Section 2
Inventory and Methodology

2.1 Watershed Inventory

The watershed inventory consisted of collecting, compiling and evaluating existing data applicable to the Master Plan development and developing new data sets. A data search was conducted to identify existing information to be used by the project team. Below is a general list of data collected:

GIS data files:

- Aerial imagery
- Agricultural Land Use
- Airport Protection Areas
- Basin boundaries
- Bridges
- Building footprints
- City and Corporate Limits
- Conservation Easements
- Contours
- County Road Projects
- Dams
- Drainage Easements
- Endangered Species
- Fire Facilities
- Floodplain data
    - current effective floodplain
    - storage areas
    - Lancaster County FIS and Firm 2013
    - Lancaster County Historic 2011 DFIRM
    - Lancaster County Historic Pre 2013
    - Flood Protection Areas
- Future Land Use
- Future Service Limit
- Grassland
- Hillshade
- Historical
- Homeowners and Neighborhood Associations
- Impervious Areas
- Lakes Streams and Waterbodies
- Landbase
- Levees
- Library Facilities
- Lidar
- Medical Facilities
- Natural Resources
- New Growth Flood Standards
- Parcels
- Parks
- Paving
- Railroad Lines
- Retirement Facilities
- Salt Valley Greenway
- Schools
- Soils
- Startran Bus Routes
- Transportation
- Treemass
- Urban Development
- Urban Road Projects
- Utility
    - Cell Towers
    - Traffic Conduits
    - Gas
    - Sanitary Sewer
    - Stormwater
    - Water
    - Williams Pipeline
- Walkability
- Wellhead Protection Areas
- Wetlands
    - National Wetland Inventory
    - Saline
- Zoning

H & H Models:

- Salt Creek FEMA
- Salt Creek DFRIM (Hydrology)
- Salt Creek DFIRM (HEC-RAS)
- Havelock Salt Creek Urban Drainage Studies (XP Model)
- Lynn Creek Urban Drainage Studies (XP Model)
- North Salt Creek Urban Drainage Studies (XP Model)
- Oak Creek Urban Drainage Studies (XP Model)

Reports:

- Lincoln/Lancaster County 2040 Comprehensive Plan
- Havelock Salt Creek (Urban Drainage Studies)
- Lynn Creek (Urban Drainage Studies)
- Lynn Creek Watershed Highlands Study (1992)
- North Salt Creek (Urban Drainage Studies)
- Oak Creek (Urban Drainage Studies)
- Watershed Master Plans, Update Procedures (2005)

Websites:

- Reports relative to Lincoln and Comprehensive Plan References
    - http://lincoln.ne.gov/city/plan/long/index.htm
- Lancaster County Stream Gage Info
    - http://lancaster.ne.gov/engineer/gis/hydro.htm
- Lincoln GIS Viewer
    - http://lincoln.ne.gov/gis/gisviewer/index.html?config=apps/ncs-nrgis.xml
- Mapshop Link
    - http://lincoln.ne.gov/city/plan/its/gisweb/home.htm
- USGS 7.5 Minute Quadrangle Maps
    - http://lancaster.ne.gov/engineer/gis/use.htm
- University of Nebraska-Lincoln School of Natural Resources GIS Information
    - http://snr.unl.edu/data/geologysoils/digitalgeologicmaps/digitalgeologicmaps.asp

The above data and data sources may not be directly utilized or referenced in this master plan, but rather represent the body of data available for our reference and use as we developed the master plan.

New data sets were developed using GIS technology during the study. The new data sets are summarized below:

- Geomorphic and Channel Data
- Potential projects/areas of concern
- Other information obtained from the field investigation

New data generated consist of GIS files, the watershed report in pdf and word format, images/photos and any subsequent supplemental data.

2.2 Study Methodology

This Lynn Creek Watershed Master Plan includes geomorphic field investigation, hydrology and hydraulic data summary and modeling of select culverts and bridges, land use and development analysis, stream corridor mapping and identification of special and unique areas within the watershed study area. Each of these study components was then considered in the development of potential capital improvement projects. A summary of each component is provided below.

2.2.1 Geomorphic Evaluation

The geomorphic evaluation is based on field reconnaissance of about 6 miles of channel divided into 14 reaches as shown in Figure 2-1.

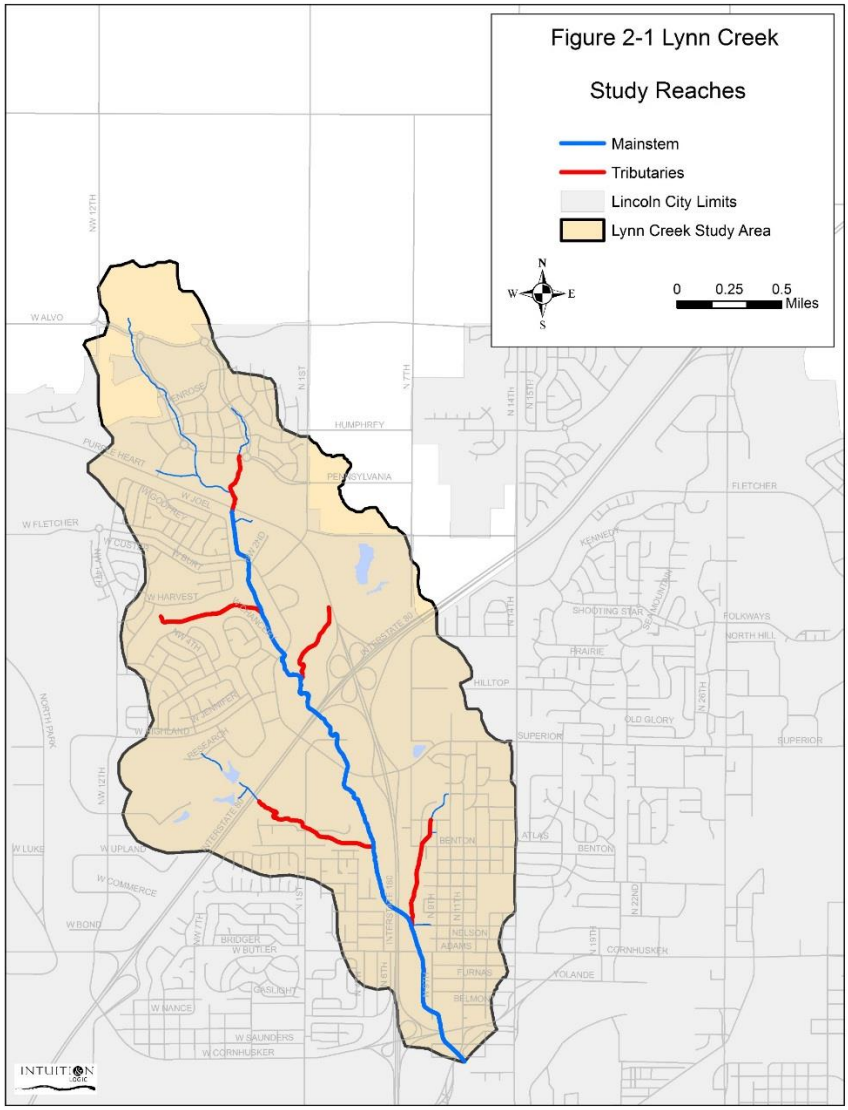

Figure 2-1: Lynn Creek Study Reaches

The main stem fieldwork limit was taken as the confluence with Salt Creek upstream to the culvert crossing at Highway 34. The tributary fieldwork limits were developed by focusing on the higher stream order reaches (the larger channels). The tributary upstream fieldwork limits began where there was one mile or more of identified drainage way contributing to the tributary. Typically, the upstream stopping point was set to the nearest roadway or confluence. Some exceptions to the contributing stream length were made where the tributary was fed by a development or where known issues were present.

Geomorphic data points were collected in GIS during the field investigation along each reach to provide reconnaissance level analysis of reach stability. Field data were collected using the following data categories:

1) Bank soil texture and coherence per Uniform Soil Classification using the visual-manual procedures (ASTM D 2488-00)
2) Average bank slope angle as measured where obvious breaks in slope create a top of bank and toe of slope
3) Average bank height as measured from the lowest point in the channel cross section to the top of bank
4) Vegetative bank protection
5) Bank cutting
6) Mass wasting (wedge or slide slope failure)
7) Bar development
8) Debris jam potential
9) Obstructions, flow deflectors and sediment traps
10) Channel bed material consolidation and armoring
11) Percentage of channel cross section constriction
12) Sediment movement
13) Sinuosity
14) Opinion of Dominant Process

The data categories are weighted and scored to provide an overall indication of stability for each data point. The data points were then summarized to provide an overall reach score and an opinion of dominant process was also provided for each reach based on observations.

Field data were also collected at potential project locations. The following field data was collected for potential projects:

- Project type (Bed Stabilization and/or Bank Stabilization)
- Project length
- Brief problem description
- Brief recommended solution description
- Additional notes as needed

See Section 3 for a detailed description of the geomorphic evaluation and results of the geomorphic data points and indicators as listed above.

2.2.2 Hydrology and Hydraulics

The Hydrologic and Hydraulics analysis will consist of summarizing existing available data, evaluating the sensitivity of potential changes in the estimated floodplain limits (identified as Zone A on FEMA maps) and evaluating select culverts within the basin. Areas containing estimated floodplain limits that are sensitive to potential changes will be identified, prioritized and recommended for detailed analysis by a future study. 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 due to the presence of the culvert. See Section 4 for detailed information.

2.2.3 Land Use and Development

The Land Use and Development Analysis will study existing land use and projected land use in the watershed to evaluate the potential effect on stormwater runoff and if changes to the stormwater management criteria are needed. Approximations of possible future development will be based on current land use and future land use projections from the 2040 comprehensive plan. See Section 5 for detailed information.

2.2.4 Minimum Stream Corridor

The current minimum corridor identification methodology will be evaluated and potential modifications will be suggested to allow for easier identification and mapping of streams in the watershed headwaters. See Section 6 for detailed information.

2.2.5 Special Areas Consideration

Identification of Special Areas was conducted to identify unique or special areas containing ecological, archeological, cultural and/or other community assets that merit consideration when developing capital improvement plans. The following methodology was used to identify special areas within the watershed:

- Coordinate with the City, County and NRD to identify and locate the special areas
- Obtain existing GIS files and identify previously generated reports containing information regarding the special areas
- Develop GIS maps of the special areas, develop a list of the areas and what existing documents and data are available, and review of the documents to extract information regarding the special areas.
- Use the special area maps and data to evaluate what, if any, effect the capital improvement projects might have on special areas and what measures need to be considered in the implementation of the capital improvement projects to mitigate the potential effects.

See Section 7 for a detailed description of the special areas evaluation and results.

This page left intentionally blank