the hydrologic soil group, land cover type, and antecedent moisture condition.

The composite curve number for each basin was calculated using digitized maps of the existing land use and hydrologic soil group. The land use information describing the vegetation and use (agricultural, urban, etc.) of the Watershed was obtained from the City and is displayed in Figure 3-7. The Soil Survey Geographic (SSURGO) soil data was obtained from the Natural Resources Conservation Service (NRCS) and classifies the hydrologic soil groups found within the Watershed. The soil layer is displayed in Figure 3-8. Overlaying the land use and soil group information resulted in areas that represented a specific combination of one land use and one soil group. Using this combination and assuming a normal antecedent moisture condition (AMC II) a CN value was assigned using tables published by the NRCS. A lookup table defining the CNs used for each land use/soil group combination is displayed in Table 3.2. After assigning the CN values to each combination, the CN for each basin was calculated using an area-weighted average for each basin.

The SCS Method uses an initial abstraction value and composite curve number to estimate runoff volumes from each sub-basin for a particular design rainfall event.

Initial abstraction is defined as losses from rainfall before runoff begins. Initial abstraction is a function of the composite CN and is commonly calculated using Equation 3.1.

$$I_a = 0.2S \qquad \text{(Eq. 3.1)}$$

Where the maximum retention, S is computed as follows:

$$S = \frac{1000}{CN} - 10 \qquad \text{(Eq. 3.2)}$$

Table 3.2 Lookup table used to define the curve number for each land use/soil group combination

Land Use Description	Details	Hydrologic Soil Group		
		B	C	D
Commercial and Business Areas	85% IMP	92	94	95
Industrial Areas	72% IMP	88	91	93
Farmsteads		74	82	86
Lakes		100	100	100
Parking lots, Roofs, and other impervious areas	Paved Streets with Curbs and Inlets	98	98	98
	Paved with open ditches	89	92	93
	Gravel	85	89	91
Parks, Golf Courses, and other Open Areas	Fair	69	79	84
	Good	61	74	80
Soil Mining	Treated as Newly Graded Area	86	91	94
Brush	Poor	67	77	83
	Good	48	65	73
Row Crops, Straight	Good	78	85	89
Schools	38% IMP	75	83	87
Wetlands		98	98	98
Woods	Fair	60	73	79
	Good	55	70	77
Residential	1/8 acre-65% IMP	85	90	92
	1/4 acre-38% IMP	75	83	87
	1/3 acre-30% IMP	72	81	86
	1/2 acre-25% IMP	70	80	85
	1 acre-20% IMP	68	79	84
	2 acre-12% IMP	65	77	82

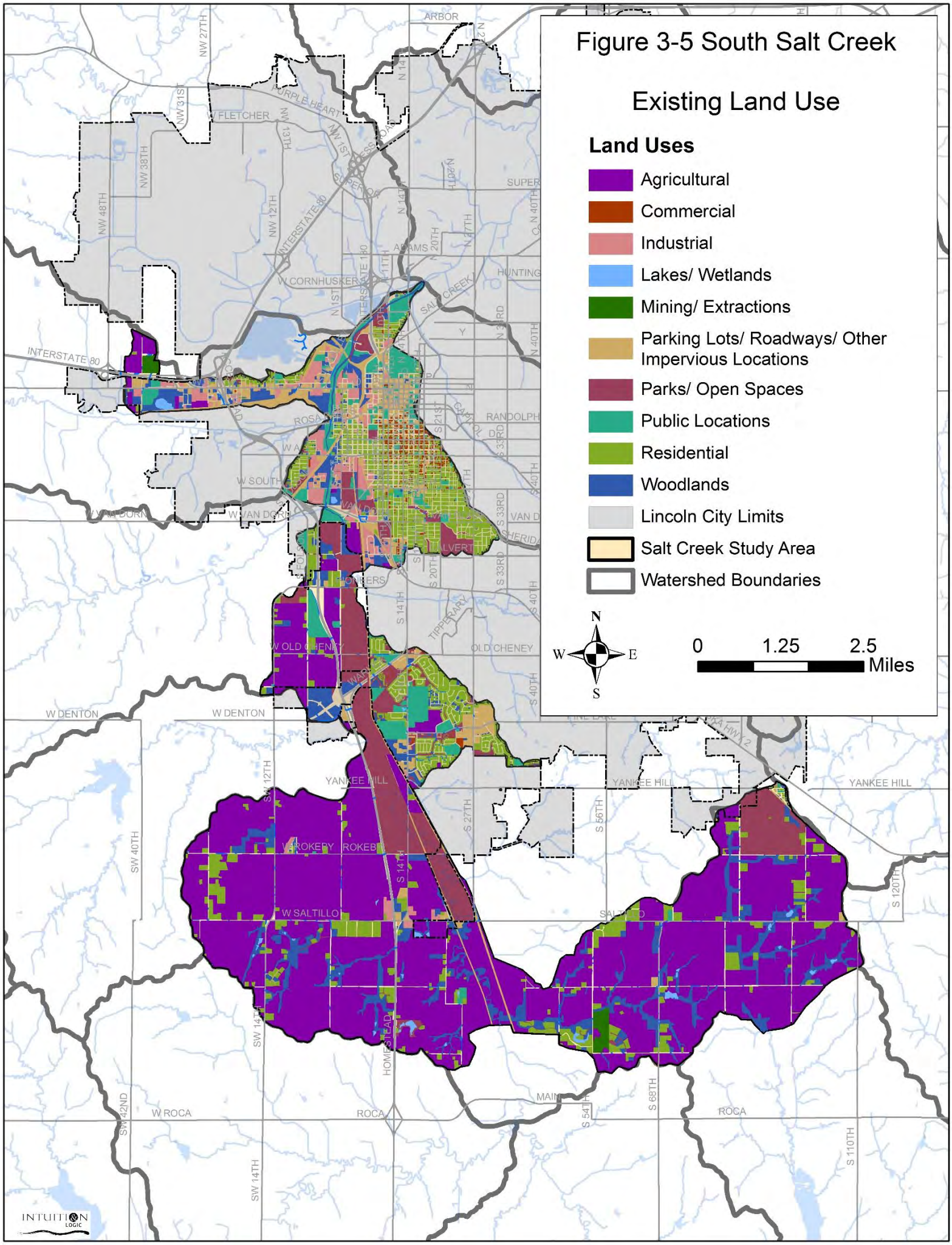
Figure 3-5 South Salt Creek
Existing Land Use
Land Uses
Agricultural
Commercial
Industrial
Lakes/ Wetlands
Mining/ Extractions
Parking Lots/ Roadways/ Other Impervious Locations
Parks/ Open Spaces
Public Locations
Residential
Woodlands
Lincoln City Limits
Salt Creek Study Area
Watershed Boundaries
N
W
E
S
0
1.25
2.5
Miles
INTERSTATE 80
W FLETCHER
W CORNHUSKER
W SOUTH
W VAN DORN
W OLD CHENEY
OLD CHENEY
W DENTON
YANKEE HILL
W ROKEBY
W SALTILLO
W ROCA
ROCA
SALT CREEK
INTUITION LOGIC

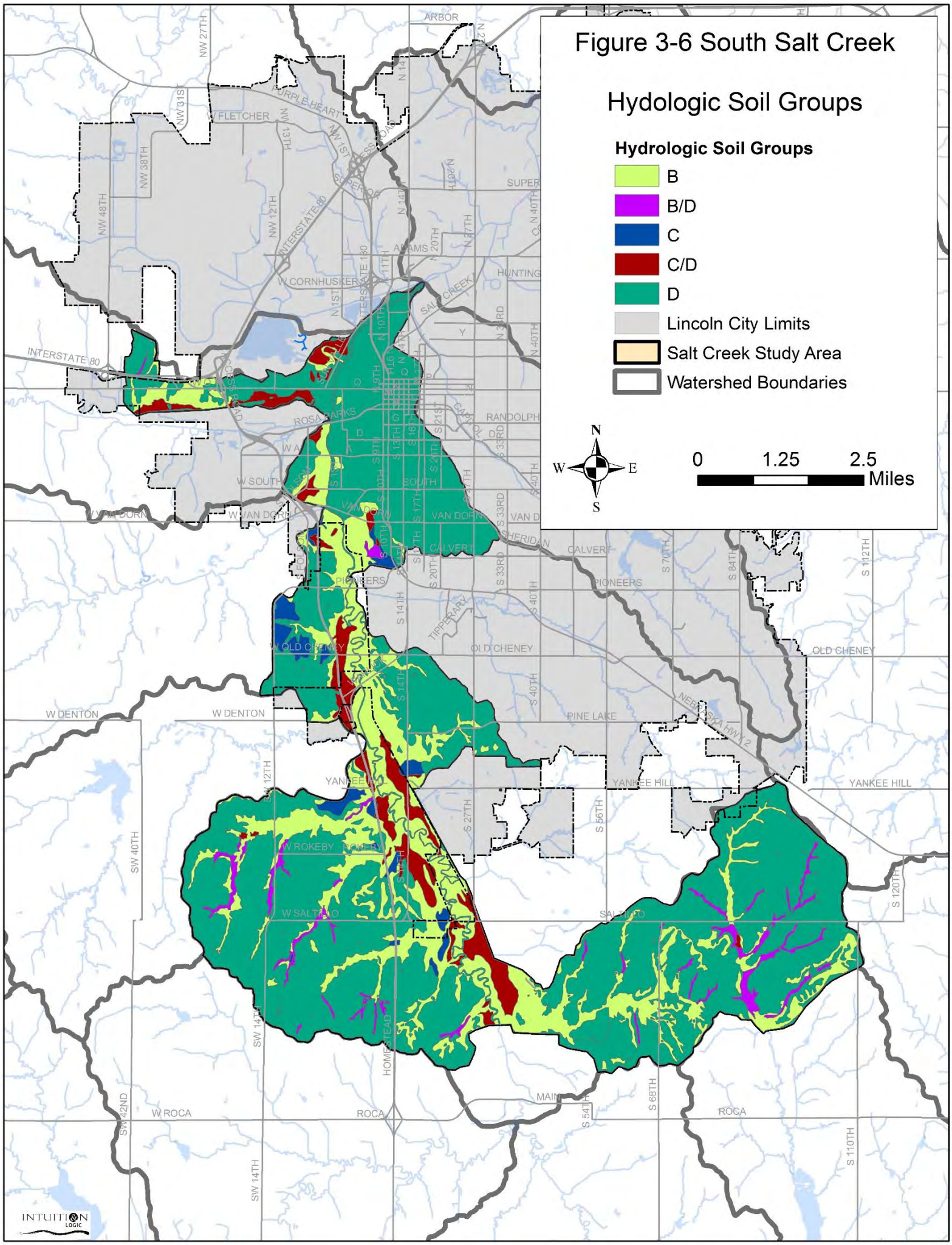
Figure 3-6 South Salt Creek
Hydologic Soil Groups
Hydrologic Soil Groups
B
B/D
C
C/D
D
Lincoln City Limits
Salt Creek Study Area
Watershed Boundaries
N
W
E
S
0
1.25
2.5
Miles
ARBOR
W FLETCHER
PURPLE HEART
INTERSTATE 80
W CORNHUSKER
ADAMS
SALT CREEK
HUNTING
ROSA PARKS
RANDOLPH
W SOUTH
SOUTH
VAN DORN
CALVERT
SHERIDAN
PIONEERS
TIPPERARY
OLD CHENEY
W OLD CHENEY
W DENTON
PINE LAKE
NEBRASKA HWY 2
YANKEE HILL
W ROKEBY
ROKEBY
W SALTILLO
SALTILLO
HOMESTEAD
MAIN
W ROCA
ROCA
INTUITION LOGIC

3.2.4 Runoff Hydrographs

The SCS Dimensionless Unit Hydrograph method was employed within HMS in order to distribute the runoff volume for each basin. This method requires the SCS lag time to be calculated. The lag time for each basin was calculated using the Curve Number Lag Method described in "National Engineering Handbook, Section 4" (Natural resources Conservation Service, 2001). This calculation was performed using an automated process available within HEC-GeoHMS. To calculate the lag time, HEC-GeoHMS employs a DEM to estimate the hydraulic length and average land slope of each basin. The lag time for each catchment was calculated using the following equation:

$$\boldsymbol{L = \frac{l^{0.8}(S+1)^{0.7}}{1900Y^{0.5}}} \qquad \text{(Eq. 3.3)}$$

in which L equals the lag time in hours; l is defined as the hydraulic length of the catchment in feet; Y represents the average Watershed slope in percent; and S represents maximum retention and can be determined using Equation 3.2, defined previously.

HMS then uses the lag time parameter to internally calculate the time of concentration (t_c) for each basin using the equation:

$$t_c = \frac{5}{3}L \qquad \text{(Eq. 3.4)}$$

The time of concentration represents the time it takes for a drop of water to travel from the hydraulically most remote point of the catchment to the outlet.

3.3 Modeling Results

Peak runoff rates were developed for each sub-basin within the South Salt Creek hydrologic study area. Table 3.3 presents the results for each sub-basin. Additional Hydrologic information can be found in Appendix C.

Table 3.3 Peak Flow Rates

	Peak flow Rate (cfs) with respect to Return Frequency (yr)						
Basin Name	**Q, 2yr (cfs)**	**Q, 5yr (cfs)**	**Q, 10yr (cfs)**	**Q, 25yr (cfs)**	**Q, 50yr (cfs)**	**Q, 100yr (cfs)**	**Q, 500yr (cfs)**
SC001	25.8	37.5	47.2	55.9	63.9	72.5	91.3
SC002	113.8	167.1	211.2	250.7	287.4	327.0	413.3
SC003	129.2	182.6	226.2	265.2	301.1	339.8	424.1
SC004	114.2	166.3	209.1	247.5	283.0	321.2	404.6
SC005	244.0	346.2	429.7	504.2	573.0	647.0	808.4
SC006	12.4	17.9	22.4	26.5	30.3	34.3	43.2
SC007	155.5	219.2	271.2	317.5	360.3	406.3	506.5
SC008	8.3	12.0	15.1	17.8	20.3	23.1	29.0
SC009	292.0	408.0	502.4	586.5	664.1	747.5	929.3
SC010	73.7	101.2	123.5	143.4	161.7	181.5	224.5
SC011	59.6	86.3	108.2	127.8	145.9	165.4	207.9
SC012	19.8	28.8	36.1	42.7	48.8	55.3	69.6
SC013	130.0	188.2	236.1	279.0	318.8	361.5	454.7
SC014	63.1	88.0	108.2	126.2	142.8	160.6	199.5
SC015	147.3	204.5	251.0	292.5	330.8	371.9	461.6
SC016	148.1	213.7	267.7	315.9	360.4	408.5	513.3
SC017	37.0	53.4	66.9	79.0	90.2	102.2	128.5
SC018	132.9	188.7	234.2	274.8	312.4	352.8	440.9
SC019	242.5	338.6	416.8	486.5	550.8	619.9	770.5
SC020	51.4	85.3	114.7	141.8	167.4	195.4	257.5
SC021	25.1	35.1	43.2	50.5	57.1	64.3	80.0
SC022	91.6	138.2	177.1	212.2	244.9	280.2	357.3
SC023	36.3	54.3	69.2	82.6	95.1	108.5	137.8
SC024	189.1	268.9	334.1	392.3	446.1	504.0	630.2
SC025	147.3	213.6	268.2	317.2	362.4	411.2	517.5
SC026	3.9	6.2	8.1	9.9	11.5	13.3	17.2
SC027	52.9	88.8	120.1	149.0	176.4	206.3	272.8
SC028	102.0	151.6	193.0	230.2	264.7	301.8	383.1
SC029	29.9	45.7	59.0	71.1	82.2	94.3	120.8
SC030	6.0	8.4	10.2	11.9	13.5	15.1	18.7
SC031	35.4	51.6	64.9	76.8	87.8	99.7	125.5
SC032	41.0	63.6	82.8	100.1	116.4	134.0	172.7
SC033	90.7	141.6	184.7	223.9	260.6	300.3	387.7
SC034	127.7	195.9	253.5	305.8	354.4	407.1	522.5
SC035	31.2	47.4	61.0	73.2	84.6	96.8	123.7
SC036	145.3	207.5	258.5	304.1	346.1	391.4	490.0

	Peak flow Rate (cfs) with respect to Return Frequency (yr)						
Basin Name	**Q, 2yr (cfs)**	**Q, 5yr (cfs)**	**Q, 10yr (cfs)**	**Q, 25yr (cfs)**	**Q, 50yr (cfs)**	**Q, 100yr (cfs)**	**Q, 500yr (cfs)**
SC037	59.3	110.4	156.9	200.9	243.1	289.8	395.1
SC038	147.5	212.5	265.8	313.5	357.6	405.0	508.3
SC039	103.0	158.9	206.1	248.9	288.8	332.0	426.9
SC040	190.7	273.9	342.2	403.2	459.5	520.2	652.3
SC041	106.1	166.4	217.7	264.3	307.8	355.2	459.2
SC042	238.4	329.8	404.0	470.1	531.0	596.6	739.4
SC043	194.3	269.4	330.5	384.8	435.0	489.0	606.8
SC044	323.0	438.1	531.4	614.4	691.1	773.6	953.6
SC045	271.9	385.9	479.1	562.2	638.9	721.4	901.2
SC046	204.5	293.9	367.2	432.6	493.1	558.2	700.0
SC047	232.3	312.1	376.8	434.5	487.7	545.0	670.2
SC048	333.6	450.4	545.0	629.3	707.1	790.9	973.7
SC049	104.3	145.0	178.1	207.6	234.8	264.1	327.8
SC050	280.7	393.3	485.1	566.9	642.4	723.5	900.3
SC051	128.9	179.9	221.4	258.4	292.5	329.2	409.2
SC052	60.9	97.5	129.0	157.8	184.8	214.2	279.1
SC053	108.2	168.9	220.3	267.1	310.9	358.4	462.7
SC054	246.7	360.7	454.9	539.3	617.6	702.0	886.0
SC055	73.9	129.0	177.9	223.6	267.0	314.7	421.3
SC056	15.1	33.9	52.6	71.1	89.3	109.8	157.3
SC057	5.6	13.3	21.1	28.7	36.2	44.6	64.2
SC058	140.0	210.0	268.5	321.1	369.9	422.8	538.4
SC059	32.0	59.3	84.1	107.5	130.0	154.9	211.1
SC060	215.9	318.3	403.1	479.2	549.7	625.7	791.9
SC061	55.4	87.4	114.6	139.3	162.5	187.7	243.2
SC062	65.3	120.4	170.5	217.7	263.0	313.2	426.0
SC063	10.1	23.1	35.8	48.3	60.5	74.3	106.1
SC064	132.3	211.8	280.1	342.6	401.3	465.1	605.9
SC065	163.0	236.5	296.9	351.0	401.0	454.9	572.4
SC066	162.8	237.7	299.4	354.8	406.0	461.2	581.5
SC067	42.2	73.6	101.6	127.7	152.5	179.8	240.7
SC068	1.3	1.9	2.4	2.9	3.3	3.7	4.7
SC069	66.6	103.7	135.1	163.7	190.4	219.3	283.0
SC070	100.4	151.7	194.8	233.6	269.7	308.7	394.1
SC071	125.4	190.5	245.2	294.6	340.7	390.5	499.6
SC072	159.9	232.0	291.3	344.4	393.5	446.3	561.6
SC073	204.4	303.8	386.5	460.9	530.0	604.6	767.4

	Peak flow Rate (cfs) with respect to Return Frequency (yr)						
Basin Name	**Q, 2yr (cfs)**	**Q, 5yr (cfs)**	**Q, 10yr (cfs)**	**Q, 25yr (cfs)**	**Q, 50yr (cfs)**	**Q, 100yr (cfs)**	**Q, 500yr (cfs)**
SC074	238.2	348.1	438.9	520.3	595.8	677.1	854.5
SC075	94.0	148.0	193.9	235.8	274.9	317.3	410.4
SC076	288.8	414.1	516.8	608.6	693.4	784.8	984.1
SC077	210.6	305.5	383.7	453.6	518.3	588.0	739.9
SC078	75.7	112.9	143.9	171.7	197.6	225.5	286.6
SC079	41.4	75.9	107.1	136.5	164.6	195.8	265.8
SC080	158.7	238.7	305.6	365.9	421.9	482.3	614.4
SC081	162.7	234.6	293.9	346.9	395.9	448.6	563.6
SC082	149.0	215.4	270.0	318.8	364.0	412.6	518.6
SC083	95.2	128.9	156.2	180.6	203.0	227.2	280.0
SC084	304.6	423.1	519.5	605.3	684.6	769.8	955.6
SC085	158.2	246.6	321.8	390.2	454.1	523.4	675.4
SC086	79.2	126.0	166.0	202.6	236.9	274.1	356.1
SC087	135.3	197.2	248.1	293.9	336.3	381.9	481.4
SC088	190.9	285.1	363.5	434.1	499.5	570.3	725.1
SC089	192.4	288.2	368.1	440.1	506.9	579.0	736.6
SC090	106.7	158.9	202.4	241.5	277.9	317.1	402.7
WT001	115.0	167.3	210.4	248.9	284.6	323.0	406.7
WT002	31.0	49.3	65.0	79.4	92.9	107.5	139.7
WT003	66.1	110.0	148.3	183.8	217.2	253.7	334.8
WT004	30.3	48.3	63.6	77.7	90.9	105.3	137.0
WT005	212.0	311.5	393.8	467.7	536.1	609.8	770.6
WT006	92.2	148.3	196.4	240.5	281.9	327.0	426.4
WT007	86.2	137.6	181.6	221.9	259.6	300.7	391.1
WT008	112.0	184.0	246.4	304.0	358.2	417.4	548.3
WT009	121.1	182.4	233.7	280.1	323.2	369.7	471.5
WT010	138.3	220.5	290.9	355.2	415.5	481.2	625.8
WT011	85.2	135.8	179.2	218.9	256.0	296.5	385.7
WT012	149.7	226.9	291.6	350.0	404.2	463.0	591.7
WT013	132.2	197.6	252.2	301.5	347.1	396.4	504.2
WT014	149.0	216.4	271.9	321.7	367.7	417.2	525.3

3.4 Culvert Analysis

The Nebraska Department of Natural Resources has prepared hydrologic and hydraulic data for the Haines Branch Study Area. This information was used to delineate the Zone A Special Flood Areas. The Zone A areas illustrate a floodplain boundary based on normal flow depths, but do not provide corresponding water surface elevations and do not consider the effect of culverts.

Many older culverts in the Watershed were designed to convey a 10 to 25 year storm event and possibly overtop the roadway during larger storm events. The Culvert Analysis is intended to evaluate culverts where sufficient flow rates and culvert as-built information is available to determine if the roadway is overtopped during a 100 year, 24 hour storm event.

3.4.1 Flowrates

The analysis is based on available discharge and depth data from the Nebraska Department of Natural Resources. NDNR developed flowrate and depth estimates for delineating the FEMA Zone A special flood hazard areas in the tributaries. The available data was provided in a GIS shape file for use in the Culvert Analysis. The data consists of the 1% annual occurrence discharge; the flood depth; the flood elevation; and the cross section location where each flood depth and elevation were determined.

3.4.2 Culvert Identification

The culvert identification process consisted of identifying all stream crossing locations; intersecting with the limits of DNR data; estimating the roadway elevation from GIS contours; and estimating the local flood elevation from the DNR depth data. A total of 91 stream crossing locations were identified in the South Salt Creek Watershed. Of those, there were 27 crossing locations that had sufficient hydrologic data for the analysis.

The evaluation list of culverts was further refined by identifying where the existing flood depth was below the roadway elevation, i.e. under normal channel flow conditions the roadway is not overtopped. Locations where the normal channel depth is greater than the roadway would require more extensive road and culvert modifications to eliminate roadway overtopping. The refinement led to 12 culvert crossing locations that were sent to the County to obtain As-Built records for further analysis (no survey data was obtained for this analysis).

Of the 12 culvert crossings, 7 crossings had As-Built records. For more information on culvert crossing locations, refer to Appendix C.

3.4.3 HY-8 Analysis

The County provided As-Builts for culvert ID number S206, O048, O153, O192, O206, P038, and S086. The As-Builts contained sufficient data for detailed analysis of the 7 crossings. The culverts were modeled in HY-8 to determine if the current culvert configuration causes the roadway to overtop for the 1% annual occurrence discharge.

3.4.4 Results

Table 3.3 summarizes the culvert locations where the existing culvert capacity is insufficient to convey the 1% annual occurrence discharge without overtopping the roadway.

Table 3.4 Culvert Overtopping Analysis

County ID	Description	Q100 year (cfs)	Normal Depth Elev (ft)	Headwater Elev (ft)	Roadway Elev (ft)	Overtopping Depth (ft)
S86	Triple 10'x9'x99' CBC	6280	1242	1255.1	1251.8	3.27
P38	Twin 8'x4'x55' CBC	2939	1356.7	1364.1	1358.7	5.43
S206	Triple 9'x6'x45' CBC	4315	471.4	479.81	474.7	5.11
O48	Single 8'x6'x51' CBC	2287	1228.0	1238.0	1233.4	4.64
O153	Single 10'x8'x45' CBC	3503	106.1	115.89	110.0	5.89
O192	Twin 8'x5'x46' CBC	3503	1243.4	1248.5	1246.3	2.19
O206	Triple 9'x7'x50' CBC	4933	1190.1	1197.3	1192.1	5.26

Figure 3-7 illustrates the location of theses South Salt Creek Study Area culvert crossings.

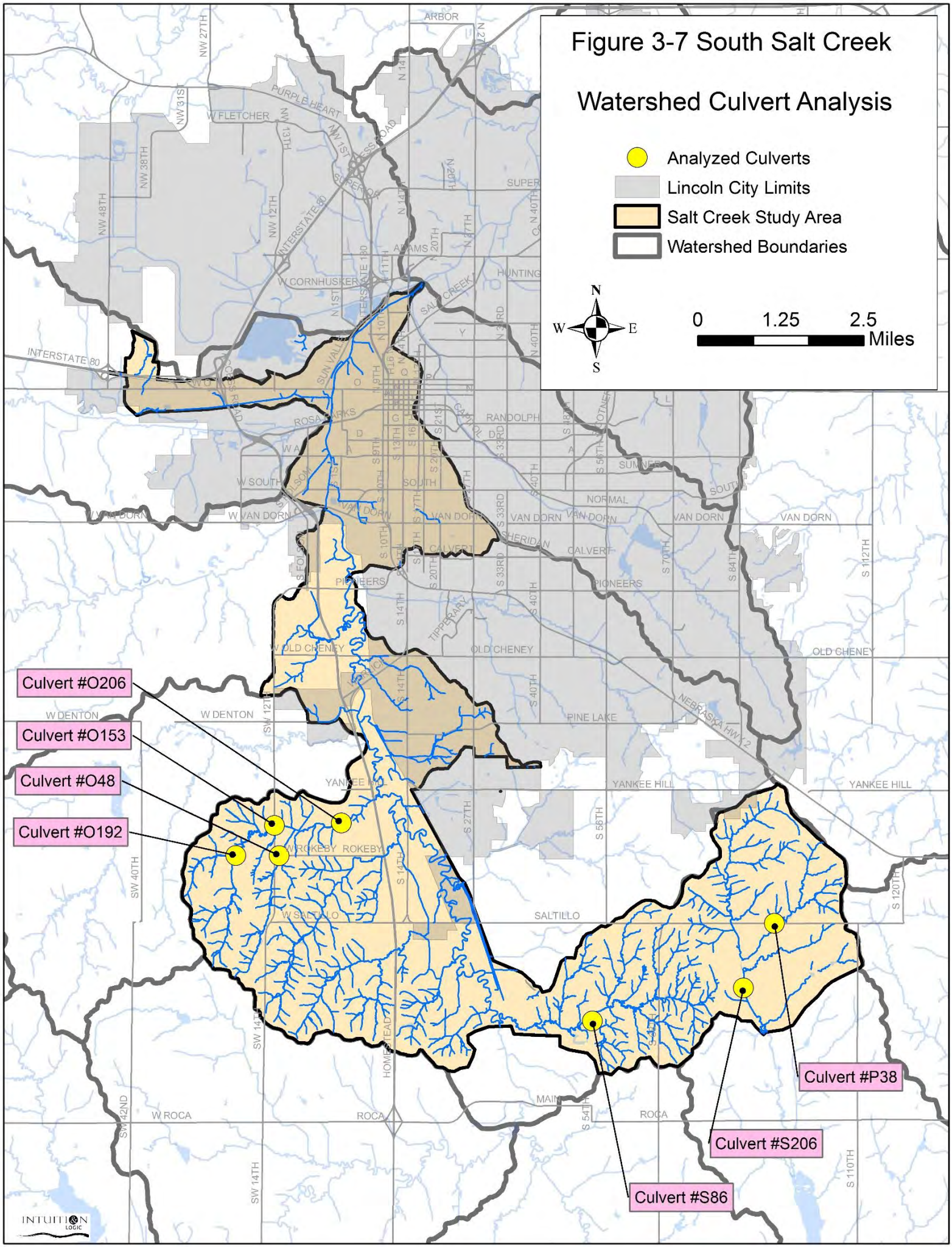
Figure 3-7 South Salt Creek
Watershed Culvert Analysis
Analyzed Culverts
Lincoln City Limits
Salt Creek Study Area
Watershed Boundaries
N
W
E
S
0
1.25
2.5
Miles
Culvert #O206
Culvert #O153
Culvert #O48
Culvert #O192
Culvert #P38
Culvert #S206
Culvert #S86
INTERSTATE 80
W FLETCHER
PURPLE HEART
W CORNHUSKER
SALT CREEK
RANDOLPH
W SOUTH
W VAN DORN
VAN DORN
NORMAL
SUMNER
CALVERT
PIONEERS
W OLD CHENEY
OLD CHENEY
W DENTON
PINE LAKE
NEBRASKA HWY 2
YANKEE HILL
W ROKEBY
ROKEBY
W SALTILLO
SALTILLO
W ROCA
ROCA
MAIN
INTUITION LOGIC