SALT CREEK FLOODPLAIN RESILIENCY STUDY FAQS

What is the schedule of the study?

The study is scheduled to be completed by the end of April 2020.

Does the study include updated floodplain maps?

No. A regulatory floodplain map update was not included in the scope. The Salt Creek floodplains were remapped in 2005.

Does this study have a role with the Lincoln-Lancaster County comprehensive plan like suggesting different standards with building materials?

The study will make recommendations on regulations, policy, and flood reduction measures. These recommendations may be incorporated in a general manner into future Lincoln- Lancaster Comprehensive Plan. One example may be low impact development regulations.

Is the foundation for the study based on climate change?

The purpose of study is to develop recommendations to reduce adverse impacts from flooding to life and property, based on current and future flood events. The study includes review of national floodplain best management practices and the potential impacts of a warming climate. Recommended flood control measures will be evaluated using current and future flood events.

How is a flood event defined?

- 2 year event = 50% annual chance of occurrence
- 10 year event = 10% annual chance of occurrence
- 50 year event = 2% annual chance of occurrence
- 100 year event =1% annual chance of occurrence
- 500 year event = .2% annual chance of occurrence

What event is used for floodplain management regulations?

The 1 percent annual chance flood event is the federal, state and local regulatory flood for floodplain mapping and administration purposes.

What are other folks “skin in the game,” those not in the floodplain?

Large flood events can have devastating, community-wide impacts that go far beyond the impacts to those who were flooded. Economic damages can be a massive burden for a community, particularly one trying to recover from a flood event. Businesses can be disrupted throughout the community because of loss of rail, vehicle, or air services. Loss of power, water supply, or sanitary sewer services can impact the entire community. Loss of tax revenues can lead to budget shortfalls and disruption of future services and infrastructure investment.

Does the pace of development impact the floodplain?

The City of Lincoln adopted detention standards city-wide in the late 1990s, a No Adverse Impact (NAI) policy in 2004 for new growth areas and added storm water quality standards in 2015. These policies have been very effective at reducing the adverse impacts of developments. The NAI policy requires no increase in flood discharges downstream from the property, no backup of floodwaters on upstream properties, no loss of floodplain volume on the developed property, and treatment of runoff for more frequent events to reduce pollutant discharges to streams and lakes. A minimum stream corridor policy was also adapted in 2004, which has significantly increased the amount of natural streams in recent development projects, as well as an associated buffer area for the environment and also helps to protect neighboring properties from flooding and issues with streambank erosion.

Where does the runoff go?

Surface runoff from precipitation events in Lincoln drain to Salt Creek.

Is the current climate reflective of existing data?

Is the historical discharge-frequency record indicative of what we can expect for future discharge-frequency events? Not, necessarily. The past climate/rainfall doesn't predict the future. For example, the Technical Paper 40 (TP 40, National Weather Service) precipitation-frequency relationships were developed based on rain gage data from the 1960's or earlier. The updated data from the National Oceanic and Atmospheric Administration (NOAA) NOAA ATLAS 14 precipitation-frequency relationships were developed within the last 5 years. The additional 50 years of data shows an increase in the magnitude of the one percent annual chance (100-year) precipitation event of approximately 10 percent. The trend is an increase in the 100-year precipitation over time. If the precipitation value for a given event stayed relatively constant over time, we would call this "stationarity", this is not what the data suggests.

How often is the analysis of precipitation data updated?

As noted previously, the TP40 data was used as the standard for floodplain management for more than 50 years. It was replaced with the NOAA Atlas 14 data, which was developed approximately five years ago.

Why did flooding happen in March 2019, even though the rainfall was not as significant?

Rainfall amount and frequency do not always directly translate into flood frequency. For example, 4.7 inches of rainfall may be a 10 percent annual chance (10-year) event in the spring or summer. However, if the ground is frozen or saturated with water, less of the rain will soak into the ground and more runoff will be generated. The 4.7-inch rainfall event may create a 25-year or 50-year runoff event, if water can't infiltrate into the ground. In March 2019, we had a combination of snow, frozen or saturated ground, and rainfall that resulted in a runoff event that was between a 100-year and 500-year event in magnitude. The rain and snow alone were not sufficient to create such a large event.

What are some flood control projects Lincoln has completed?

The City of Lincoln and Lower Platte South NRD have completed many flood control projects, including the Antelope Valley Flood Control Project, the Upper Antelope Creek Flood Reduction Project, the Beal Slough Flood Reduction Project, and the ongoing Deadman's Run Flood Control Project.

What is the floodway and why is it larger in some areas?

The floodplain is the extent of the area that is inundated during a flood event. The floodplain includes shallower areas at the edges, where the flow is not as active. The floodway is the actively flowing portion of the floodplain that must be kept free from obstructions to avoid excess increases to the flood elevations due to "squeezing" the floodplain. In some locations, the active flowing portion of the floodplain is wider and, in some locations, narrower. The floodway is confined to the Salt Creek levees through the levee extents of the levees and through the use of flood storage areas landward of the levees.

How does precipitation impact design standards for detention cells, bridges, and storm drain systems?

- Detention cells are typically designed to offset (mitigate) increased runoff rates due to development for the 2-year, 10-year, and 100-year events.
- Bridges and roadway culverts are typically designed based on the level of service (how much traffic) and location. For example, a residential road in the City of Lincoln may be designed so that water doesn't overtop the structure during the 50-year event. A county road with little traffic may be designed to not overtop during a 5-year event.
- Storm drain systems are designed to convey the 5-year, or 10-year event in the infrastructure pipes. Excess flows travel along the curb and gutter of the street. Typically, the bypassed flows from larger events that don't make it in the storm drain system, are required to be contained within the roadway right-of-way.

- If the rainfall amounts associated with the design event for a detention cell, bridge or culvert for a roadway crossing, or storm drain system change, that can have an impact on the cost to replace that infrastructure. Increased precipitation amounts typically lead to increased costs for the construction and maintenance of drainage features.

If rain events increase in frequency and volume should the city look at changing standards, or flood control solutions?

This is a foundational study to examine potential future measures for floodplain management and flood control. New regulations and flood control measures may be part of the recommendations that come forward from this report; but, are not specifically being brought forward for formal approval at this time.

What is the difference between precipitation data and discharge data?

Precipitation data is recorded by rain gages and is the measure of how much rainfall occurred. Precipitation data is usually measured and reported on an hourly or daily basis. Streamflow data is the measure of how much water is flowing in the stream. Streamflow can be measured on a continuous basis and we typically use the peak annual streamflow (peak streamflow for each year of the stream gage record) to analyze extreme flood events and develop an estimate of the flows for the one percent annual chance, or 100-year, regulatory event.

What do United States Geological Survey (USGS) stream gauges measure?

Stream gages measure how much water is flowing in a stream. The measurement is reported in cubic feet per second (cfs). Stream gage data is available from USGS, USGS Current Water Data for Nebraska.

What impacts streamflow?

Generally, the amount of flow in a stream is a result of the precipitation received and the ground surface conditions in the watershed. The more impervious (paved areas, roof tops, etc.) areas there are within a watershed, the greater and quicker the amount of runoff will be generated for a given rainfall event. If soils are saturated (can't soak up any more water), or if the ground is frozen, that can also lead to more runoff.

What role does temperature play in stream discharge?

Increases in atmospheric temperature have a direct influence on precipitation. Increased precipitation leads to increased stream discharges.

What are storm water quality challenges?

Water quality is different than floodplain management but some design items offer a benefit to both. Healthy floodplain corridors and minimum buffer stream corridors that include green spaces, can help improve water quality along our streams.

What is a levee?

A man-made structure, usually an earthen embankment, designed and constructed to contain, control or divert the flow of water to reduce the risk from temporary flooding. Levees are typically built parallel to a water way, to reduce risk on the "landward" side.

Where are the levees located and what areas do they protect?

The Salt Creek levees are along either bank of Salt Creek from Calvert Street in the south to Superior Street in the north (area red below). The levees protect numerous neighborhoods, commercial, and industrial areas (area in pink). The levees also help to provide protection for critical infrastructure like the Theresa Street Wastewater Treatment Facility and the Lincoln Electric System facility along North 27th Street.

Based on NOAA Atlas 14, is there an increase risk in downtown?

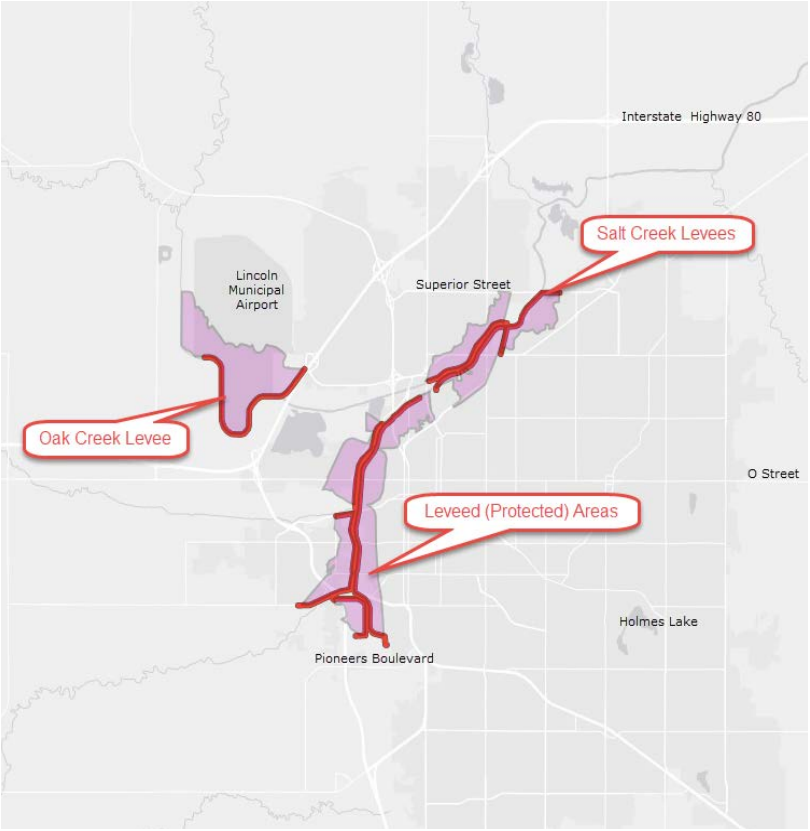
All the areas protected by the Salt Creek levees are at increased risk of flooding and flood damages. This includes the areas on the west and north side of downtown Lincoln.

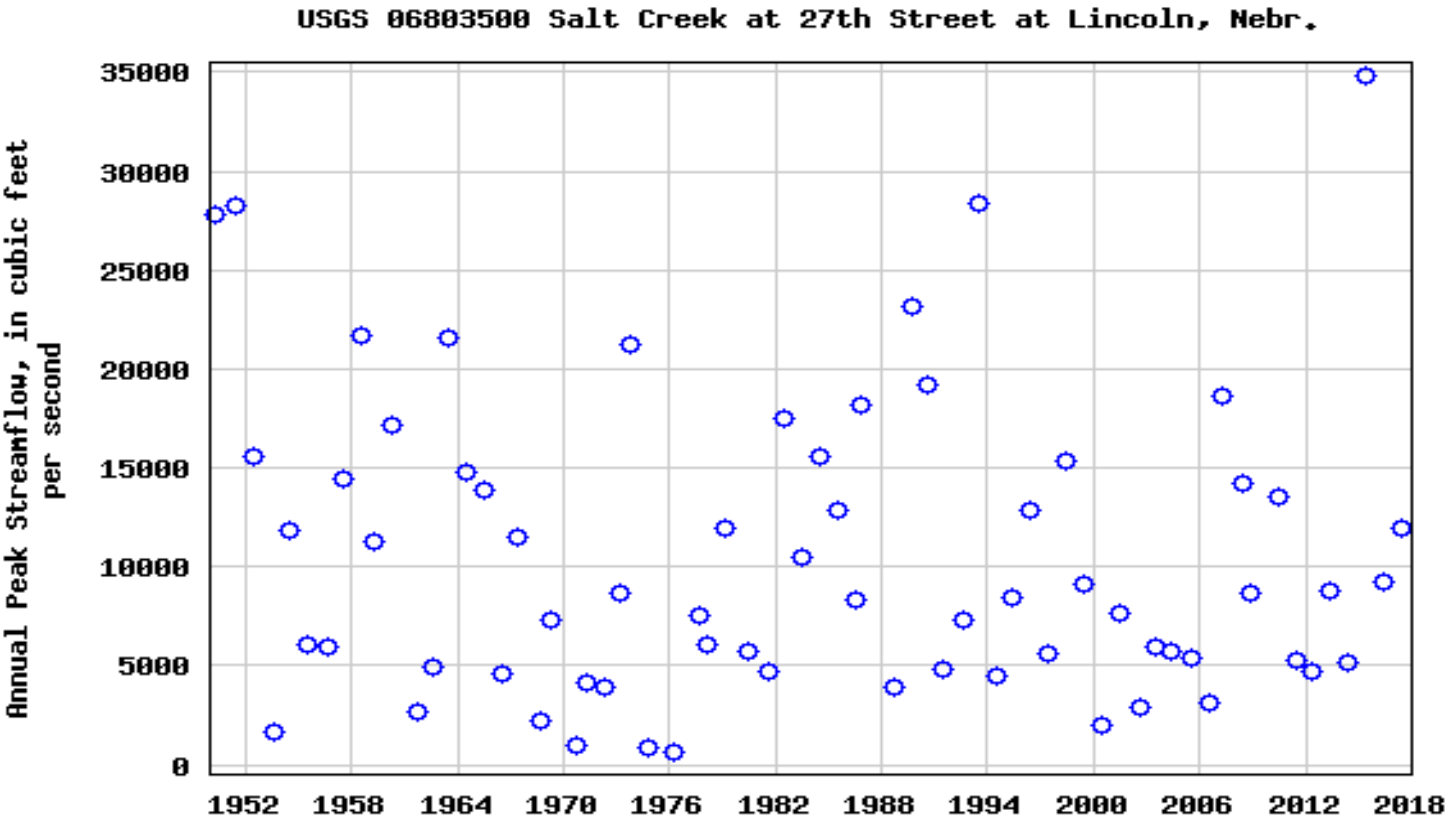
What are the conditions that would cause levee overtopping?

The levee generally provides protection and does not overtop for the approximate two percent annual chance (50-year) flood event. Minimal overtopping of the levees occurred during the May 2015 flood event.

Since the levee system was installed in the 1960's, in the last 50 years , how many flooding events has Lincoln experienced?

According to the USGS Gage 06803500, the flows in Salt Creek at North 27th Street have exceeded the 10-year flow rate seven times since 1970. The 50-year flow rate has been equaled or exceeded three times, and the 100-year flow event was exceeded once in 2015. The flood stage flow for the gage is approximately 16,000 cfs. The peak flow rates are 18,500, 24,000, and 30,100 cfs for the 10-year, 50-year, and 100-year events, respectively.





Are there flood control reservoirs (dams) in the Salt Creek watershed?

Salt Creek watershed has 10 large flood management dams, built by USACE and 66 smaller dams.

What does no adverse impact mean?

No Adverse Impact (NAI) means the action of one property owner does not negatively impact the flooding risk for other properties.

What is a detention area and what does it do?

Development creates more runoff due to more impervious surfaces, which causes an increase in runoff, quicker stormwater runoff to the stream, and an easier path for pollutants to get to local streams and lakes. Developments are required to maintain the runoff rates from preexisting development conditions and to account for stormwater quality discharges. Detention areas and stormwater quality areas are the areas reserved for holding stormwater, slowing it down to reduce runoff rates, and improve the downstream water quality.

Based on the new precipitation data (NOAA Atlas 14) future detention cells may need to be larger to accommodate the increased runoff that comes with larger rainfall events. The one percent annual chance flood event from Atlas 14 is approximately 10 percent larger than the precipitation used for the 100-year design storm today.

What other spaces can be used for detention?

The green space in city parks often provide flood storage as well as outlots in residential and commercial developments. One example of flood storage in a park is Wilderness Park along Salt Creek.

Why not do a project similar to Antelope Creek and widen Salt Creek so that the 1 percent annual chance flood is contained within the channel?

Since the early 1980's, when it was identified that the existing flood control project would not protect Lincoln from the 1 percent annual chance flood, the LPSNRD and the City of Lincoln have been working closely with USACE to address increasing the level of protection and structural integrity of the Salt Creek levee system. The most promising options to restore the level of protection of the levees to the 1 percent annual chance flood and potentially meet technical and economic feasibility have been evaluated as described in Section 4 of the report. Because of its probable high cost (e.g. bridge and utility replacements, taking of private property, and other items), widening the channel to accommodate the 1 percent annual chance flood below the bank elevations has not been evaluated in previous reports (see Section 4).

Why not raise the levees to contain the mapped Salt Creek floodplain between the levees?

Past studies of the Salt Creek floodplain conducted by the USACE have looked at numerous options to reduce flood damages and improve the level of protection provided by the levee system. A 1987 USACE study (described in Section 4 of the report) concluded "…that it is not economically feasible to improve the level of flood protection along the entire existing Salt Creek levee and channel project or to its original design level of protection (100-year);..." Other studies have inferred or come to the same conclusion (see Section 4).

Shouldn't there be a recommendation for the city to adopt the concept of "Sponge Cities" (i.e. use of practices to soak up water) to reduce the flow into Salt Creek to lessen flooding?

The "Sponge Cities" concept is very similar to Low Impact Development (LID). As described in Alternate

Stormwater Best Management Practices (BMP's) Guidelines, City of Lincoln, Nebraska and the Lower Platte South Natural Resources District, April 2006 (https://www.lincoln.ne.gov/city/ltu/watershed/bmp.htm), LID commonly incorporates numerous best management practices to achieve environmental and economic benefits. Recommendations in this study for cluster subdivisions regulations, setbacks and riparian preservation, and low impact development regulations support the "Sponge Cities" concepts. In addition to these recommendations, there are many other voluntary practices that can be implemented by the public such as the installation of rain gardens, green roofs, using pervious pavement, and amending soils to increase infiltration, reduce runoff, and improve water quality.

Typically, these practices work well in more frequent rainfall events (i.e. smaller rainfall events that occur more often) and consequently work well for the purposes of stormwater quality. However, the "Sponge Cities" concept is typically less effective for larger rainfall events because the runoff volume greatly exceeds the capacity of the LID components to hold runoff. The intensity of rainfall in larger events can also create more runoff than the LID features can infiltrate. LID will not provide significant flood control benefits unless the LID practices are done very extensively and with significantly more capacity in both existing and developing areas.

What is the data on recent rainfall events as compared to historic events? Does the data provide evidence of the future climate model proposed in this study?

The current Flood Insurance Study (FIS) for Lincoln is based on precipitation data from the U.S. Weather Bureau's Technical Paper No. 40 (TP40), which dates from 1961. More up-to-date precipitation data, through December 2012, is contained in the National Oceanic and Atmospheric Administration (NOAA) Atlas 14. The methodology used to determine future precipitation frequency estimates is described in Section 5.2.1 of the report and is referred to as Future (RCP8.5). Table 1 provides a comparison of precipitation values from TP40, Atlas 14, and Future (RCP8.5) for the 50, 10, 2, 1, and 0.2 percent annual chance precipitation events.

This data shows that the 50-, 100-, and 500-year 24-hour point precipitation values have increased since TP40 was published in 1961 and are expected to increase even more in the future. Comparisons of wettest years and other rainfall data nationwide and in the Midwest confirm this increase in rainfall values.

Table 1. Comparison of Corresponding 24-Hour Point Precipitation Values from Different Sources

Probability (percent annual chance)	Common Event Name	Total Precipitation TP40 (in)	Total Precipitation Atlas 14 (in)	Total Precipitation Future Conditions RCP 8.5 (in)
50	2-Year	3.00	3.03	3.21
10	10-year	4.69	4.47	4.83
2	50-year	6.00	6.37	6.94
1	100-year	6.68	7.31	7.97
0.2	500-year	8.18	9.75	10.73