6 CAPITAL IMPROVEMENT PROJECTS BY WATERSHED

6.1 Antelope Creek

Table 5 - Proposed Projects - Antelope Creek Watershed

Project ID	Project Type	Project Location	Project Description	2021 Prioritization Score*	2021 Updated Cost**
AC-7	WQ	Woods Park (West of 33rd St. & J St.)	Bioretention & Hydrodynamic Separators	100	$291,192
AC-8	WQ	Gere Library (SE of 56th St. & Normal Blvd.)	Bioretention & Hydrodynamic Separators	80	$110,653
AC-9	WQ	Eden Park (North of 44th St. & Antelope Creek Rd.)	Bioretention	100	$52,414
AC-10	WQ	NW of 60th St. & South St.	Detention Cell Retrofit	80	$52,414
AC-11	WQ	SW of 24th St. & N St.	Antelope Creek Labyrinth Weir Water Quality	195	$727,979
AC-12	WQ	Van Dorn Plaza & US Post Office (North of 48th St. & Van Dorn St.)	Bioretention	80	$75,710
AC-13	WQ	SE of 40th St. & Normal Blvd.	Bioretention & Hydrodynamic Separators	80	$145,596

***These scores were determined in 2021 using concept level data and are subject to change as additional data becomes available**

****Costs are adjusted to 2021 dollars based on inflation since the original master plan was completed**

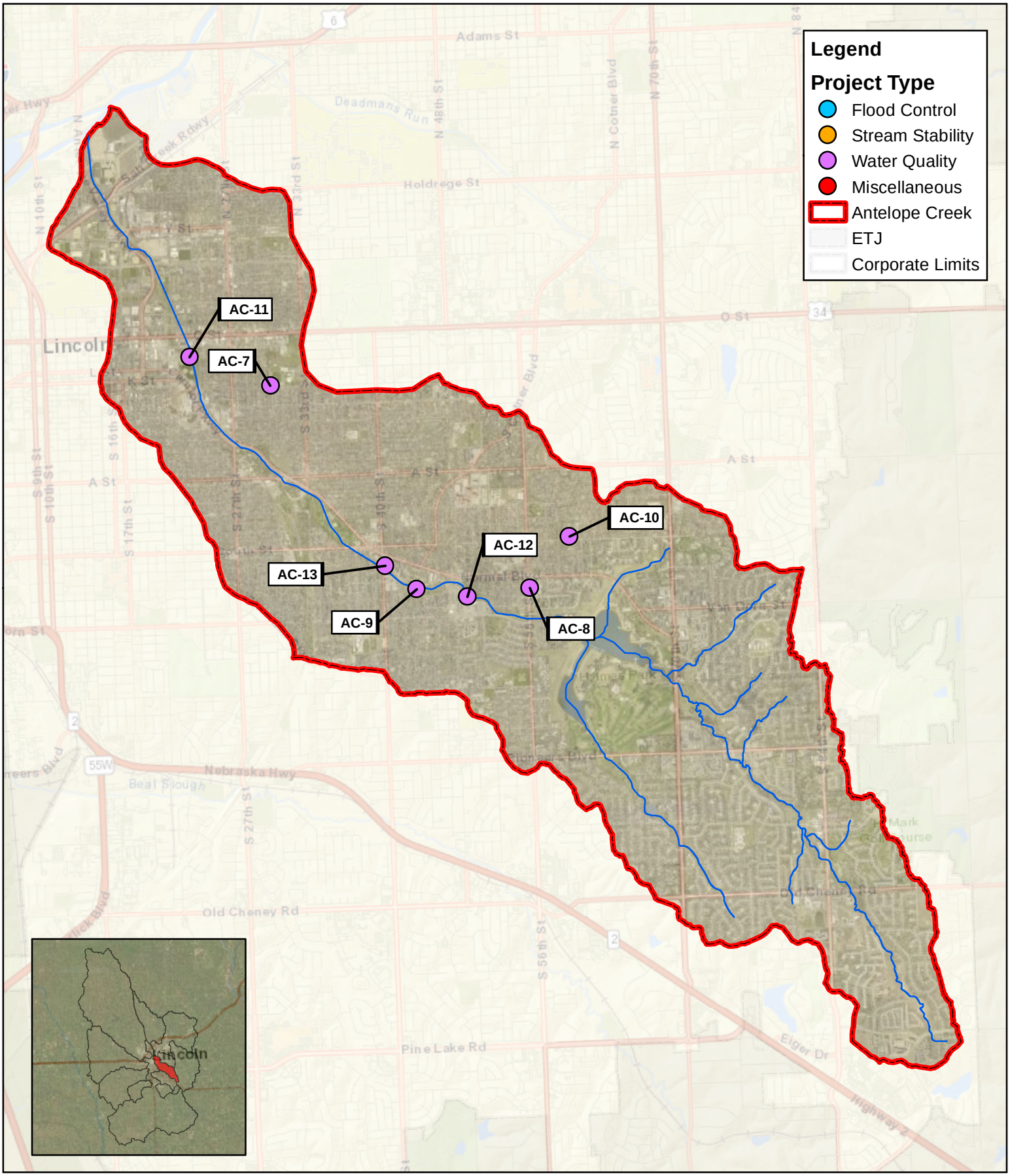

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Figure 5: Proposed Projects
Antelope Creek Watershed

Lincoln, NE

0 1,250 2,500 5,000 Feet

Antelope Creek: Bioretention & Hydrodynamic Separators | AC-7

Woods Park (West of 33rd St. & J St.)

Problem Description: This project is located west of 33rd and J Street at Woods Park, and is illustrated in Figure 8-9. The sub-watershed for this project is approximately 2 acres in size. The land use consists of residential development, park space and recreational facilities. Flow within the sub-watershed is generally in a westerly direction.

Recommendation: Install hydrodynamic separators near parking areas as shown in Figure 8-9. Flow from the parking areas should be directed into the units. Outflow from units should be either directed back into the storm drainage system or nearby bioretention areas. Grit chambers can be substituted for hydrodynamic separators where only sediment and gravel are of concern. Construct bioretention areas as shown in Figure 8-9. Total size of the bioretention areas is approximately 2,000 square feet. Each bioretention area is approximately 1.0 to 1.5 feet deep, with 2 to 3 feet of engineered soil. Overflows within a bioretention cell should carry large rainfall events to nearby storm drains. Curbs should be cut, and inlets modified where possible to allow runoff from nearby parking areas and rooftops to be captured.

Impact to Water Quality: Use of hydrodynamic separators can reduce the overall pollutant loading to Antelope Creek by capturing floatable debris, oils, grease, sediment, and gravel. The units should always be located in areas accessible for maintenance. Installing the bioretention areas will promote infiltration, reduce runoff, and reduce the loading of sediment, nutrients, and E. coli to Antelope Creek. The bioretention areas will also help to slow stormwater runoff; aiding in the prevention of future erosion downstream. Disconnecting impervious areas and redirecting them to green areas helps promote infiltration while reducing the volume of stormwater runoff. A reduction in the volume of stormwater runoff directly reduces each pollutant load being carried to Antelope Creek. Table 8-10 summarizes the current pollutant load, as well as the anticipated load reduction based on the structural BMPs to be implemented within this site. These loads are largely based upon WinSLAMM, and were adjusted to account for a variety of site specific measures.

Estimated Project Cost: $291,191

FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

Antelope Creek: Bioretention & Hydrodynamic Separators | AC-8

Gere Library (SE of 56th St. & Normal Blvd.)

Problem Description: This project is located southeast of 56th and Myrtle Street. The sub-watershed for this project includes the adjacent parking areas to the east; less than 3 acres in size. Flow within the sub-watershed is generally in a westerly direction.

Recommendation: Install a hydrodynamic separator near parking lot as shown in Figure 8-10. Flow from the parking lot should be directed into the unit. Outflow from unit should be directed back into the storm drainage system. A grit chamber can be substituted for the hydrodynamic separator where only sediment and gravel are of concern. Construct a bioretention area as shown in Figure 8-10. The bioretention area is approximately 2,000 to 2,500 square feet and approximately 1.0 to 1.5 feet deep with 2 to 3 feet of engineered soil. Overflows should have large events directed to nearby storm drain inlets. Curbs should be cut, or inlets modified where possible to allow runoff from nearby parking areas and rooftops to be captured.

Impact to Water Quality: Use of hydrodynamic separators can reduce the overall pollutant loading to Antelope Creek by capturing floatable debris, oils, grease, sediment, and gravel. The units should always be located in areas accessible for maintenance. Installing the bioretention areas will promote infiltration, reduce runoff, and reduce the loading of sediment, nutrients, and E. coli to Antelope Creek. The bioretention area will also help to slow stormwater runoff, which will aid in the prevention of future erosion downstream. Disconnecting impervious areas and redirecting them to green areas helps promote infiltration while reducing the volume of stormwater runoff. A reduction in the volume of stormwater runoff directly reduces each pollutant load being carried to Antelope Creek. Table 8-11 summarizes the current pollutant load, as well as the anticipated load reduction based on the structural BMPs to be implemented within this site. These loads are largely based upon WinSLAMM, and were adjusted to account for a variety of site specific measures.

Estimated Project Cost: $110,652

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**Refer to the original Master Plan for all Figure and Table Callouts*

Antelope Creek: Bioretention | AC-9

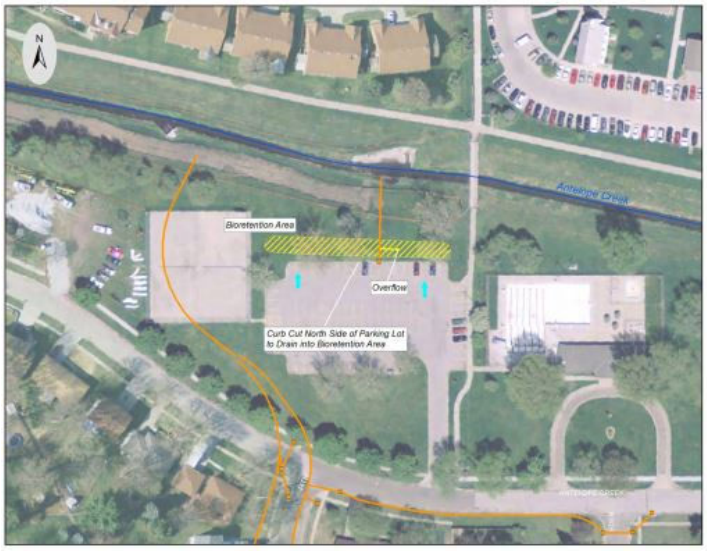
Eden Park (North of 44th St. & Antelope Creek Rd.)

Problem Description: This project is located north of 44th and Antelope Creek Road. The sub-watershed for this project is confined to the parking lot and areas immediately adjacent; less than 2 acres in size. The land use consists of parking areas and green space. Flow within the sub-watershed is generally in a northerly direction.

Recommendation: Installation of curb cuts along the north side of the parking lot to allow runoff to drain into a bioretention area. Construct a bioretention area as shown in Figure 8-11. Total size of the bioretention area is approximately 1,000 to 1,200 square feet. The bioretention area is approximately 1.0 to 1.5 feet deep, with 2 to 3 feet of engineered soil. Overflows within a bioretention cell should carry large rainfall events to nearby storm drains.

Impact to Water Quality: Curb cuts allow stormwater from the parking lot to discharge into the bioretention area designed to treat pollutants carried in the water. The bioretention area will promote infiltration, reduce runoff, and reduce the loading of sediment, nutrients, and E. coli to Antelope Creek. The bioretention area will also help to slow stormwater runoff, which will aid in the prevention of future erosion downstream. Disconnecting impervious areas and redirecting them to green areas helps promote infiltration while reducing the volume of stormwater runoff. A reduction in the volume of stormwater runoff directly reduces each pollutant load being carried to Antelope Creek. Table 8-12 summarizes the current pollutant load, as well as the anticipated load reduction based on the structural BMPs to be implemented within this site. These loads are largely based upon WinSLAMM, and were adjusted to account for a variety of site specific measures.

Estimated Project Cost: $52,414



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**Refer to the original Master Plan for all Figure and Table Callouts*

Antelope Creek: Detention Cell Retrofit | AC-10

NW of 60th St. & South St.

Problem Description: This potential retrofit project is located north of 60th and South Street, illustrated in Figure 8-12. The sub-watershed for this project is approximately 3 acres in size and consists entirely of residential development. Flow within the sub-watershed is generally in a southwesterly direction.

Recommendation: Modify the lining of the existing extended detention basin to enhance infiltration into soils. This can be accomplished by replacing approximately 1,500 to 2,000 square feet with 2 to 3 feet of engineered soil to promote infiltration, and planting deep rooted vegetation to aid soil aeration. Modifications to the basin outlet were also included as part of this project to aid in retaining runoff to infiltration and sediment deposition.

Impact to Water Quality: Modifying the existing detention basin will promote infiltration, reduce runoff, and reduce the loading of sediment, nutrients, and E. coli to Antelope Creek. The detention basin will also help to slow stormwater runoff; aiding in the prevention of future erosion downstream. A reduction in the volume of stormwater runoff directly reduces the loading of sediment, nutrients, and E. coli to Antelope Creek. Table 8-13 summarizes the current pollutant load, as well as the anticipated load reduction based on the structural BMPs to be implemented within this site. These loads are largely based upon WinSLAMM, and were adjusted to account for a variety of site specific measures.

Estimated Project Cost: $52,414

FOR MORE INFORMATION

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**Refer to the original Master Plan for all Figure and Table Callouts*

Antelope Creek: Antelope Creek Labyrinth Weir Water Quality | AC-11

SW of 24th St. & N St.

Problem Description: This project is located south of N Street, west of 24th Street and is illustrated in Figure 8-13. The watershed (downstream of and not including Holmes Lake) for this project is approximately 3,900 acres in size; the land use is wide ranging, including residential development, commercial development, schools, park space and recreational facilities. Flow within the sub-watershed is generally in a northwest direction.

Recommendation: Construct an inline concrete weir along Antelope Creek, approximately 250 feet upstream of the labyrinth weir southwest of 24th and N Street. Excavate upstream of the new weir to provide an inline wet pond that is approximately 300 feet long, and 4 to 5 feet deep. The sides of this wet pond should be stabilized with sheet pile, gabion, or concrete. This inline wet pond will create an area for TSS to drop out of the water column and provide an area for easy removal of the captured sediment. Remove the existing concrete channel and articulated concrete block lining upstream of the labyrinth weir. Construct a low-flow concrete channel downstream of the new weir. A concrete apron should be placed at the base of the new concrete weir and extended to the outlet of the two stormwater outfalls located just downstream of the new weir. The low flow channel should be constructed to direct base flows toward the sluice gate located in the labyrinth weir. The channel should also be designed with a stub wall so that if the sluice gate is closed or under moderate flows, portions of the flow can be directed to the existing enclosed conduit. During high flows, the green space could potentially fill up and spill over the labyrinth weir. Construction of this project will require coordination with the US Army Corps of Engineers.

Impact to Water Quality: The wet pond is intended to capture large amounts sediment and gravel. A portion of the overall phosphorus load is expected to be bound to the sediment. By placing these types of structures in an area accessible to maintenance crews, the overall phosphorus and sediment load within Antelope Creek can reduced. The new weir would increase the water surface area during base flows, therefore increasing the amount of sunlight exposed to the water and reducing the amount of E. coli within Antelope Creek. The new concrete channel and green space will both increase aesthetics and flow through the Labyrinth Weir. Table 8-14 summarizes the current pollutant load, as well as the anticipated load reduction based on the structural BMPs to be implemented within this site. These loads are largely based upon WinSLAMM, and were adjusted to account for a variety of site specific measures.

Estimated Project Cost: $727,978

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Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

Antelope Creek: Bioretention | AC-12

Van Dorn Plaza & US Post Office (North of 48th St. & Van Dorn St.)

Problem Description: This project is located in Van Dorn Plaza, near 48th and Van Dorn Street. The total sub-watershed for this project is approximately 2 acres in size; the land use consists entirely of commercial development. Flow within the sub-watershed is generally in a northeast direction.

Recommendation: Construct bioretention areas as shown in Figure 8-14. Total size of the bioretention areas is approximately 2,000 to 2,500 square feet. The bioretention areas are approximately 1.0 to 1.5 feet deep, with 2 to 3 feet of engineered soil. Overflows within a bioretention area should carry large rainfall events to nearby storm drains. Nearby inlets should be modified to allow runoff from nearby parking areas and rooftops to flow to the bioretention areas.

Impact to Water Quality: Inlet modifications allow stormwater from the rooftops and parking lots to discharge into the bioretention areas designed to treat pollutants carried in the water. Rooftops and parking lots often pollute stormwater with heavy metals, sediment, gravel and oils and greases. The bioretention areas will promote infiltration, reduce runoff, and reduce the loading of sediment, nutrients, and E. coli to Antelope Creek. The bioretention areas will also help to slow stormwater runoff; aiding in the reduction of future erosion downstream. A reduction in the volume of stormwater runoff directly reduces each pollutant load being carried to Antelope Creek. Table 8-15 summarizes the current pollutant load, as well as the anticipated load reduction based on the structural BMPs to be implemented within this site. These loads are largely based upon WinSLAMM, and were adjusted to account for a variety of site specific measures.

Estimated Project Cost: $75,709

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**Refer to the original Master Plan for all Figure and Table Callouts*

Antelope Creek: Bioretention & Hydrodynamic Separators | AC-13

SE of 40th St. & Normal Blvd.

Problem Description: This project is located southwest of 40th and Normal Boulevard. The sub-watershed for this project is confined to the parking areas immediately north; less than 3 acres in size. The land use consists of parking areas and residential development. Flow within the sub-watershed is generally in a northwesterly direction.

Recommendation: Install a hydrodynamic separator near the parking lot, as shown in Figure 8-15. Flow from the parking lot should be directed into the unit. Outflow from unit should be directed back into the storm drainage system. Grit chambers can be substituted for hydrodynamic separators where only sediment and gravel are of concern. Construct bioretention areas as shown in Figure 8-15. Total size of the bioretention areas is approximately 3,000 to 3,500 square feet. The bioretention area is approximately 1.0 to 1.5 feet deep, with 2 to 3 feet of engineered soil. Overflows within a bioretention area should carry large rainfall events to nearby storm drains. Curbs should be cut, or inlets modified where possible to allow runoff from nearby parking areas and rooftops to be captured.

Impact to Water Quality: Use of hydrodynamic separators can reduce the overall pollutant loading to Antelope Creek by capturing floatable debris, oils, grease, sediment, and gravel. The units should always be located in areas accessible for maintenance. Installing the bioretention areas will promote infiltration, reduce runoff, and reduce the loading of sediment, nutrients, and E. coli to Antelope Creek. The bioretention areas will also help to slow stormwater runoff, which will aid in the reduction of future erosion downstream. Disconnecting impervious areas and redirecting them to green areas helps promote infiltration while reducing the volume of stormwater runoff. A reduction in the volume of stormwater runoff directly reduces each pollutant load being carried to Antelope Creek. Table 8-16 summarizes the current pollutant load, as well as the anticipated load reduction based on the structural BMPs to be implemented within this site. These loads are largely based upon WinSLAMM, and were adjusted to account for a variety of site specific measures.

Estimated Project Cost: $145,595

FOR MORE INFORMATION

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**Refer to the original Master Plan for all Figure and Table Callouts*

6.2 Beal Slough

Table 6 - Proposed Projects - Beal Slough Watershed

Project ID	Project Type	Project Location	Project Description	2021 Prioritization Score*	2021 Updated Cost**
BS-6	SS	South of Hwy 2 East & West of Southwood Dr.	Channel Stabilization & Grade Controls	180	$442,889
BS-11	FC	40th St. north of Hwy 2	Construct Culvert	340	$2,657,334
BS-18	WQ	Tierra Park: SW of 40th St. & Hwy 2	Wetland Construction	270	$73,815
BS-24	WQ	SW of 20th St. & King Arthur Ct.	Wetland Construction	250	$103,341

***These scores were determined in 2021 using concept level data and are subject to change as additional data becomes available**

****Costs are adjusted to 2021 dollars based on inflation since the original master plan was completed**

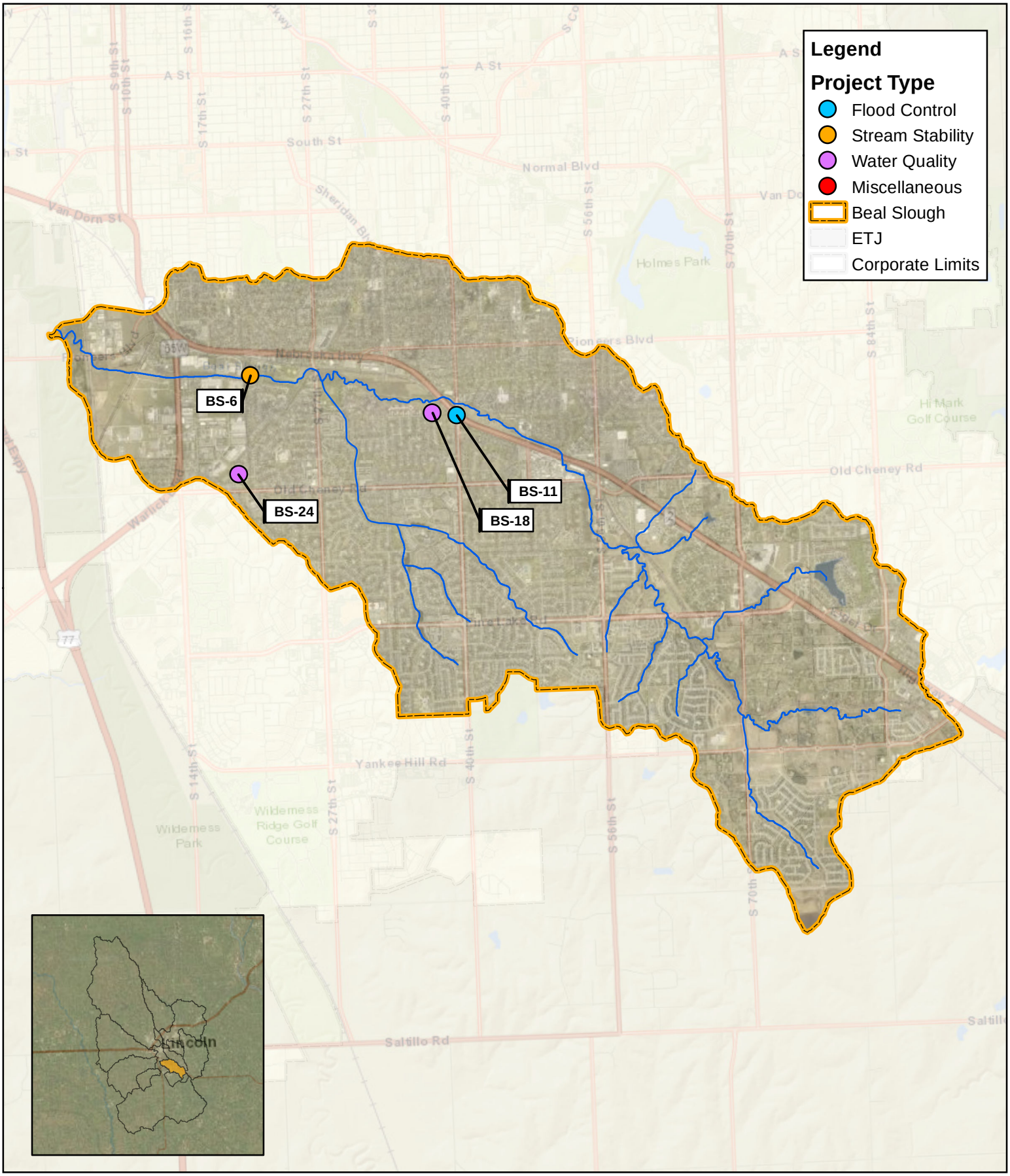

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Figure 6: Proposed Projects
Beal Slough Watershed

Lincoln, NE

0 1,250 2,500 5,000 Feet

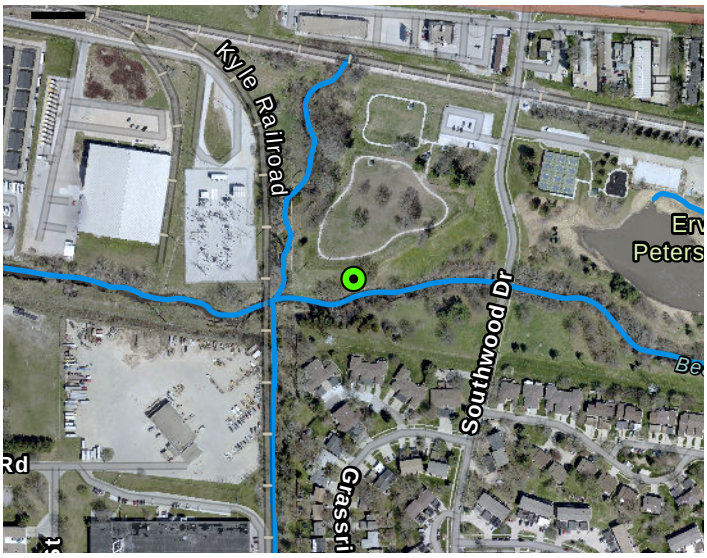
Beal Slough: Channel Stabilization & Grade Controls | BS-6

South of Hwy 2 East & West of Southwood Dr.

Problem Description: Channel banks are sloughing on the outside radii of meanders due to toe cutting and the stream bed has degraded at this location.

Recommendation: Channel bed and bank stability improvements. Construct grade controls at the location.

Estimated Project Cost: $442,888



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Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

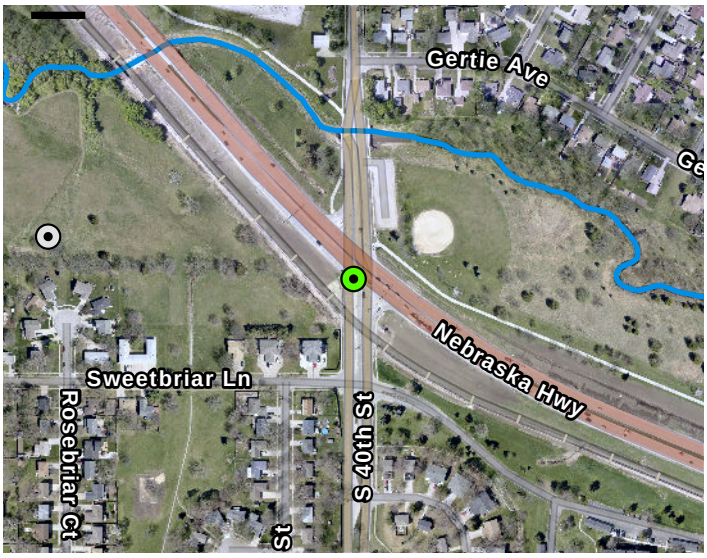
Beal Slough: Construct Culvert | BS-11

40th St. north of Hwy 2

Problem Description: Increased peak flow rates result in more frequent overtopping of the 40th Street culvert. Backwater effects from the Highway 2 bridge west of 40th Street for the 1997 conditions 100-year flood increases the water surface profile by 3 feet at 40th Street and effects the profile for an additional 2000 feet upstream.

Recommendation: Supplemental culvert under 40th Street and Highway 2, training dike, enlargement of bridge openings at Highway 2 and BNSFRR.

Estimated Project Cost: $2,657,333



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**Refer to the original Master Plan for all Figure and Table Callouts*

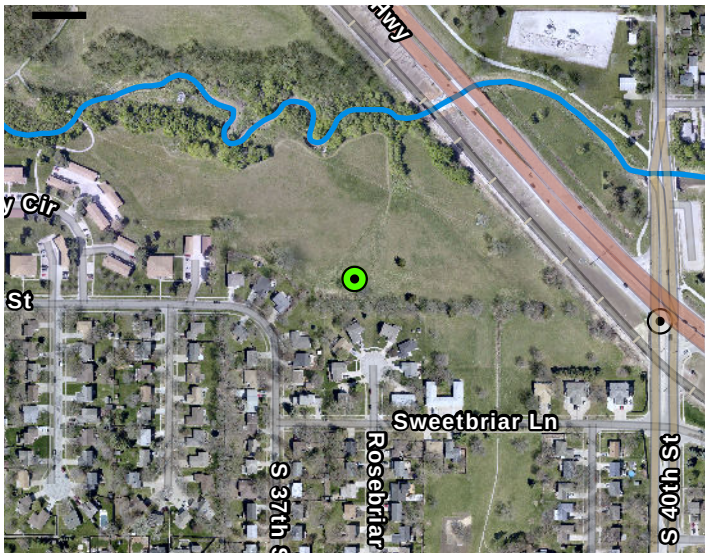
Beal Slough: Wetland Construction | BS-18

Tierra Park: SW of 40th St. & Hwy 2

Problem Description: The LPSNRD bioengineering project created a stable channel between Highway 2 and 40th Street reducing the sediment load generated by bank sloughing and bed degradation. Although bank sloughing and bed degradation continue to be a significant sediment source between 27th Street and Highway 2, runoff from residential and commercial land uses in the basin likely effect water quality in this reach.

Recommendation: Construct water quality wetlands in off-channel storage facility.

Estimated Project Cost: $73,814



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**Refer to the original Master Plan for all Figure and Table Callouts*

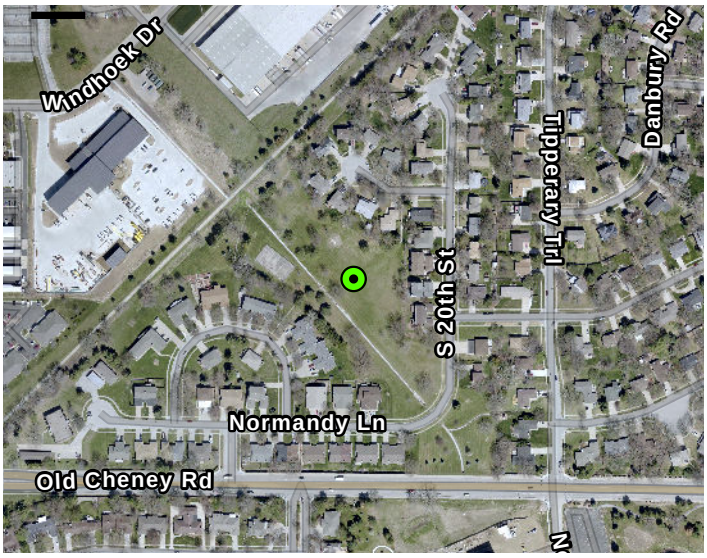
Beal Slough: Wetland Construction | BS-24

SW of 20th St. & King Arthur Ct.

Problem Description: Parking lot and roof top runoff from adjoining industrial and commercial land use and runoff from adjoining residential land use are likely the determinants of water quality of this intermittent stream.

Recommendation: Construct water quality wetland in park.

Estimated Project Cost: $103,340



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**Refer to the original Master Plan for all Figure and Table Callouts*

6.3 Cardwell Branch

Table 7 - Proposed Projects - Cardwell Branch Watershed

Project ID	Project Type	Project Location	Project Description	2021 Prioritization Score*	2021 Updated Cost**
CB-1	SS	SE of W. 40th St. & Denton Rd.	Grade Controls	100	$290,744
CB-2	SS	W. 27th St. South of Denton Rd.	Stepped Grade Controls	180	$444,368
CB-3	SS	North of Cardwell Cir. Cul-de-sac	Grade Controls	100	$350,416
CB-4	SS	SE of W. 12th St. & Denton Rd.	Grade Controls	110	$893,815
CB-5	SS	NE of W. 27th St. & Cardwell Rd.	Grade Controls	180	$302,170
CB-6	SS	NW of W. 27th St. & Rokeby Rd.	Grade Controls	150	$1,131,234
CB-7	SS	NE of W. 40th St. & Saltillo Rd.	Grade Controls	100	$275,508
CB-8	SS	NE of W. 40th St. & Saltillo Rd.	Grade Controls	100	$288,204

***These scores were determined in 2021 using concept level data and are subject to change as additional data becomes available**

****Costs are adjusted to 2021 dollars based on inflation since the original master plan was completed**

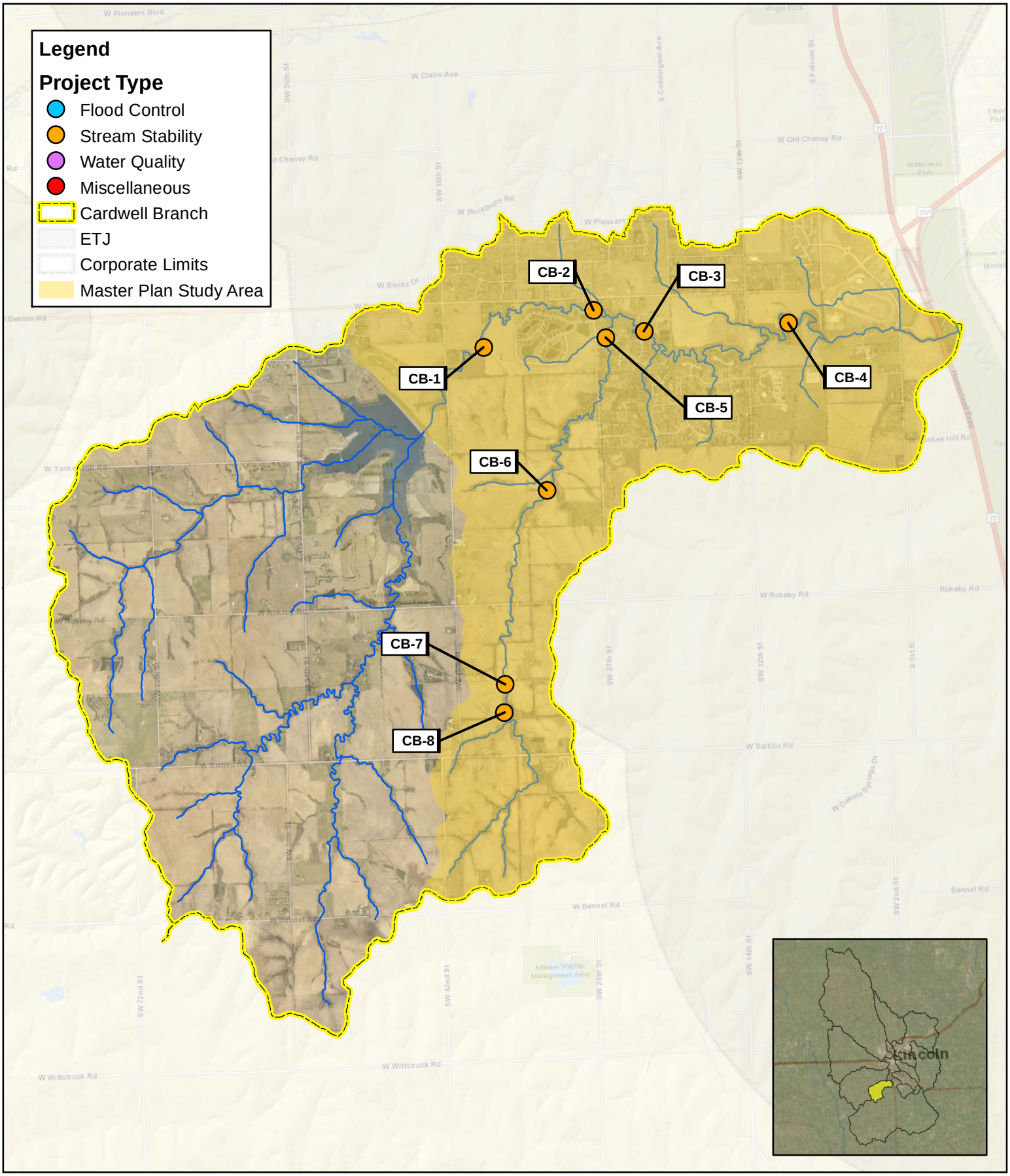

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Figure 7: Proposed Projects Cardwell Branch Watershed

Lincoln, NE

0 1,250 2,500 5,000 Feet

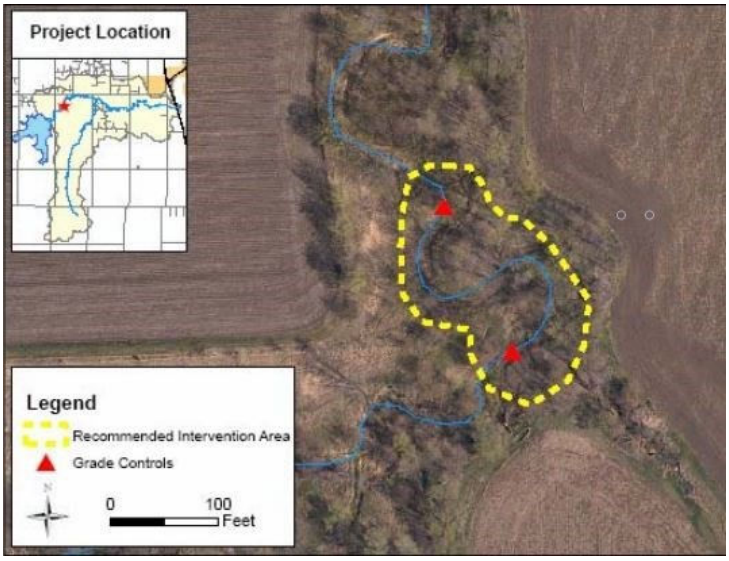
Cardwell Branch: Grade Controls | CB-1

SE of W. 40th St. & Denton Rd.

Problem Description: Extensive downcutting, a relatively narrow lower channel and at least one knickpoint was observed in this segment. Accumulations of woody debris apparently have slowed the rate of incision; but, through the presence of the knickpoint in the bare channel, incision has not been abated. Continued incision will generate more woody debris, as well as generate significant sediment. Further, the upstream migration of incision will erode the channel and degrade the banks upstream and along this segment. Further accumulation and raising of woody debris along existing locations of the main stem may contribute to backpooling behind the debris and thereby lead to uncontrolled flooding.

Recommendation: Placing several grade controls to arrest incision and direct flows along the fairly tight meanders. The grade controls should be Newbury-type rock structures with gently sloping tailwater ramps. The grade controls should be shaped to direct flows through the tight meanders as well as manage meander migration. Other than vegetating the transitions upstream and downstream of the grade controls, the current condition of the banks does not warrant further stabilization.

Estimated Project Cost: $290,743



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**Refer to the original Master Plan for all Figure and Table Callouts*

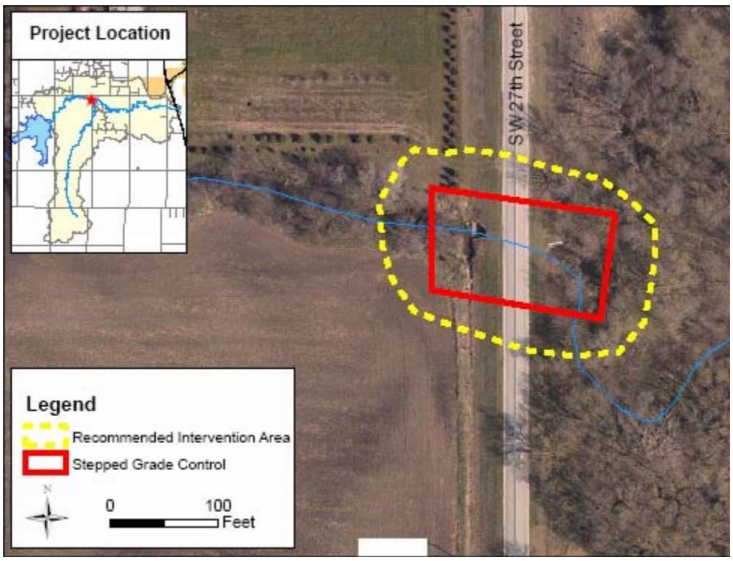
Cardwell Branch: Stepped Grade Controls | CB-2

W. 27th St. South of Denton Rd.

Problem Description: The headcut underneath and downstream of the crossing is currently stabilized by ongoing armoring of the channel. The channel bed elevation difference upstream and downstream of the crossing is 4.0 feet for a channel slope in excess of 0.03 ft/ft, indicating the presence of a knick zone. This slope is highly unstable for the natural bed and bank soils and will cause significant degradation of the channel under the crossing and downstream of the crossing. Should the knick zone under this crossing be allowed to migrate upstream, the channel will incise as deep as 4 feet, thereby causing bank instability and significant generation of sediment and woody debris. In particular, this woody debris could block the crossing.

Recommendation: Stabilizing the knick zone more permanently with a stepped-grade control structure immediately downstream of the crossing with a scour pool. The grade control structure shall be constructed of crushed stone with a cross-sectional shape that directs the flow toward the center of the channel. The scour pool shall be sized to properly dissipate energy at the end of the stepped structure. The current condition of the banks does not necessitate extensive bank stabilization other than what would be required for the installation of the stepped-grade control and scour pool.

Estimated Project Cost: $444,368



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Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

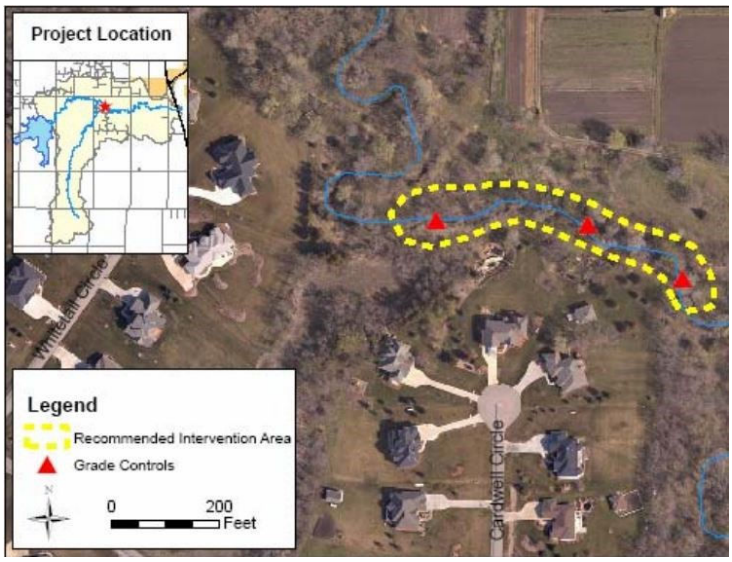
Cardwell Branch: Grade Controls | CB-3

North of Cardwell Cir. Cul-de-sac

Problem Description: The 2-feet high check dam, which crosses the channel near the upstream portion of this segment, was flanked along the right descending bank. It is no longer controlling the grade in the channel and is manifesting itself into a headcut. If left unabated, this headcut will migrate upstream. The eroded channel will raise the banks, exposing bare ground below the root zone. This erosion could potentially lead to bank instability, accelerated generation of woody debris, and toppling of trees and significant sediment generation.

Recommendation: Replace the lost function of the check dam with a series of rock grade controls. The grade control structures should be the Newbury-type structures with gentle slope tailwater ramps. Vegetating the transitions from the grade controls to the adjacent banks would provide a more robust and flexible connection between the grade control and natural banks and additional energy dissipation.

Estimated Project Cost: $350,415



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

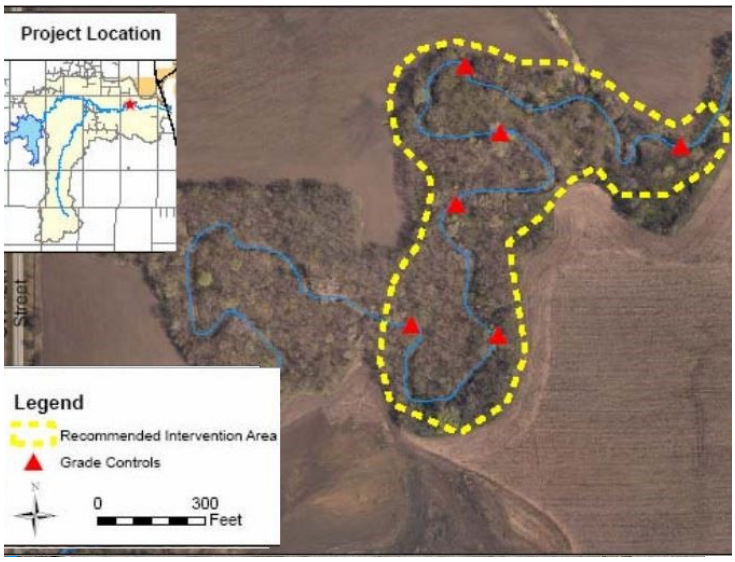
Cardwell Branch: Grade Controls | CB-4

SE of W. 12th St. & Denton Rd.

Problem Description: This segment shows active meandering as indicated by alternating scoured and bare banks. This active meandering is progressing in the downstream direction. Typically, the scoured banks were bare to nearly bare, and the grass and tree root zones are undercut, leaving overhanging to imminently overhanging trees. If left unabated, this active meandering will continue, scouring the banks over a large scale, generating great volumes of woody debris and sediment. Further, the continuance of this active migration could potentially cut off meanders, shorten the channel length, and cause incision in a location where incision is currently not a process.

Recommendation: Arrest the active channel meandering by fixing select locations of current riffles with rock grade controls. The grade controls should be Newbury-type structures with gently sloping tailwater ramps and a cross-sectional shape to direct flow. Because of the existing tree and other vegetation cover in place, the installation of more robust bank treatments would disrupt the riparian environment more than it would improve it. The diversion of the flow away from the bank would reduce the shear force on these banks and allow them to mend. Further, vegetating the transitions from the grade controls to the adjacent banks would provide a more robust and flexible connection between the grade control and natural banks and provide additional energy dissipation.

Estimated Project Cost: $893,814



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

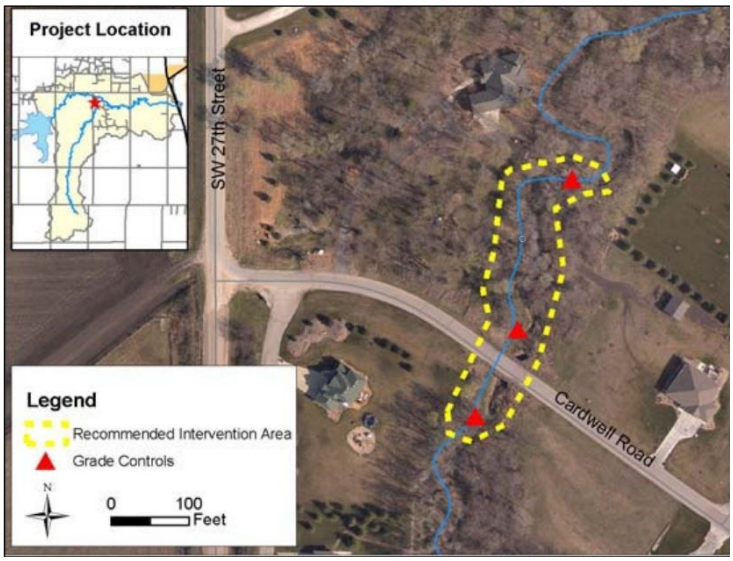
Cardwell Branch: Grade Controls | CB-5

NE of W. 27th St. & Cardwell Rd.

Problem Description: Extensive downcutting with steep banks are present along this segment. At least two knickpoints were found in this segment. The sanitary sewer, encased in concrete, is exposed immediately downstream of the crossing at Cardwell Road and forms one of the knickpoints. Continued incision could undermine the concrete encasement of the sanitary sewer, potentially leading to a line break. The continuation of incision will also generate more woody debris that could block either the tributary or Cardwell Branch. Further, the upstream migration of incision will erode the channel and degrade the banks upstream and along this segment. Additional accumulation of woody debris along existing locations of the tributary may contribute to backpooling behind the debris and thereby lead to uncontrolled flooding.

Recommendation: Placing grade controls to arrest incision and direct flows toward the central portion of the channel. The grade controls should be Newbury-type rock structures with gently sloping tailwater ramps. The grade controls should be shaped to direct flows through the tight meanders as well as manage meander migration. Other than vegetate the transitions upstream and downstream of the grade controls, the current condition of and location of the banks does not warrant further stabilization.

Estimated Project Cost: $302,170



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

Cardwell Branch: Grade Controls | CB-6

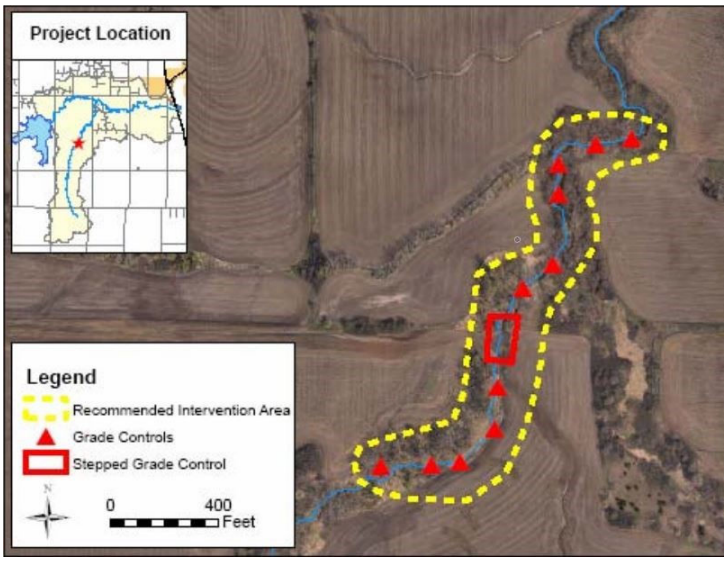
NW of W. 27th St. & Rokeby Rd.

Problem Description: This segment of the tributary is incised with steep-sided banks and a channel slope approaching 0.007 ft/ft. In addition, the flows at the bankfull/dominant discharge stage exert the highest shear stress on the channel over this segment than any other in the study area. A knick zone approaching 850 feet long is upstream of and through a culvert crossing located in the center of the problem area. The culvert crossing is in poor condition and will likely be flanked or a headcut will propagate through the corroded bottom, thus potentially creating a 4.5-foot high headcut that will ultimately migrate upstream. The banks, with little or no deep root reinforcement from woody vegetation, will slough and erode and generate significant volumes of sediment. This sediment will accumulate downstream in Cardwell Branch and Salt Creek. Further, continued degradation of the banks and lack of stream energy management will continue until the channel slope flattens and the channel widens after it incises.

Recommendation: Several rock structures in conjunction with a stepped-grade structure and scour pool will manage the channel slope, abate migration of the knick zone, and provide longer-term stabilization than the existing culvert. The grade controls should be Newbury-style structures, which are hydraulically rough with gentle tailwater slopes. The stepped-grade control structure with a scour pool should be placed in the area of the existing culvert crossing. The grade control structure shall be constructed of crushed stone with a cross-sectional shape that directs the flow toward the center of the channel.

The scour pool shall be sized to properly dissipate energy at the end of the stepped structure. Currently, the banks are in good enough condition not to warrant bank stabilization other than vegetated transitions upstream and downstream of each structure and around the scour pool. Further, the installation of the grade controls should provide a stabilizing influence through diverting flows away from the banks and thereby reducing the stress on the banks. However, the current bank vegetation is the invasive reed canary grass. Augmenting the stability of the banks with deeper rooted vegetation along the banks near construction access points would prove fortuitous.

Estimated Project Cost: $1,131,234



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

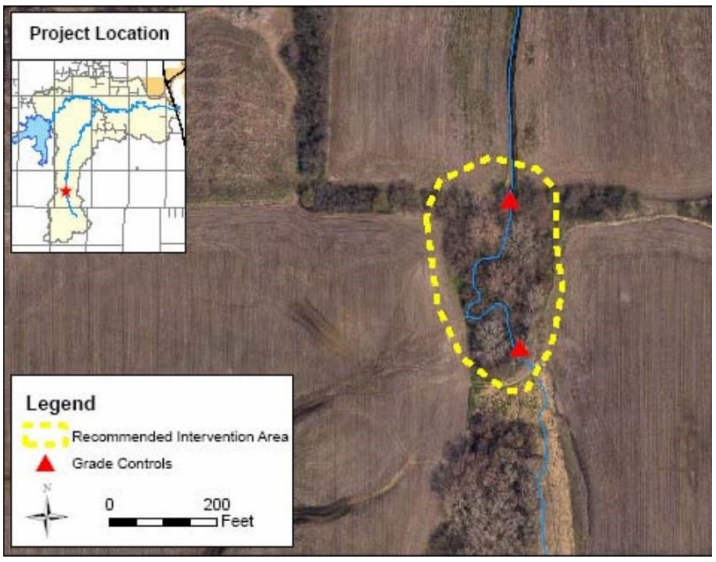
Cardwell Branch: Grade Controls | CB-7

NE of W. 40th St. & Saltillo Rd.

Problem Description: This segment of the tributary shows signs of incision through steep banks and at least two knickpoints. Currently one of the knickpoints is abated by tree roots that are being undermined such that there are little or no mechanisms to prevent incision from migrating upstream. Unless the headcuts are more permanently arrested, the upstream channel will downcut and the banks will erode and generate significant volumes of excess sediment that will accumulate downstream in the Cardwell Branch main stem and Salt Creek. Further, the stable channel upstream of this incised segment will not be preserved.

Recommendation: Several rock structures will abate migration of the knickpoints or headcuts and will provide long-term preservation of the upstream stable channels. The grade controls should be Newbury-style structures with hydraulically rough surfaces and gently sloping tailwater slopes. Currently, the banks are in good enough condition not to warrant bank stabilization other than vegetated transitions upstream and downstream of each structure. Further, the installation of the grade controls will provide a stabilizing influence through diverting flows away from the banks and thereby reducing the stress on the banks.

Estimated Project Cost: $275,508



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

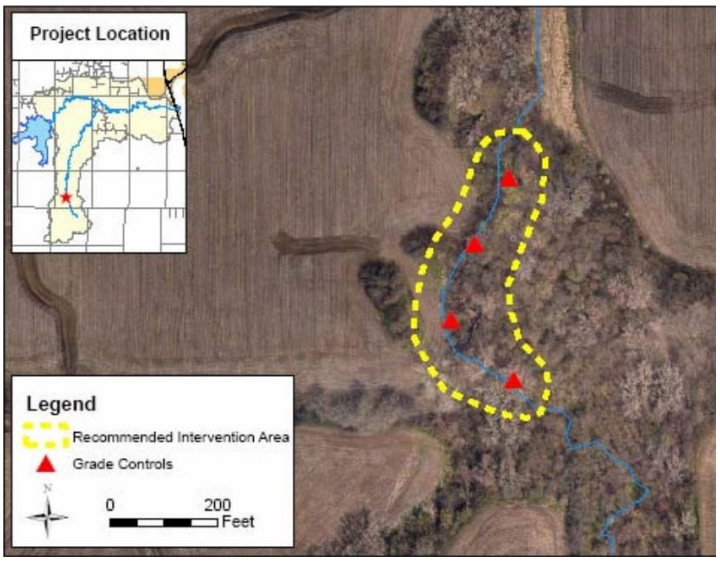
Cardwell Branch: Grade Controls | CB-8

NE of W. 40th St. & Saltillo Rd.

Problem Description: This segment of the tributary shows signs of incision through steep banks and at least one knickpoint. Currently, there are no mechanisms to prevent incision from migrating upstream. Unless the headcuts are arrested, the upstream channel will downcut and the banks will erode and generate significant volumes of excess sediment that will accumulate downstream in Cardwell Branch main stem and Salt Creek. Further, the stable channel upstream of this incised segment will not be preserved.

Recommendation: Several rock structures will abate migration of the knickpoints and will provide long-term preservation of the upstream stable channels. The grade controls should be Newbury-style structures with hydraulically rough surfaces and gently sloping tailwater slopes. Currently, the banks are in good enough condition not to warrant bank stabilization other than vegetated transitions upstream and downstream of each structure. Further, the installation of the grade controls should provide a stabilizing influence through diverting flows away from the banks and thereby reducing the stress on the banks.

Estimated Project Cost: $288,204



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

6.4 Deadmans Run

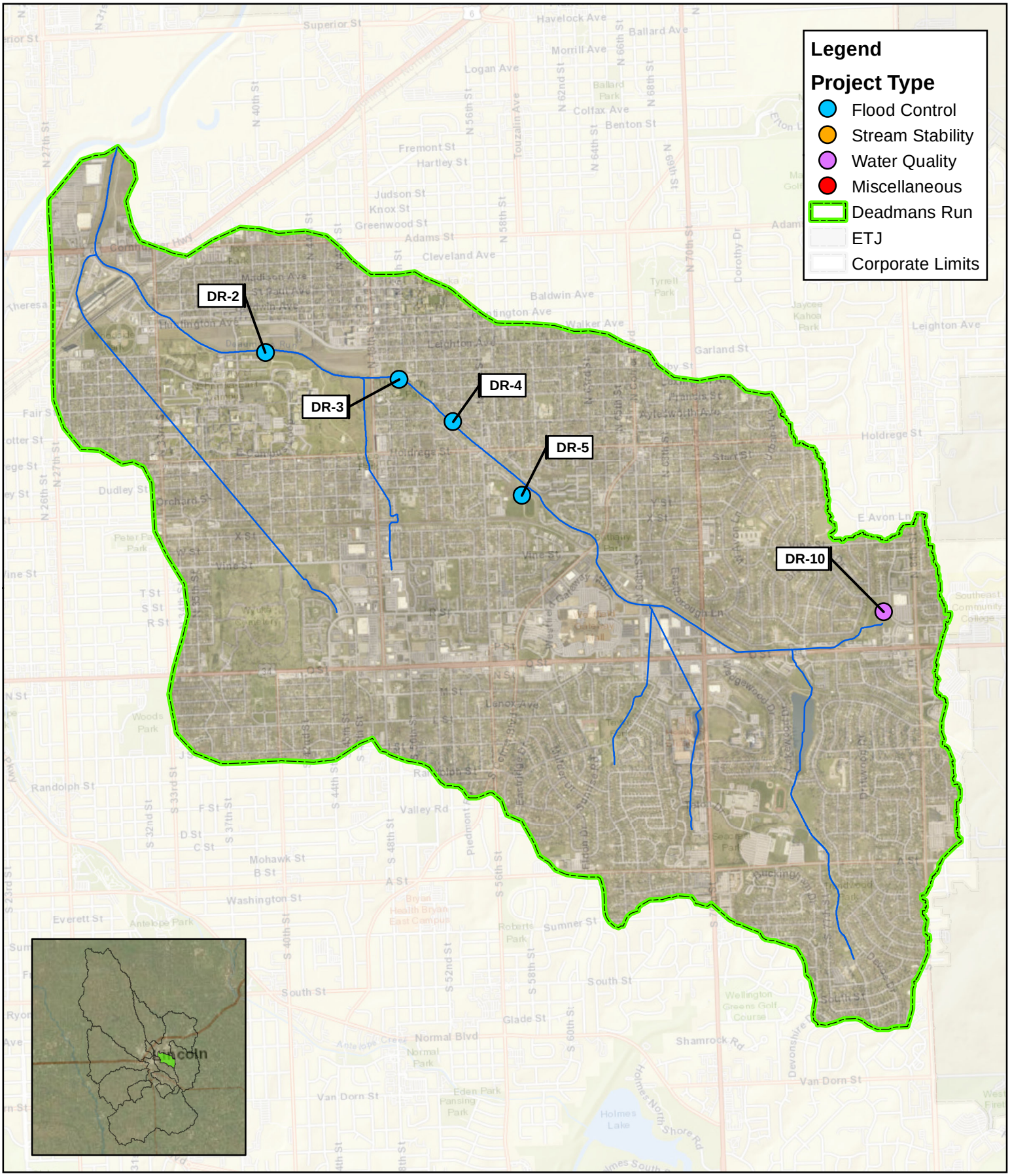
Table 8 - Proposed Projects - Deadmans Run Watershed

Project ID	Project Type	Project Location	Project Description	2021 Prioritization Score*	2021 Updated Cost**
DR-2* **	FC	South of Huntington Ave./ Leighton Ave. from 33rd St. to 48th St.	Channel Widening	270	N/A
DR-3	FC	North of Francis St. from 48th St. to 52nd St.	Channel Widening & Bridge Replacements	270	$3,141,047
DR-4	FC	SE of 52nd St. & Francis St. to NW of 56th St. & Holdrege St.	Channel Widening & Bridge Replacements	270	$9,857,353
DR-5	FC	Lincoln Lutheran Middle/High School (NE of 56th St. & Mopac Trail)	Dry Detention Construction	270	$3,722,535
DR-10	WQ	SW of Trail Ridge Rd. & Russwood Blvd.	Detention Pond Retrofit for Water Quality	130	$44,437

***These scores were determined in 2021 using concept level data and are subject to change as additional data becomes available**

****Costs are adjusted to 2021 dollars based on inflation since the original master plan was completed**

*****This project is currently being implemented**



Created By: MB
Date: 3/15/2022
Software: ArcGIS 10.8.1
File: Lincoln Prioritization CIP Locations.mxd

Figure 8: Proposed Projects Deadmans Run Watershed

Lincoln, NE

0 750 1,500 3,000 Feet

Deadmans Run: Channel Widening & Bridge Replacements | DR-2

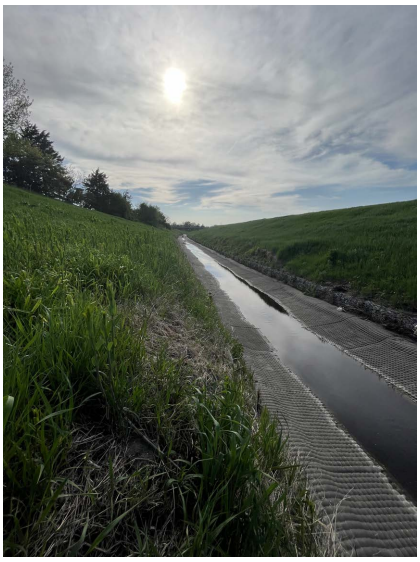
Downstream of 48th Street to Cornhusker Highway

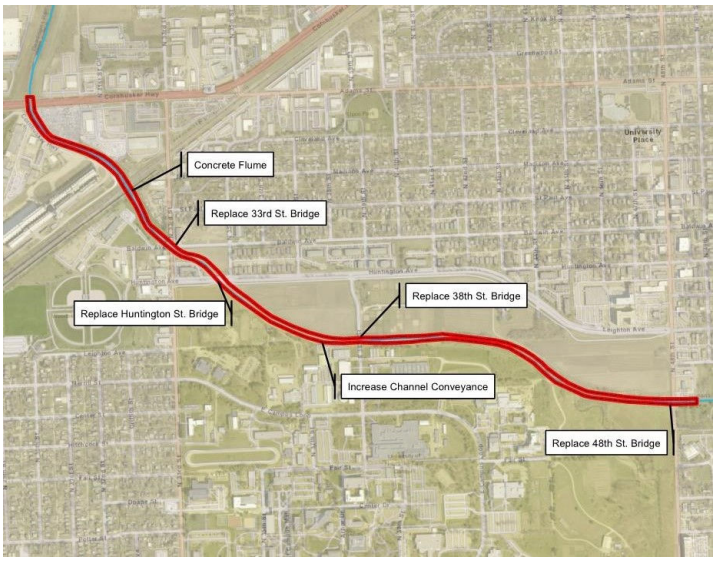
Problem Description: This segment of the main channel from the downstream of the 48th Street to Cornhusker Highway does not have adequate capacity for larger storm events. During the 100-year storm event, the channel capacity is exceeded resulting in overbank flooding. In addition, the railroad bridges, 33rd Street culvert, the Huntington Street bridge and 38th Street bridge openings are too small to accommodate the 100-year storm event, resulting in overbank flooding throughout this channel segment.

Recommendation: Increase channel capacity by widening the channel and remove constrictions at the bridge crossings by increasing the conveyance though the bridge opening. Following outlines on-going flood risk reduction projects in this project area:

- The NRD and city is partnering with U.S. Army Corps of Engineers (Omaha District) in developing an address to flood risk in this area. The project components involve; channel widening, flumes at Railroad Bridge, new bridge at 33rd Street, 38th Street and 48th Street.
- Huntington Street bridge will be replaced in the future

Estimated Project Cost: $25,000,000





FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

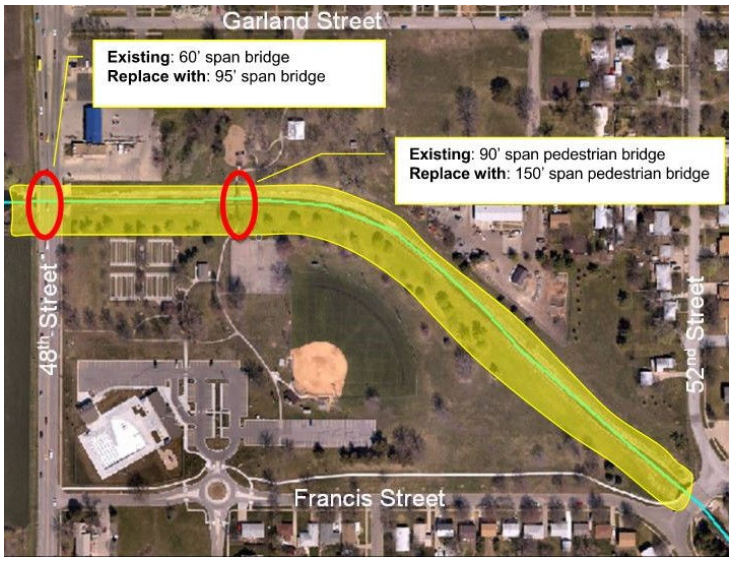
Deadmans Run: Channel Widening & Bridge Replacements | DR-3

North of Francis St. from 48th St. to 52nd St.

Problem Description: The narrow channel constricts flow during larger storm events, causing overbank flooding to the south. In addition, the 48th Street culvert and the pedestrian bridge near the park are undersized to convey the 100-year storm event.

Recommendation: The recommended improvement consists of widening the channel using flood benches to reduce the overbank flooding, as well as replacing the pedestrian crossing and the bridge that extends beneath 48th Street. Figure 8-11 depicts the channel widening and project construction limit extents. Flood benching the channel by an average of 50 feet to the south, with the process shown on Figure 8-12 will provide an opportunity to replace the existing main channel with stream meanders, riffles, and pools. Flood bench terraces will be vegetated with native grasses similar to the vegetation found in the park. Trees that are impacted during channel widening will be mitigated by replanting riparian trees adjacent to the stream corridor.

Estimated Project Cost: $3,141,047



FOR MORE INFORMATION

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**Refer to the original Master Plan for all Figure and Table Callouts*

Deadmans Run: Channel Widening & Bridge Replacements | DR-4

SE of 52nd St. & Francis St. to NW of 56th St. & Holdrge St.

Problem Description: Through previous channelization projects, this section of the creek has been improved using hard armoring components. The channel consists of a Fabriform mattress liner with gabion basket retaining walls to support vertical banks. In addition, a limited amount of open space exists near the channel because of the close proximity of residential homes. The narrow channel does not have adequate capacity to support larger storm events, causing overbank flooding to the south. The culverts at 52nd Street and 56th Street are undersized for the 100-year storm event, which causes backwater flooding immediately upstream of the area.

Recommendation: The recommended improvements include widening the channel by approximately 20 feet on each side of the banks as shown on Figure 8-13. To maximize the capacity of the channel without impacting the backyards of the adjacent residential homes, vertical structural retaining walls using a terraced approach is recommended, as depicted on Figure 8-14. Native planting the terraces will provide water quality benefits and improve wildlife habitat.

The 60-foot-wide bridge at 52nd Street should be modified to incorporate vertical walls rather than sloping abutments. The existing sloping abutments of the bridge are causing the bottleneck of flows as well as reported debris jams. The 56th Street culvert should be replaced with an 80-foot span bridge to adequately convey the upstream flood flows.

Estimated Project Cost: $9,857,353

FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

Deadmans Run: Dry Detention Construction | DR-5

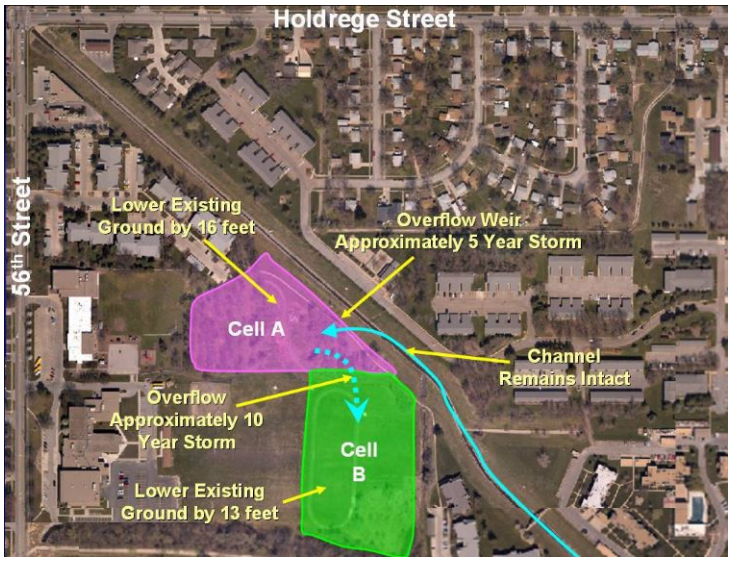
Lincoln Lutheran Middle/High School (NE of 56th St. & Mopac Trail)

Problem Description: Projects 1 through 4 include channel improvement projects that lower the floodplain elevation by increasing conveyance in the channel. This process eliminates existing flood storage in the overbanks and results in higher flood flows. To mitigate this increase in flow and potential adverse impacts downstream, stormwater detention basins must be constructed upstream of the channel conveyance projects.

Recommendation: The goal of stormwater detention projects is to reduce flood flows by temporarily storing flood waters during severe rain storms and then slowly releasing the stormwater back into the channel. Multiple alternatives were evaluated in this area, including variations of in-line storage with a wet bottom and variations of off-line storage with a dry bottom. The offline dry detention option was selected based on its efficiency of reducing flood flows for a given volume and project cost. Available open space was targeted for the offline storage facility based on the size and geographic location within the watershed. The configuration of the basin consists of two cells. Cell A encompasses land owned by an apartment complex and is designated as open space on their Community Unit Plan, which was approved by the City of Lincoln's Planning Department. The apartment complex has built a trail on the north side of the area that provides a connection from the west apartments to the leasing office and recreational facilities to the east. The area south of the trail includes varying topography, mature trees, and a maintenance road currently used as a disposal site for construction fill and debris. Cell B encompasses land owned by a private school. The school has recently improved the area by regrading and seeding the field to create improved recreational playing surfaces.

The construction of Cell A will involve excavating approximately 16 feet of soil material using gradual 4:1 side slopes. The construction of Cell B will involve excavating approximately 13 feet of soil material using the same side slopes. A side channel weir will be constructed along the left bank of Deadmans Run main channel. The left bank and weir will separate the excavated storage facility from the channel. The weir elevation will be positioned at approximately the 5-year design storm stage. When the Deadmans Run main channel water level reaches the crest elevation of the weir, stormwater will be diverted into Cell A. As the main channel continues to rise, the bottom of Cell A will fill. During 10-year design storm, Cell B will begin to inundate, storing stormwater for larger, less frequent storms. After the storms end, the storage facilities will drain water back into the main channel within a 24-hour period. Other supplemental features of Cell A will include environmental enhancement by replanting with native grasses and trees. In addition, the connection trail can be replaced along the existing alignment, or through the detention facility providing access to passive recreation activities. Cell B will include a sand bed, underdrain system, and turf grass that can be used for recreational purposes. The area will gravity drain to Cell A and be available for recreational use within 24 hours of the storm subsiding.

Estimated Project Cost: $3,722,534



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

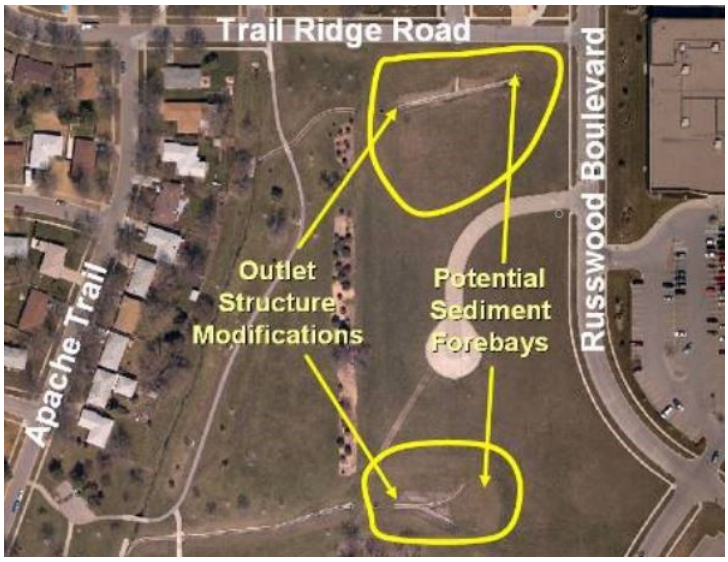
Deadmans Run: Detention Pond Retrofit for Water Quality | DR-10

SW of Trail Ridge Rd. & Russwood Blvd.

Problem Description: The commercial development upstream of two existing dry detention basins is drained by a traditional drainage system that provides limited water quality benefits. The existing basin outlet structures are designed for flood control, which allows low flows to exit the facility without proper water quality treatment, as shown in the picture to the right.

Recommendation: The proposed recommended improvements, as shown in Figure 8-21, include modifying each basin's outlet to achieve an appropriate drawdown of the water quality volume. The basins have adequate capacity to treat the entire water quality volume. In addition to the outlet modification, the construction of sediment forebays at the two east inlet locations is recommended to provide pretreatment measures.

Estimated Project Cost: $44,436



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

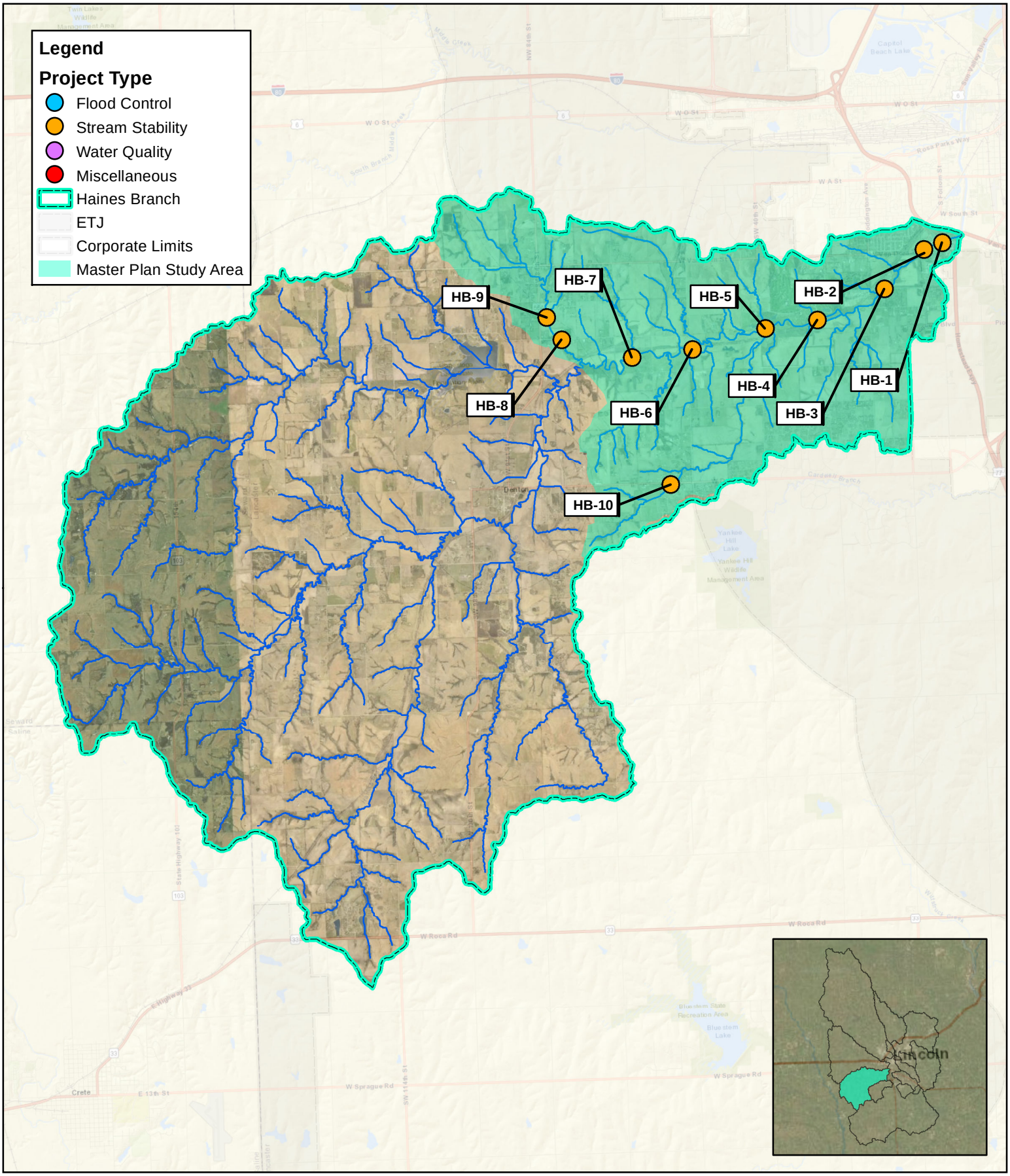
6.5 Haines Branch

Table 9 - Proposed Projects - Haines Branch Watershed

Project ID	Project Type	Project Location	Project Description	2021 Prioritization Score*	2021 Updated Cost**
HB-1	SS	East of Folsom St. south of Van Dorn St.	Grade Control & Outlet Protection	180	$215,505
HB-2	SS	SW of Van Dorn St. & Folsom St.	Bank Stabilization & Grade Controls	180	$530,473
HB-3	SS	West of W. 16th St. & Calvert St.	Grade Control	150	$137,039
HB-4	SS	South of Pioneers Park	Grade Control	150	$184,560
HB-5	SS	South of Pioneers Park Nature Center	Bank Stabilization & Grade Control	150	$205,558
HB-6	SS	NE of W. 56th St. & Claire Ave.	Grade Controls	140	$165,773
HB-7	SS	West of W. 56th St. between Pioneers Blvd. & Claire Ave.	Bank Stabilization & Grade Controls	190	$247,554
HB-8	SS	South of Pioneers Blvd. east of W. 84th St.	Bank Stabilization & Grade Control	160	$160,247
HB-9	SS	NE of W. 84th St. & Pioneers Blvd.	Grade Controls	190	$305,022
HB-10	SS	SE of W. 60th St. & Denton Rd.	Bank Stabilization & Grade Controls	190	$191,191

***These scores were determined in 2021 using concept level data and are subject to change as additional data becomes available**

****Costs are adjusted to 2021 dollars based on inflation since the original master plan was completed**



Created By: MB
Date: 3/15/2022
Software: ArcGIS 10.8.1
File: Lincoln Prioritization CIP Locations.mxd

This map was prepared using information from record drawings supplied by JEO and/or other applicable city, county, federal, or public or private entities. JEO does not guarantee the accuracy of this map or the information used to prepare this map. This is not a scaled plat.

Figure 9: Proposed Projects Haines Branch Watershed

Lincoln, NE

0 2,500 5,000 10,000 Feet

Haines Branch: Grade Control & Outlet Protection | HB-1

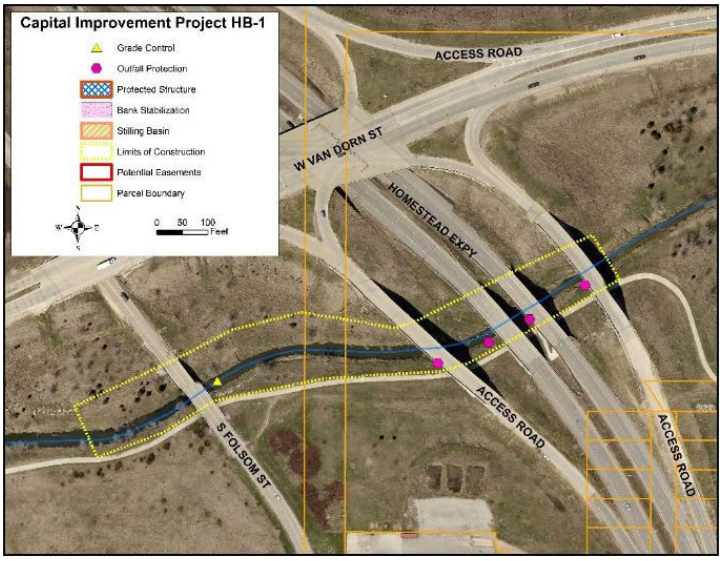
East of Folsom St. south of Van Dorn St.

Problem description: Two knickpoints are located on the main stem HBR005 at the S Folsom St Bridge, one under the bridge, and one approximately 110 feet upstream of the bridge. Each knickpoint is creating approximately a 6 inch to 1 foot drop in the channel. Also, scour and erosion is occurring at multiple pipe outfall locations along Bison Trail at Homestead Expressway. Potentially affected parcels are public and within state right-of-way. Close coordination between the City of Lincoln (City), the Lower Platte South Natural Resources District (LPSNRD) and the Nebraska Department of Transportation (NDOT) will be required for the completion of this project.

Recommendation: Construct an engineered grade control immediately downstream of S Folsom St to halt the propegation of knickpoints upstream. Install scour protection at each pipe outfall to eliminate erosion and protect the pipe outfall and stream bank.

Impact to Special Areas and Water Quality: Project is located along Bison Trail within Salt Valley Greenway as well as the Prairie Corridor. The grade control and pipe outfall protection will help protect these special areas. Consideration during design and construction should be provided to minimize disturbance to these special areas and reduce impacts to water quality to the greatest extent practical.

Estimated Project Cost: $215,504



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

Haines Branch: Bank Stabilization & Grade Controls | HB-2

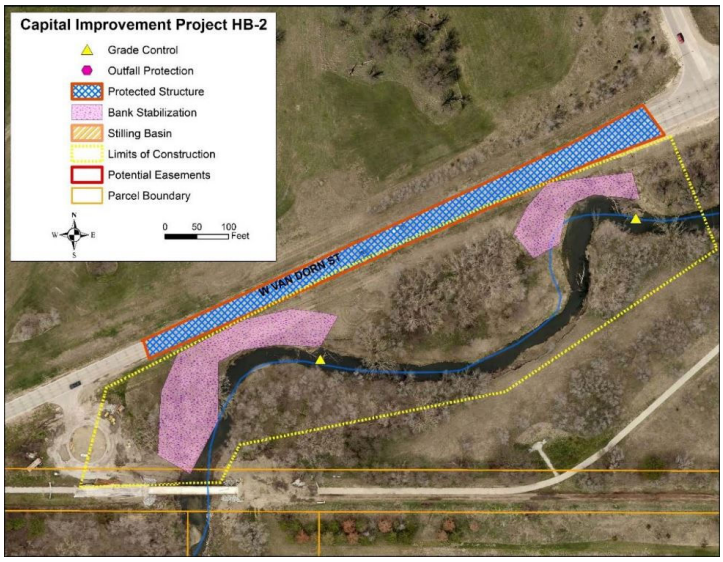
SW of Van Dorn St. & Folsom St.

Problem description: Bank erosion along main stem HBR005 is threatening W Van Dorn St about 1,050 feet southwest of the intersection of W Van Dorn St and S Folsom St. Potentially affected parcels are public and within the State right-of-way. Close coordination between the City, LPSNRD and NDOT will be required for the completion of this project.

Recommendation: Construct bank stabilization along the left descending bank with associated grade controls as needed to protect W Van Dorn St.

Impact to Special Areas and Water Quality: Project is located in the Prairie Corridor. Bank stabilization and grade controls will help protect this special area. Consideration during design and construction should be provided to minimize disturbance to special areas and reduce impacts to water quality to the greatest extent practical.

Estimated Project Cost: $530,473



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

Haines Branch: Grade Control | HB-3

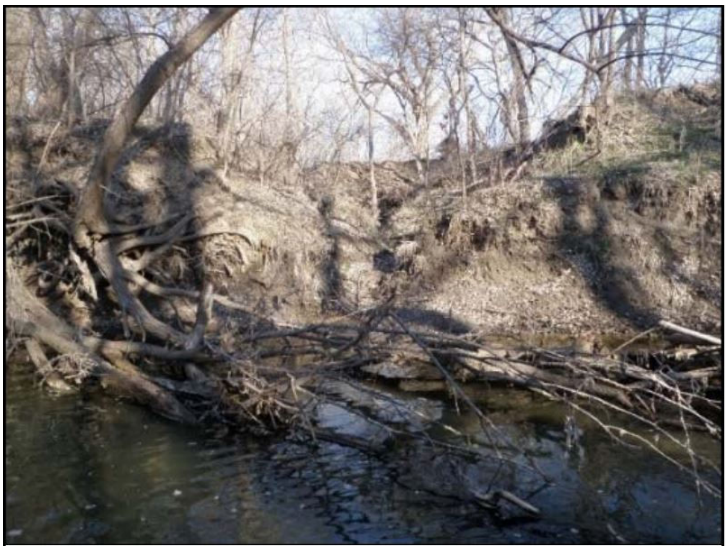
West of W. 16th St. & Calvert St.

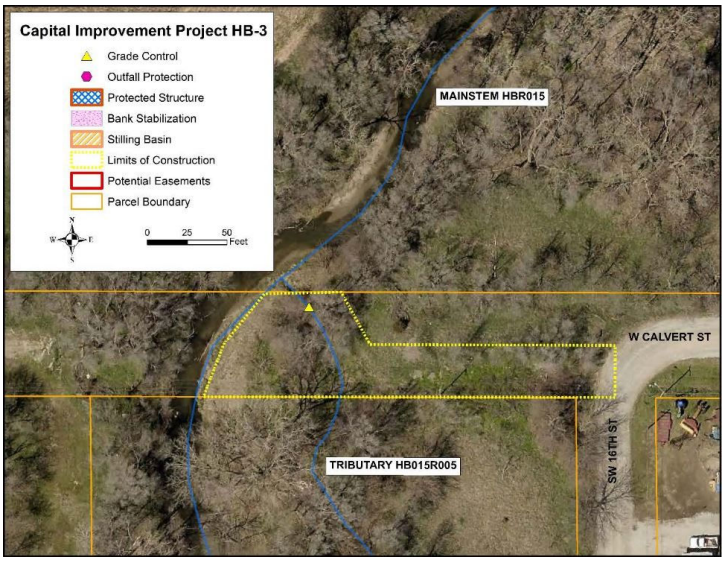
Problem description: There is a tall knickpoint in tributary HB015R005 at the confluence with the main stem. The main stem flowline is several feet below the tributary on the right descending bank west of W Calvert St and SW 16th St. Upstream of the knickpoint, the tributary is showing early signs of incision. Potentially affected parcels are public. Close coordination between the City, County, LPSNRD and NDOT will be required for the completion of this project.

Recommendation: Construct grade control at tributary confluence to halt incision and protect the upstream reach. This project could be combined with a bridge or culvert at W Calvert St.

Impact to Special Areas and Water Quality: Portion of project is located in the Prairie Corridor and grade controls will help protect this special area. Consideration during design and construction should be provided to minimize disturbance to special areas and reduce impacts to water quality to the greatest extent practical.

Estimated Project Cost: $137,038





FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

Haines Branch: Grade Control | HB-4

South of Pioneers Park

Problem description: At this location there is an existing knickpoint in tributary HB0040R005 at the confluence with the main stem within Pioneers Park. The knickpoint is stabilized by an existing rubble grade control that is actively failing. This project will protect the pedestrian trail from channel erosion. When entering South Pioneers Park from S Coddington Ave, take the left at the first "Y" in the road. The access will be located directly before the next "Y" in the road. Project will be located on the left side of the road near the RR tracks. Potentially affected parcels are public property.

Recommendation: Remove existing failing grade control and constuct one or more new grade controls to stop incision and protect the tributary and park.

Impact to Special Areas and Water Quality: Project is located in Pioneers Park, within the Prairie Corridor, and within designated treemass areas. Grade controling this tributary will help protect these special areas. Consideration during design and construction should be provided to minimize disturbance to special areas and reduce impacts to water quality to the greatest extent practical.

Estimated Project Cost: $184,560

FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

Haines Branch: Bank Stabilization & Grade Control | HB-5

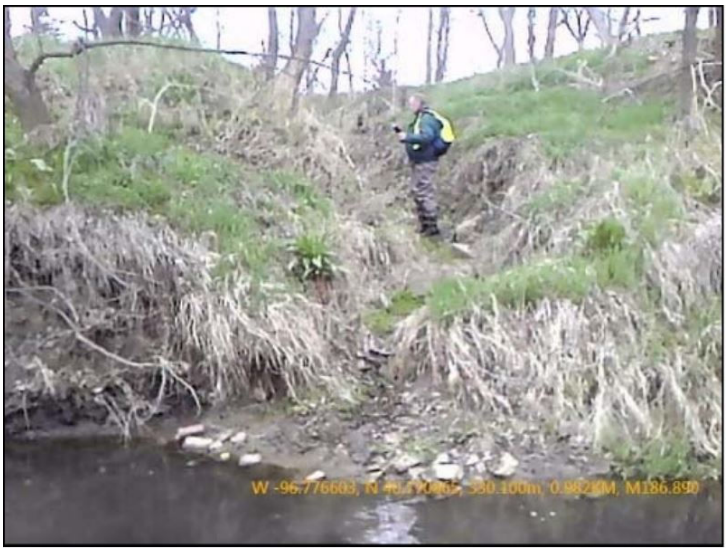
South of Pioneers Park Nature Center

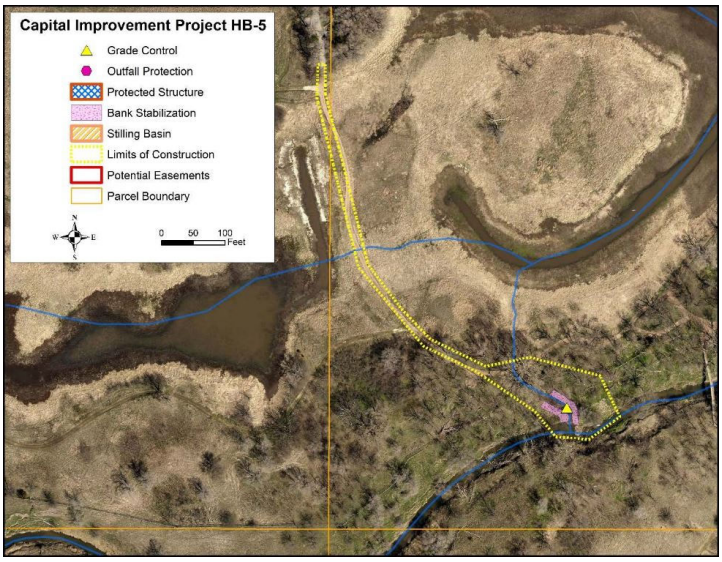
Problem description: Knickpoints and erosion in tributary HB045R005 from the main stem to the outfall at the fence line on the southwest side of the Nature Center is potentially threatening the outfall. Access for this project is through the Nature Center from the southwest corner of the Pioneer Park Golf Course. Potentially affected parcels are public property.

Recommendation: Construct multiple grade controls and associated bank stabilizations to stabilize the tributary and stop incision.

Impact to Special Areas and Water Quality: Project is located within a Prairie Corridor, woodland, and Pioneers Park. The proposed access to the location runs near, but not through a designated wetland. Consideration during design and construction should be provided to minimize disturbance to special areas and reduce impacts to water quality to the greatest extent practical.

Estimated Project Cost: $205,558





FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

Haines Branch: Grade Controls | HB-6

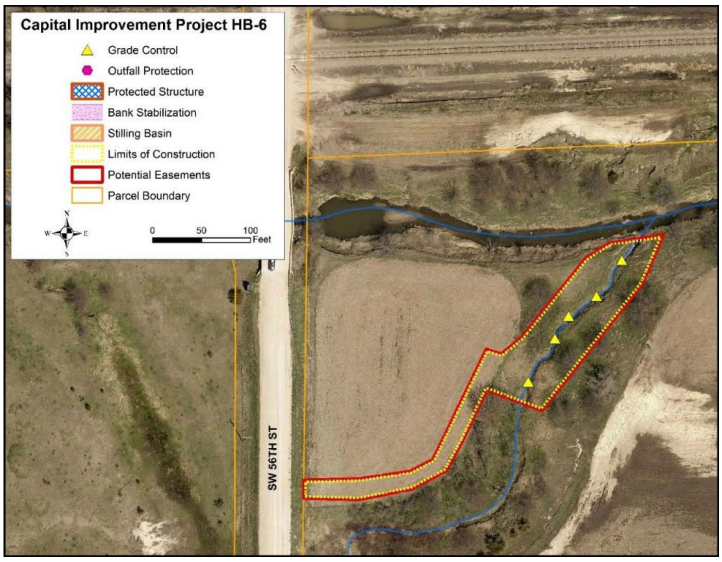
NE of W. 56th St. & Claire Ave.

Problem description: Knickpoint in the tributary HB055R005 near its confluence with Haines Branch approximately 400 feet downstream of SW 56th St. The access is approximately 0.2 miles north of the SW 56th St and W Claire Ave intersection. Potentially affected parcels are private property.

Recommendation: Construct grade controls to stabilize tributary and stop incision.

Impact to Special Areas and Water Quality: Project is located within a wetland, as well as the planned Prairie Corridor. West of the proposed access across SW 56th St is another wetland with proposed critical habitat. Consideration during design and construction should be provided to minimize disturbance to special areas and reduce impacts to water quality and proposed critical habitat to the greatest extent practical.

Estimated Project Cost: $165,772



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

Haines Branch: Bank Stabilization & Grade Controls | HB-7

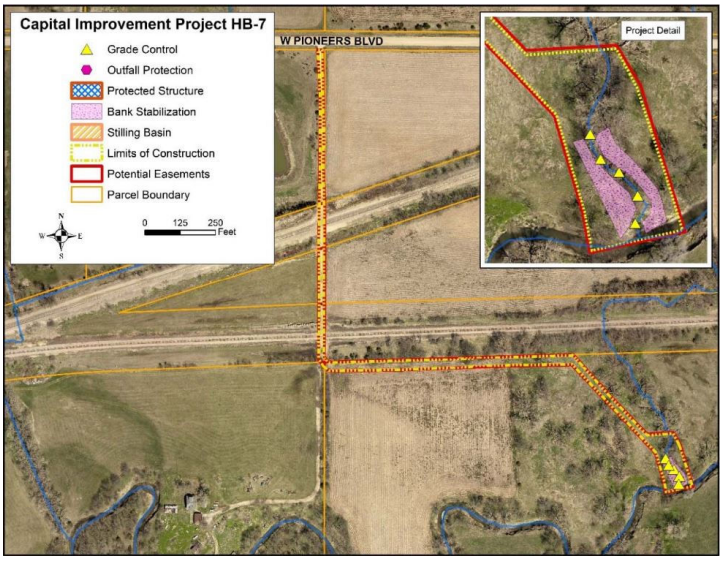
West of W. 56th St. between Pioneers Blvd. & Claire Ave.

Problem description: A large woody debris jam is holding up a greater than five foot tall knickpoint at the tributary HB070R005 confluence located approximately 1,500 feet south of W Pioneers Blvd. Potentially affected parcels are private property. Potential access may follow along an existing driveway and will cross two railroad lines.

Recommendation: Remove debris jam and replace with grade control and associated bank stabilization to stop incision.

Impact to Special Areas and Water Quality: Project is located in the planned Prairie Corridor and a woodland. Consideration during design and construction should be provided to minimize disturbance to special areas and reduce impacts to water quality to the greatest extent practical.

Estimated Project Cost: $247,554



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

Haines Branch: Bank Stabilization & Grade Control | HB-8

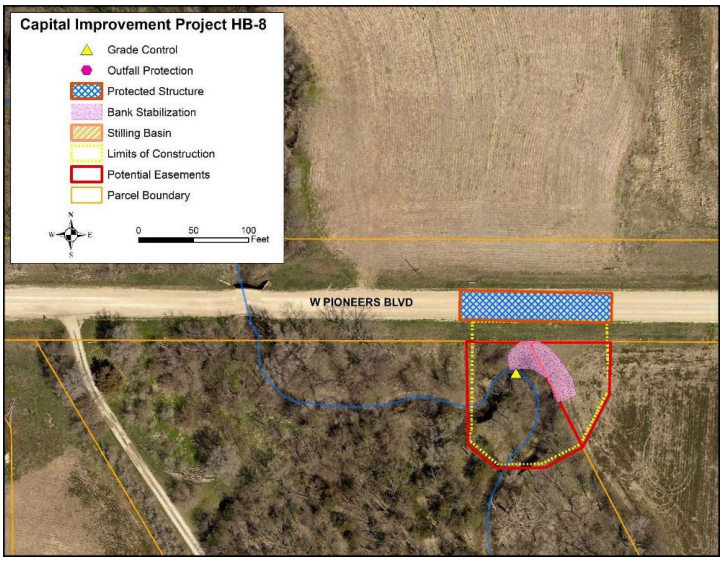
South of Pioneers Blvd. east of W. 84th St.

Problem description: Bank erosion on tributary HB080R005 is threatening W Pioneers Blvd located approximately 1,520 feet east of SW 84th St and W Pioneers Blvd. Potentially affected parcels are both public and private property.

Recommendation: Construct bank stabilization with associated grade controls to stop erosion and protect the road. Include culvert outfall protection for the storm outfall on the right descending bank.

Impact to Special Areas and Water Quality: Project is located in an area dominated by woodland. Consideration during design and construction should be provided to minimize disturbance to special areas and reduce impacts to water quality to the greatest extent practical.

Estimated Project Cost: $160,247



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

Haines Branch: Grade Controls | HB-9

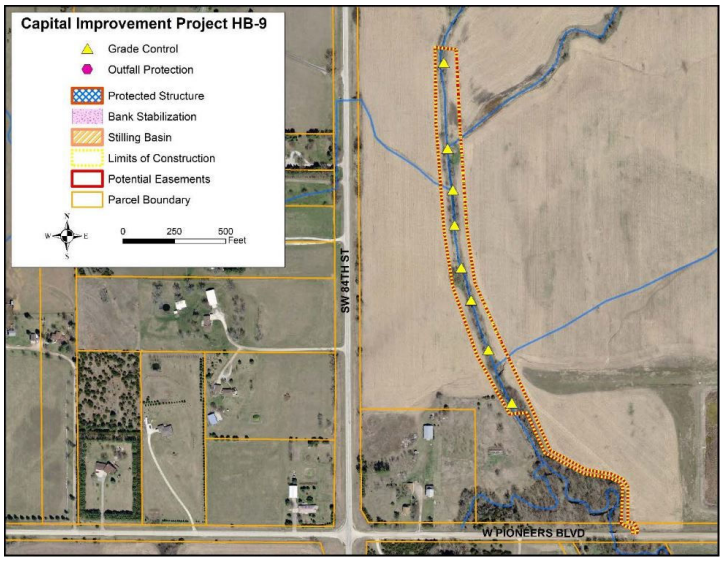
NE of W. 84th St. & Pioneers Blvd.

Problem description: Multiple knickzones and active incision exists along a 1,700 foot section of tributary HB080R010 located east of SW 84th St and north of W Pioneers Blvd. Potentially affected parcels are private property.

Recommendation: Construct multiple grade controls along this reach to stop incision. There is approximately 14 feet of vertical drop in the profile elevation from the upstream to the downstream limit of this reach.

Impact to Special Areas and Water Quality: No special area impacts are anticipated. Consideration during design and construction should be provided to minimize disturbance to special areas and reduce impacts to water quality to the greatest extent practical.

Estimated Project Cost: $305,022



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

Haines Branch: Bank Stabilization & Grade Controls | HB-10

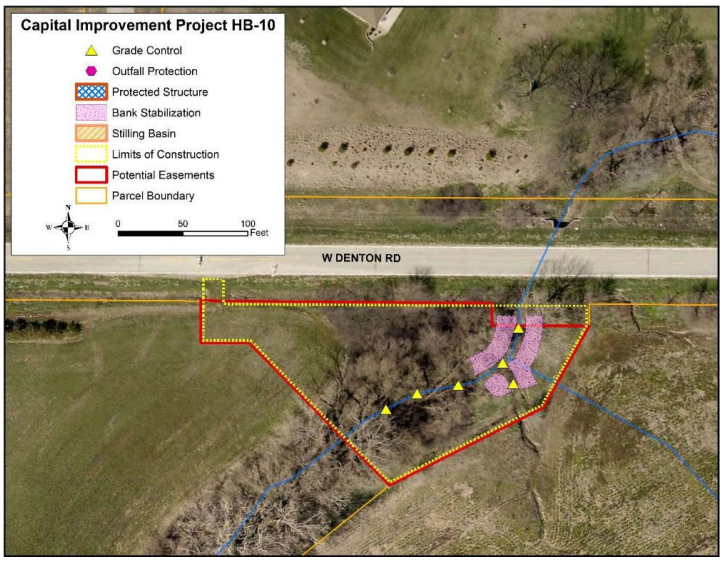
SE of W. 60th St. & Denton Rd.

Problem description: 4 foot knickzone on the tributary HB035R040 immediately upstream of the W Denton Rd culvert (County Structure N-129) located 250 feet east of SW 60th St. potentially affected parcels are private property.

Recommendation: Construct a series of grade controls and associated bank stabilization to stop incision.

Impact to Special Areas and Water Quality: Project is located in a woodland. Consideration during design and construction should be provided to minimize disturbance to special areas and reduce impacts to water quality to the greatest extent practical.

Estimated Project Cost: $191,191



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

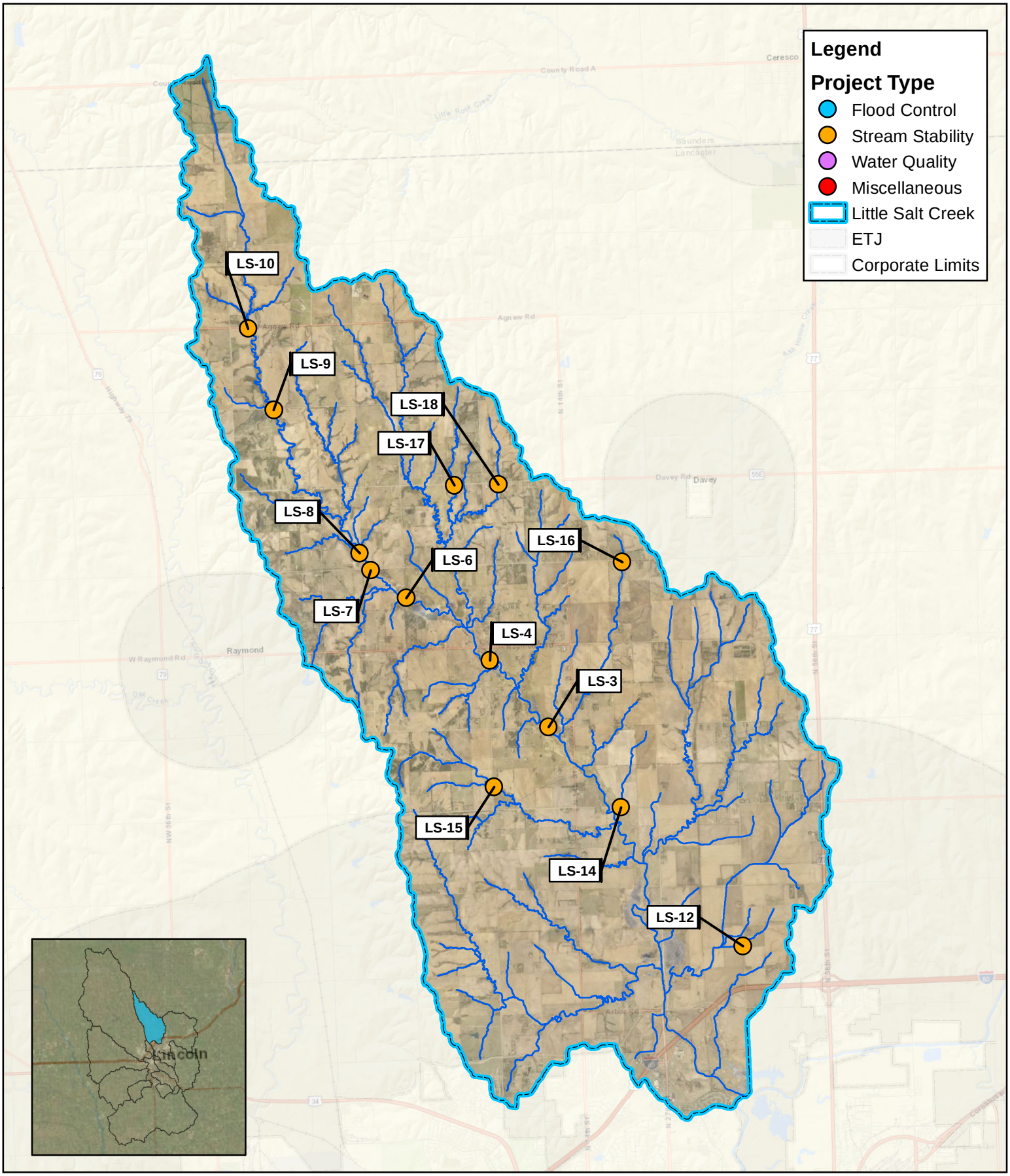
6.6 Little Salt Creek

Table 10 - Proposed Projects - Little Salt Creek Watershed

Project ID	Project Type	Project Location	Project Description	2021 Prioritization Score*	2021 Updated Cost**
LS-3	SS	South of Mill Rd. West of 14th St.	Grade Control	220	$111,050
LS-4	SS	East of 1st St. South of Raymond Rd.	Grade Control	220	$133,016
LS-6	SS	East of W. 12th St. South of Branched Oak Rd.	Grade Control	220	$111,050
LS-7	SS	South of Branched Oak Rd. East of W. 19th St.	Grade Control	220	$86,644
LS-8	SS	East of W. 19th St. North of Branched Oak Rd.	Grade Control	220	$102,508
LS-9	SS	South of Rock Creek Rd. East of W. 40th St.	Grade Control	220	$95,186
LS-10	SS	South of Agnew Rd. East of W. 40th St.	Grade Control	220	$84,203
LS-12	SS	West of 40th St. north of I-80	Stilling Basin	150	$93,966
LS-14	SS	South of Waverly Rd. West of 27th St.	Stilling Basin	130	$91,525
LS-15	SS	West of 1st St. North of Waverly Rd.	Stilling Basin	140	$103,728
LS-16	SS	South of Branched Oak Rd. West of 27th St.	Stilling Basin	125	$115,932
LS-17	SS	South of Davey Rd. West of 1st St.	Stilling Basin	125	$137,898
LS-18	SS	South of Davey Rd. East of 1st St.	Stilling Basin	120	$104,949

***These scores were determined in 2021 using concept level data and are subject to change as additional data becomes available**

****Costs are adjusted to 2021 dollars based on inflation since the original master plan was completed**



Created By: MB
Date: 3/15/2022
Software: ArcGIS 10.8.1
File: Lincoln Prioritization CIP Locations.mxd

This map was prepared using information from record drawings supplied by JEO and/or other applicable city, county, federal, or public or private entities. JEO does not guarantee the accuracy of this map or the information used to prepare this map. This is not a scaled plat.

Figure 10: Proposed Projects Little Salt Creek Watershed

Lincoln, NE

Little Salt Creek: Grade Control | LS-3

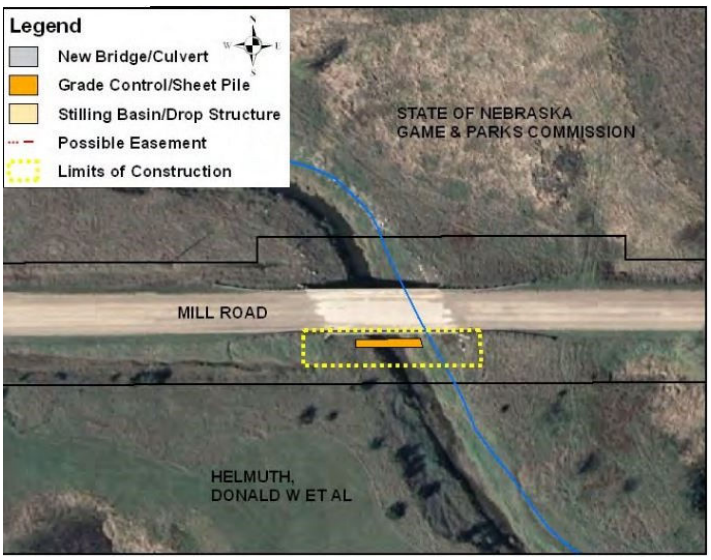
South of Mill Rd. West of 14th St.

Problem description: The main stem is incising and projected to continue to incise an additional six to twelve feet over the next 25 years. The incision will cause erosion at the bridge that could compromise bridge footings and stability. Sediment released from incision and subsequent bank failures could threaten natural resources along the channel.

Recommendation: The recommended improvement is to construct a grade control immediately downstream of the bridge crossing to hold the profile grade of the channel. Figure 9-11 shows the proposed location of the grade control, possible limits of construction and possible easement needs. The grade control should be placed at grade on the channel bottom and formed in a manner to mimic the elevation and stable slopes of the existing channel banks. The grade control should extend to the top of each bank or the 25 year flow depth, whichever is greater. Consideration should be given to soil erodability, piping and shear stresses along the grade control and at the edges. The grade control can be constructed using various materials. For the purposes of this study, a sheet pile grade control system was assumed.

Impact to Natural Resources and/or Salt Creek Tiger Beetle Habitat: Grade stabilizing the main stem will protect the Tiger Beetle habitat at the toe of slope and within the saline wetlands near the top of banks along the main stem. The grade control is sited within road right of way so there is no direct impact on the possible Salt Creek Tiger Beetle habitat.

Estimated Project Cost: $111,050



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

Little Salt Creek: Grade Control | LS-4

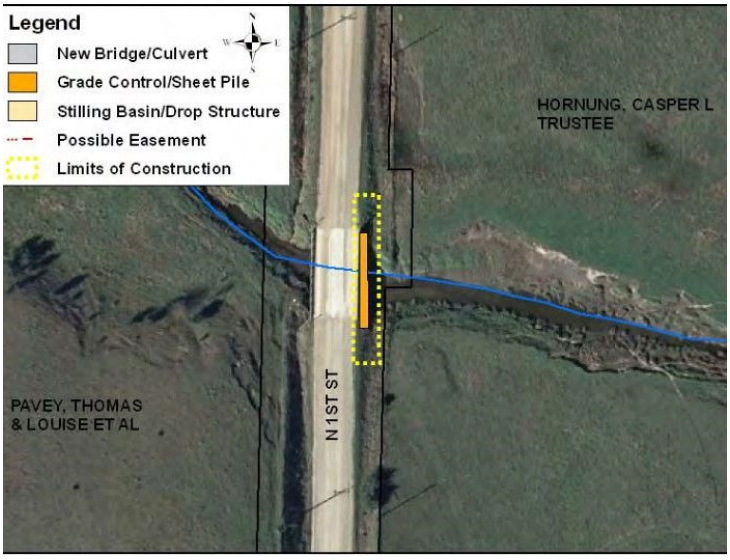
East of 1st St. South of Raymond Rd.

Problem description: The main stem is incising and projected to continue to incise an additional six to twelve feet over the next 25 years. The incision will cause erosion at the bridge that could compromise bridge footings and stability. Sediment released from incision and subsequent bank failures could threaten natural resources along the channel.

Recommendation: The recommended improvement is to construct a grade control immediately downstream of the bridge crossing to hold the profile grade of the channel. Figure 9-13 shows the proposed location of the grade control, possible limits of construction and possible easement needs. The grade control should be placed at grade on the channel bottom and formed in a manner to mimic the elevation and stable slopes of the existing channel banks. The grade control should extend to the top of each bank or the 25 year flow depth, whichever is greater. Consideration should be given to soil erodability, piping and shear stresses along the grade control and at the edges. The grade control can be constructed using various materials. For the purposes of this study, a sheet pile grade control system was assumed.

Impact to Natural Resources and/or Salt Creek Tiger Beetle Habitat: Grade stabilizing the main stem will protect the Tiger Beetle habitat at the toe of slope and within the saline wetlands near the top of banks along the main stem. The grade control is sited within road right of way so there is no direct impact on the possible Salt Creek Tiger Beetle habitat.

Estimated Project Cost: $133,016



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

Little Salt Creek: Grade Control | LS-6

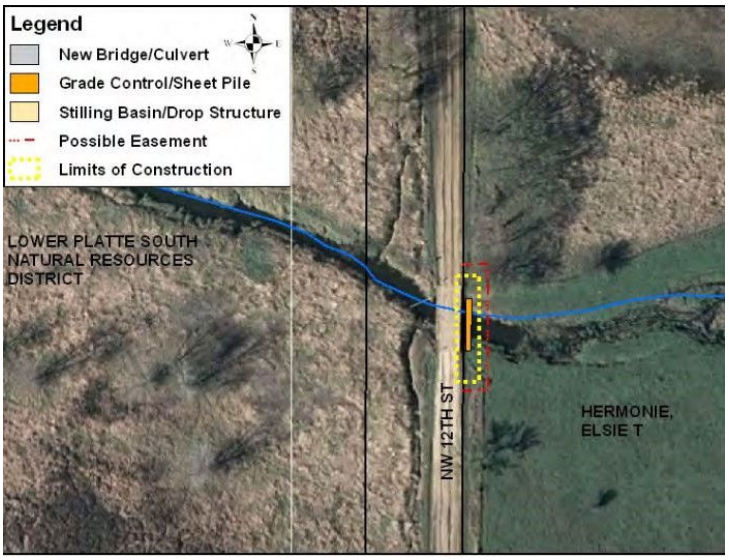
East of W. 12th St. South of Branched Oak Rd.

Problem description: The main stem is incising and projected to continue to incise an additional six to twelve feet over the next 25 years. The incision will cause erosion at the bridge that could compromise bridge footings and stability. Sediment released from incision and subsequent bank failures could threaten natural resources along the channel.

Recommendation: The recommended improvement is to construct a grade control immediately downstream of the bridge crossing to hold the profile grade of the channel. Figure 9-17 shows the proposed location of the grade control, possible limits of construction and possible easement needs. The grade control should be placed at grade on the channel bottom and formed in a manner to mimic the elevation and stable slopes of the existing channel banks. The grade control should extend to the top of each bank or the 25 year flow depth, whichever is greater. Consideration should be given to soil erodability, piping and shear stresses along the grade control and at the edges. The grade control can be constructed using various materials. For the purposes of this study, a sheet pile grade control system was assumed.

Impact to Natural Resources and/or Salt Creek Tiger Beetle Habitat: Grade stabilizing the main stem will protect the Tiger Beetle habitat at the toe of slope and within the saline wetlands near the top of banks along the main stem. The grade control is sited within road right of way so there is no direct impact on the possible Salt Creek Tiger Beetle habitat.

Estimated Project Cost: $111,050



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

Little Salt Creek: Grade Control | LS-7

South of Branched Oak Rd. East of W. 19th St.

Problem description: The main stem is incising and projected to continue to incise an additional six to twelve feet over the next 25 years. The incision will cause erosion at the bridge that could compromise bridge footings and stability. Sediment released from incision and subsequent bank failures could threaten natural resources along the channel.

Recommendation: The recommended improvement is to construct a grade control immediately downstream of the bridge crossing to hold the profile grade of the channel. Figure 9-19 shows the proposed location of the grade control, possible limits of construction and possible easement needs. The grade control should be placed at grade on the channel bottom and formed in a manner to mimic the elevation and stable slopes of the existing channel banks. The grade control should extend to the top of each bank or the 25 year flow depth, whichever is greater. Consideration should be given to soil erodability, piping and shear stresses along the grade control and at the edges. The grade control can be constructed using various materials. For the purposes of this study, a sheet pile grade control system was assumed.

Impact to Natural Resources and/or Salt Creek Tiger Beetle Habitat: Grade stabilizing the main stem will protect the Tiger Beetle habitat at the toe of slope and within the saline wetlands near the top of banks along the main stem. The grade control is sited within road right of way so there is no direct impact on the possible Salt Creek Tiger Beetle habitat.

Estimated Project Cost: $86,643

FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

Little Salt Creek: Grade Control | LS-8

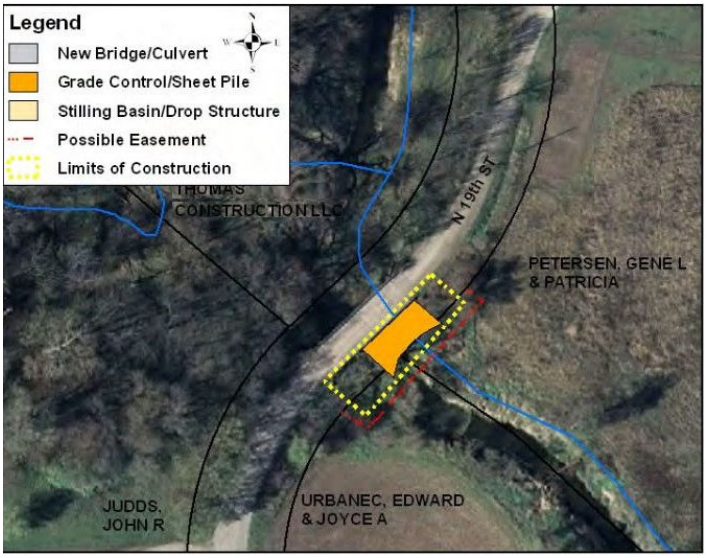
East of W. 19th St. North of Branched Oak Rd.

Problem description: The main stem is incising and projected to continue to incise an additional six to twelve feet over the next 25 years. The incision will cause erosion at the bridge that could compromise bridge footings and stability. Sediment released from incision and subsequent bank failures could threaten natural resources along the channel.

Recommendation: The recommended improvement is to construct a grade control immediately downstream of the bridge crossing to hold the profile grade of the channel. Figure 9-21 shows the proposed location of the grade control, possible limits of construction and possible easement needs. The grade control should be placed at grade on the channel bottom and formed in a manner to mimic the elevation and stable slopes of the existing channel banks. The grade control should extend to the top of each bank or the 25 year flow depth, whichever is greater. Consideration should be given to soil erodability, piping and shear stresses along the grade control and at the edges. The grade control can be constructed using various materials. For the purposes of this study, a sheet pile grade control system was assumed.

Impact to Natural Resources and/or Salt Creek Tiger Beetle Habitat: Grade stabilizing the main stem will protect the Tiger Beetle habitat at the toe of slope and within the saline wetlands near the top of banks along the main stem. The grade control is sited within road right of way so there is no direct impact on the possible Salt Creek Tiger Beetle habitat.

Estimated Project Cost: $102,507



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

Little Salt Creek: Grade Control | LS-9

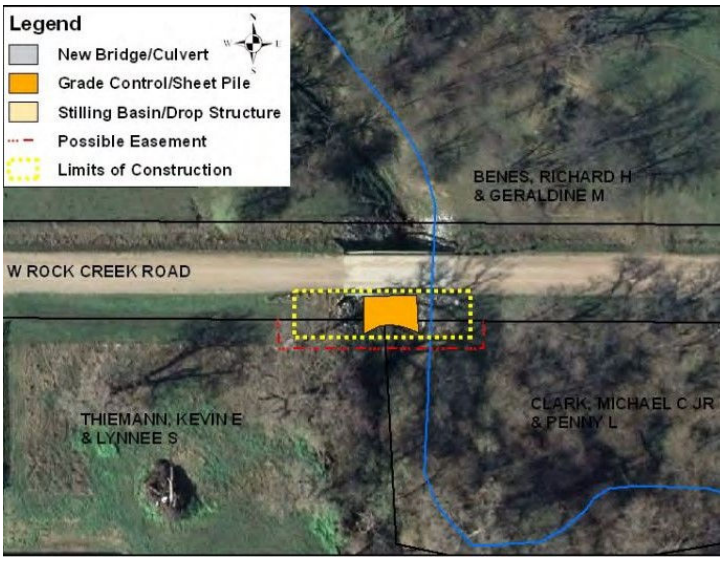
South of Rock Creek Rd. East of W. 40th St.

Problem description: The main stem is incising and projected to continue to incise an additional six to twelve feet over the next 25 years. The incision will cause erosion at the bridge that could compromise bridge footings and stability. Sediment released from incision and subsequent bank failures could threaten natural resources along the channel.

Recommendation: The recommended improvement is to construct a grade control immediately downstream of the bridge crossing to hold the profile grade of the channel. Figure 9-23 shows the proposed location of the grade control, possible limits of construction and possible easement needs. The grade control should be placed at grade on the channel bottom and formed in a manner to mimic the elevation and stable slopes of the existing channel banks. The grade control should extend to the top of each bank or the 25 year flow depth, whichever is greater. Consideration should be given to soil erodability, piping and shear stresses along the grade control and at the edges. The grade control can be constructed using various materials. For the purposes of this study, a sheet pile grade control system was assumed.

Impact to Natural Resources and/or Salt Creek Tiger Beetle Habitat: Grade stabilizing the main stem will protect the Tiger Beetle habitat at the toe of slope and within the saline wetlands near the top of banks along the main stem. The grade control is sited within road right of way so there is no direct impact on the possible Salt Creek Tiger Beetle habitat.

Estimated Project Cost: $95,185



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

Little Salt Creek: Grade Control | LS-10

South of Agnew Rd. East of W. 40th St.

Problem description: The main stem is incising and projected to continue to incise an additional six to twelve feet over the next 25 years. The incision will cause erosion at the bridge that could compromise bridge footings and stability. Sediment released from incision and subsequent bank failures could threaten natural resources along the channel.

Recommendation: The recommended improvement is to construct a grade control immediately downstream of the bridge crossing to hold the profile grade of the channel. Figure 9-25 shows the proposed location of the grade control, possible limits of construction and possible easement needs. The grade control should be placed at grade on the channel bottom and formed in a manner to mimic the elevation and stable slopes of the existing channel banks. The grade control should extend to the top of each bank or the 25 year flow depth, whichever is greater. Consideration should be given to soil erodability, piping and shear stresses along the grade control and at the edges. The grade control can be constructed using various materials. For the purposes of this study, a sheet pile grade control system was assumed.

Impact to Natural Resources and/or Salt Creek Tiger Beetle Habitat: Grade stabilizing the main stem will protect the Tiger Beetle habitat at the toe of slope and within the saline wetlands near the top of banks along the main stem. The grade control is sited within road right of way so there is no direct impact on the possible Salt Creek Tiger Beetle habitat.

Estimated Project Cost: $84,202

FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

Little Salt Creek: Stilling Basin | LS-12

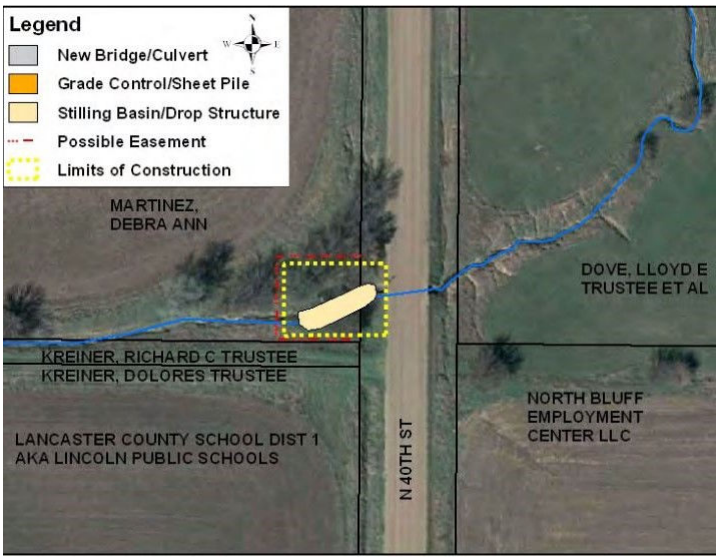
West of 40th St. north of I-80

Problem description: Tributary 110 is a managed swale between two farm fields. Channel erosion and incision have caused the existing culvert to be perched approximately one to two feet threatening the stability of the culvert.

Recommendation: The recommended improvement is to construct a stilling basin at the downstream end of culvert to dissipate the energy and protect the outfall. The stilling basin should be designed to withstand hydraulic forces during a 25 year storm event. Figure 9-29 shows the proposed location of the stilling basin, possible limits of construction and possible easement needs. The stilling basin and associated bank protection can be constructed using various materials. Consideration should be given to soil erodability, piping and shear stresses along the grade control and at the edges. For the purposes of this study, a rock stilling basin with vegetated banks was assumed.

Impact to Natural Resources and/or Salt Creek Tiger Beetle Habitat: This project has no impact on the possible Salt Creek Tiger Beetle habitat or natural resources.

Estimated Project Cost: $93,965



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

Little Salt Creek: Stilling Basin | LS-14

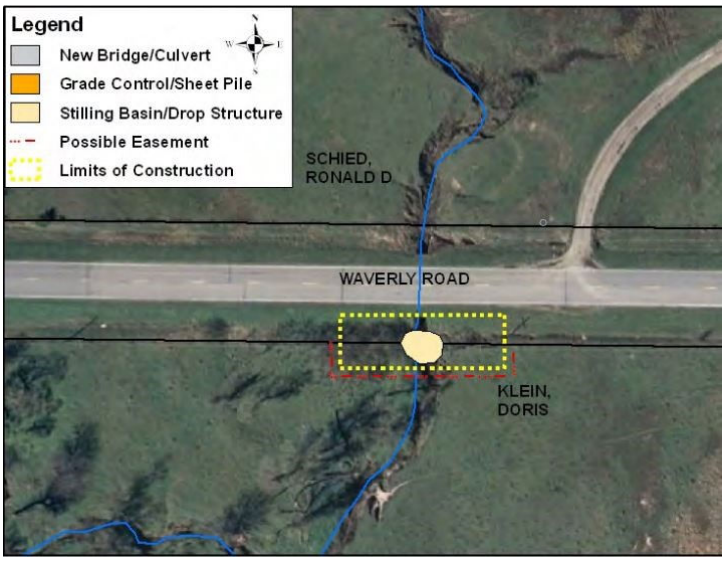
South of Waverly Rd. West of 27th St.

Problem description: Channel erosion and past incision at the outfall of the Waverly Road culvert on Tributary 35 have caused the existing culvert to be perched approximately one to two feet threatening the stability of the culvert.

Recommendation: The recommended improvement is to construct a stilling basin at the downstream end of culvert to dissipate the energy and protect the outfall.The stilling basin should be designed to withstand hydraulic forces during a 25 year storm event. Figure 9-33 shows the proposed location of the stilling basin, possible limits of construction and possible easement needs. The stilling basin and associated bank protection can be constructed using various materials. Consideration should be given to soil erodability, piping and shear stresses along the grade control and at the edges. For the purposes of this study, a rock stilling basin with vegetated banks was assumed.

Impact to Natural Resources and/or Salt Creek Tiger Beetle Habitat: This project has no impact on the possible Salt Creek Tiger Beetle habitat or natural resources.

Estimated Project Cost: $91,524



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Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

Little Salt Creek: Stilling Basin | LS-15

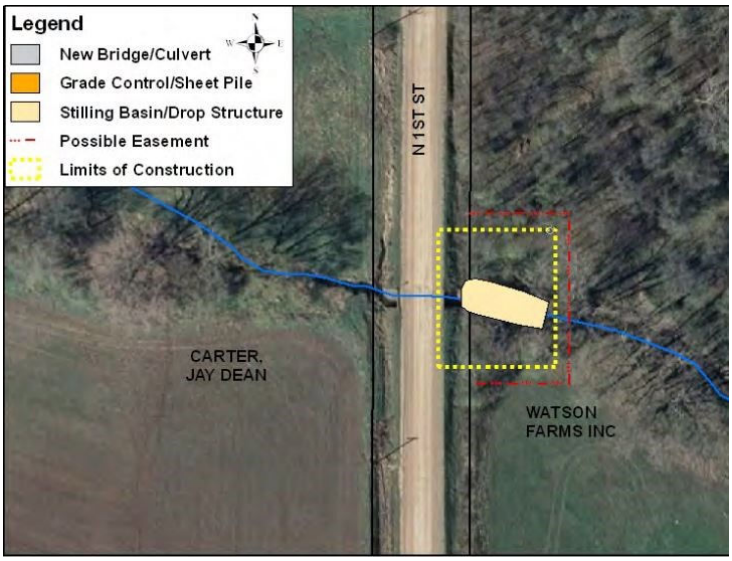
West of 1st St. North of Waverly Rd.

Problem description: The existing grouted concreted outfall protection/armor is undermined and fractured immediately downstream of the outfall of the N 1st Street culvert on Tributary 30. The grout is armoring an approximately six-foot drop in bed elevation at the outfall.

Recommendation: The recommended improvement is to remove the grouted concrete apron and construct a ramp and stilling basin at the downstream end of culvert to dissipate the energy and protect the outfall. The ramp and stilling basin should be designed to withstand hydraulic forces during a 25 year storm event. Figure 9-35 shows the proposed location of the ramp and stilling basin, possible limits of construction and possible easement needs. The ramp, stilling basin and associated bank protection can be constructed using various materials. For the purposes of this study, a rock ramp and basin with vegetated banks was assumed.

Impact to Natural Resources and/or Salt Creek Tiger Beetle Habitat: This project has no impact on the possible Salt Creek Tiger Beetle habitat or natural resources.

Estimated Project Cost: $103,728



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

Little Salt Creek: Stilling Basin | LS-16

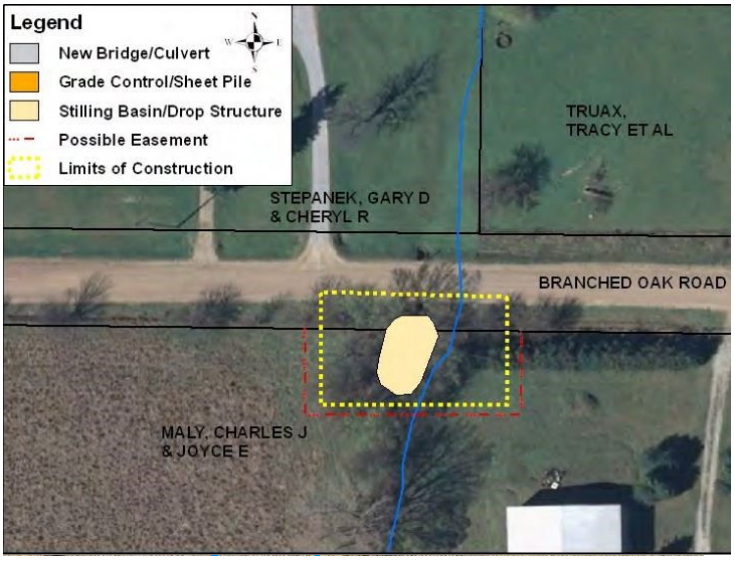
South of Branched Oak Rd. West of 27th St.

Problem description: Channel erosion and incision at the outfall of the Branched Oak Road culvert on Tributary 45 have caused the existing culvert to be perched approximately one to two feet threatening the stability of the culvert.

Recommendation: The recommended improvement is to construct a stilling basin at the downstream end of culvert to dissipate the energy and protect the outfall. The stilling basin should be designed to withstand hydraulic forces during a 25 year storm event. Figure 9-37 shows the proposed location of the stilling basin, possible limits of construction and possible easement needs. The stilling basin and associated bank protection can be constructed using various materials. For the purposes of this study, a rock stilling basin with vegetated banks was assumed.

Impact to Natural Resources and/or Salt Creek Tiger Beetle Habitat: This project has no impact on the possible Salt Creek Tiger Beetle habitat or natural resources.

Estimated Project Cost: $115,931



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

Little Salt Creek: Stilling Basin | LS-17

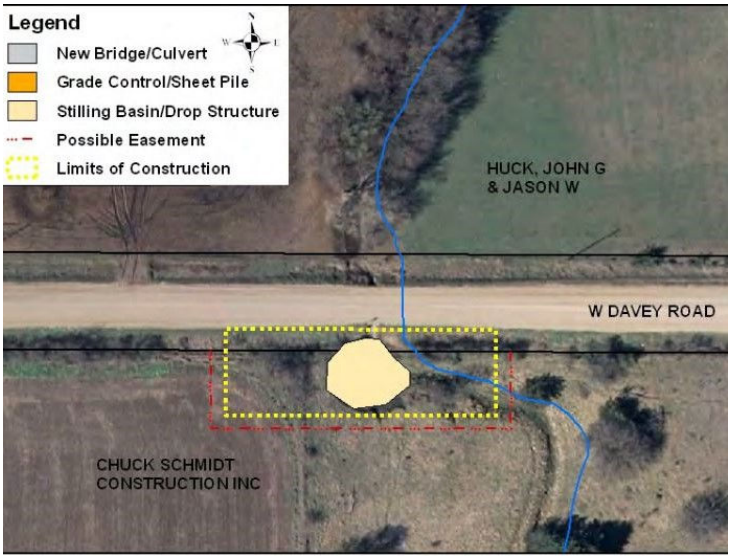
South of Davey Rd. West of 1st St.

Problem description: Channel erosion and incision at the outfall of the W Davey Road culvert on Tributary 1260 have caused the existing culvert to be perched approximately one to two feet threatening the stability of the culvert.

Recommendation: The recommended improvement is to construct a stilling basin at the downstream end of culvert to dissipate the energy and protect the outfall. The stilling basin should be designed to withstand hydraulic forces during a 25 year storm event. Figure 9-39 shows the proposed location of the stilling basin, possible limits of construction and possible easement needs. The stilling basin and associated bank protection can be constructed using various materials. For the purposes of this study, a rock stilling basin with vegetated banks was assumed.

Impact to Natural Resources and/or Salt Creek Tiger Beetle Habitat: This project has no impact on the possible Salt Creek Tiger Beetle habitat or natural resources.

Estimated Project Cost: $137,897



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

Little Salt Creek: Stilling Basin | LS-18

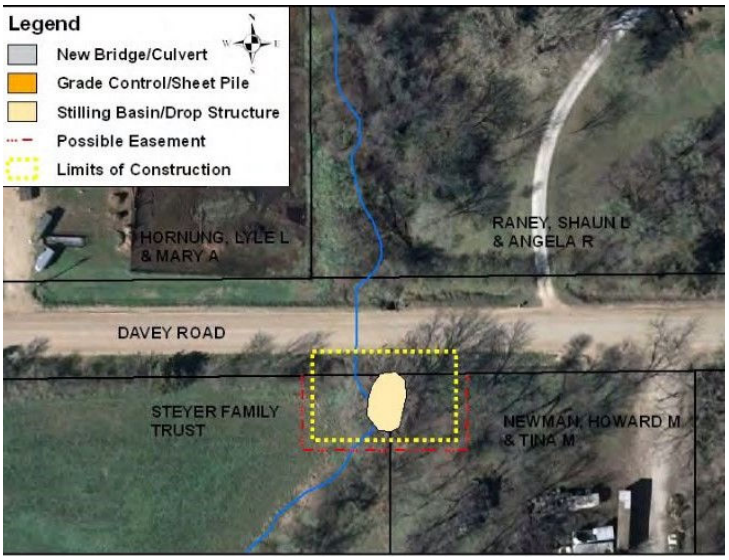
South of Davey Rd. East of 1st St.

Problem description: Channel erosion and incision on Tributary 260 have caused the existing culvert to be perched approximately one to two feet threatening the stability of the culvert.

Recommendation: The recommended improvement is to construct a stilling basin at the downstream end of culvert to dissipate the energy and protect the outfall. The stilling basin should be designed to withstand hydraulic forces during a 25 year storm event. Figure 9-41 shows the proposed location of the stilling basin, possible limits of construction and possible easement needs. The stilling basin and associated bank protection can be constructed using various materials. For the purposes of this study, a rock stilling basin with vegetated banks was assumed.

Impact to Natural Resources and/or Salt Creek Tiger Beetle Habitat: This project has no impact on the possible Salt Creek Tiger Beetle habitat or natural resources.

Estimated Project Cost: $104,948



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

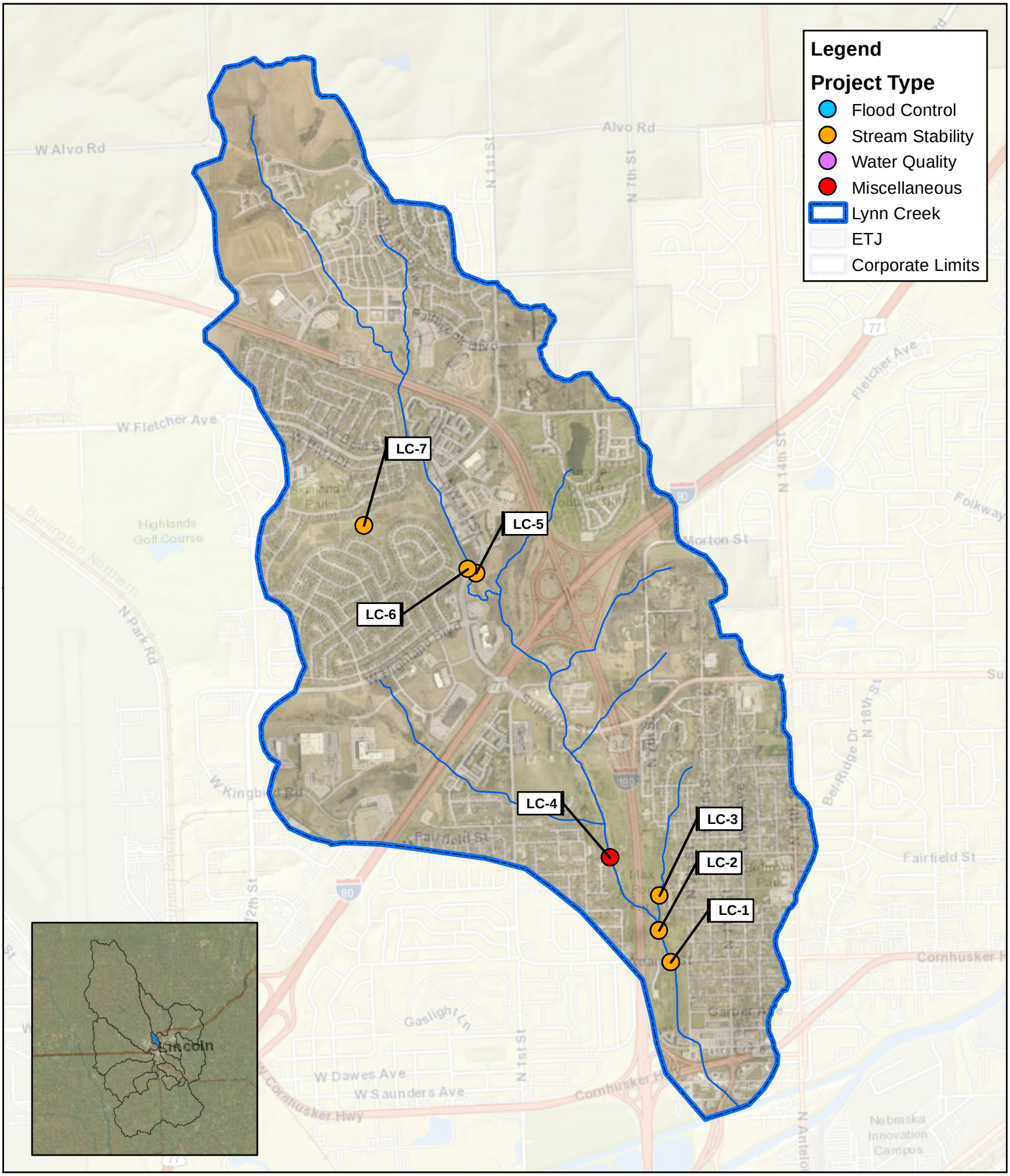
6.7 Lynn Creek

Table 11 - Proposed Projects - Lynn Creek Watershed

Project ID	Project Type	Project Location	Project Description	2021 Prioritization Score*	2021 Updated Cost**
LC-1	SS	Roper Park East: Adams St. West of N 9th St.	Grade Control & Armored Plunge Pool	250	$381,450
LC-2	SS	Roper Park East: SW of N 9th St. & Knox St.	Grade Control	220	$386,647
LC-3	SS	Roper Park East: West of N 9th St. between Manatt St. & Judson St.	Grade Control	220	$255,686
LC-4	MISC	Roper Park West: NE of N 4th St. Ct.	Stream Stabilization & Trail Relocation	160	$77,953
LC-5	SS	West of NW 1st St. & Barons Rd.	Grade Control & Armored Plunge Pool	250	$134,079
LC-6	SS	North of NW 1st St. & Barons Rd.	Grade Control	220	$86,268
LC-7	SS	South of W. Harvest Dr. between NW Fairway Dr. & NW 5th St.	Grade Control	250	$366,899

***These scores were determined in 2021 using concept level data and are subject to change as additional data becomes available**

****Costs are adjusted to 2021 dollars based on inflation since the original master plan was completed**



Created By: MB
Date: 3/15/2022
Software: ArcGIS 10.8.1
File: Lincoln Prioritization CIP Locations.mxd

Figure 11: Proposed Projects
Lynn Creek Watershed

Lincoln, NE

0 500 1,000 2,000 Feet

Lynn-Creek: Grade Control & Armored Plunge Pool | LC-1

Roper Park East: Adams St. West of N 9th St.

Problem description: Incision is occurring along Mainstem LCR005. The Adams St box culvert is perched and the footing is exposed. There is a one foot drop at the stormwater outfall undermining the structure. A storm water pipe outfall in the park, located 150 feet downstream, is also perched with a two foot drop at the outfall. The affected parcel is public.

Recommendation: Construct two engineered grade control structures to stabilize each perched culvert outfall. Construct a third grade control upstream Adams St using a two stage configuration to provide a stabilized approach to the culvert entrance while maintaining sediment continuity through the crossing. Remove accumulated material from the structure to restore flood flow capacity. When the culvert is eventually replaced, use a two stage configuration. Extend the downstream grade control across Lynn creek and incorporate the outfall stabilization into the bank protection.

Impact to Special Areas and Water Quality: Project is located in Roper Park. Consideration during design and construction should be provided to minimize disturbance to special areas and reduce impacts to water quality to the greatest extent practical.

Estimated Project Cost: $381,450

FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

Lynn-Creek: Grade Control | LC-2

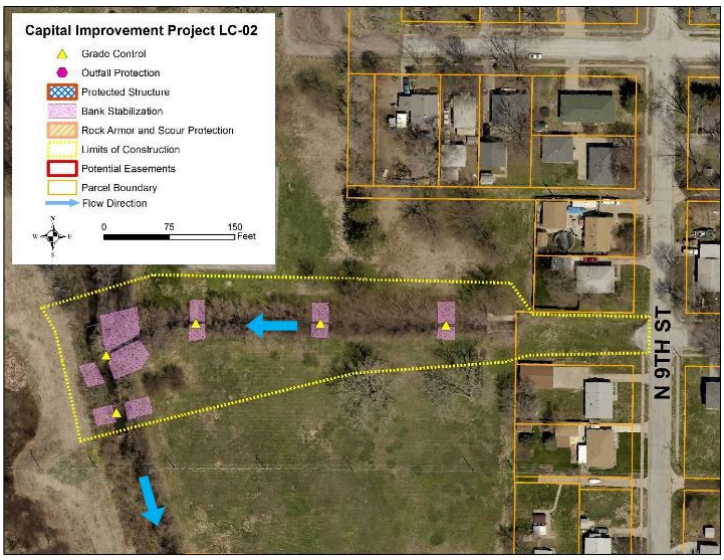
Roper Park East: SW of N 9th St. & Knox St.

Problem description: Incision is occurring on the Mainstem LCR005 and the side tributary in Roper Park. The affected parcel is public.

Recommendation: Constructing a series of grade control structures along the tribuary and at the confluence with LCR005 to stop incision.

Impact to Special Areas and Water Quality: This project is located in Roper Park. Consideration during design and construction should be provided to minimize disturbance to special areas and reduce impacts to water quality to the greatest extent practical.

Estimated Project Cost: $386,647



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

Lynn-Creek: Grade Control | LC-3

Roper Park East: West of N 9th St. between Manatt St. & Judson St.

Problem description: Incision is occurring on Tributary LC005R005 in Roper Park. The affected parcels are public.

Recommendation: Construct a series of grade control structures along the tribuary to stop incision.

Impact to Special Areas and Water Quality: This project is located in Roper Park. Consideration during design and construction should be provided to minimize disturbance to special areas and reduce impacts to water quality to the greatest extent practical.

Estimated Project Cost: $255,686

FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

Lynn-Creek: Stream Stabilization & Trail Relocation | LC-4

Roper Park West: NE of N 4th St. Ct.

Problem description: Bank failure is encroaching on the Roper Park Trail along Mainstem LCR005. The affected parcels are public.

Recommendation: Regrade the slope to a 2:1 to stabilize the bank relocating the trail 6 feet to the west. Ability to relocate trail is restricted due to private property.

Impact to Special Areas and Water Quality: Project is located within the Roper Park Trail. Consideration during design and construction should be provided to minimize disturbance to special areas and reduce impacts to water quality to the greatest extent practical.

Estimated Project Cost: $77,953

FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

Lynn-Creek: Grade Control & Armored Plunge Pool | LC-5

West of NW 1st St. & Barons Rd.

Problem description: Scour is beginning to undermine the culvert and wingwall at NW 1st St. The affected parcels are private.

Recommendation: Construct a grade control with associated bank stabilization to protect the culvert outfall and wingwall.

Impact to Special Areas and Water Quality: There are no special areas at this project location. Consideration during design and construction should be provided to minimize disturbance and reduce impacts to water quality to the greatest extent practical.

Estimated Project Cost: $134,079

FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

Lynn-Creek: Grade Control | LC-6

North of NW 1st St. & Barons Rd.

Problem description: Incision is occurring on a drainage swale discharging into the Mainstem LCR015. The affected parcel is public.

Recommendation: Construct a series of grade control structures along the swale to prevent the propagation of incision upstream. An alternate stabilization approach consists of piping and enclosing the tributary.

Project Alternate – Construct an area inlet at the top of the reach and pipe the captured stormwater to the channel. Construct a grade control on the mainstem at the culvert outfall for energy dissipation. Compensatory mitigation may be required for the 404 permit by the US Army Corps of Engineers for filling in the tributary.This includes constructing a manhole at the top of the reach, an area inlet structure halfway along the tributary and an outfall protection rock pad.

Impact to Special Areas and Water Quality: The project is located within Highlands South Park. Consideration during design and construction should be provided to minimize disturbance to special areas and reduce impacts to water quality to the greatest extent practical.

Estimated Project Cost: $86,268

FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

Lynn-Creek: Grade Control | LC-7

South of W. Harvest Dr. between NW Fairway Dr. & NW 5th St.

Problem description: Incision is occurring on the Tributary LC020R005 downstream of W Harvester Dr in Highlands South Park. The affected parcel is public.

Recommendation: Construct a series of grade control structures along the project reach.

Project Alternate - In addition to the grade controls, restore the reach with a meandering, natural channel.

Impact to Special Areas and Water Quality: The project is located within Highland South Park. Consideration during design and construction should be provided to minimize disturbance to special areas and reduce impacts to water quality to the greatest extent practical.

Estimated Project Cost: $366,899

FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

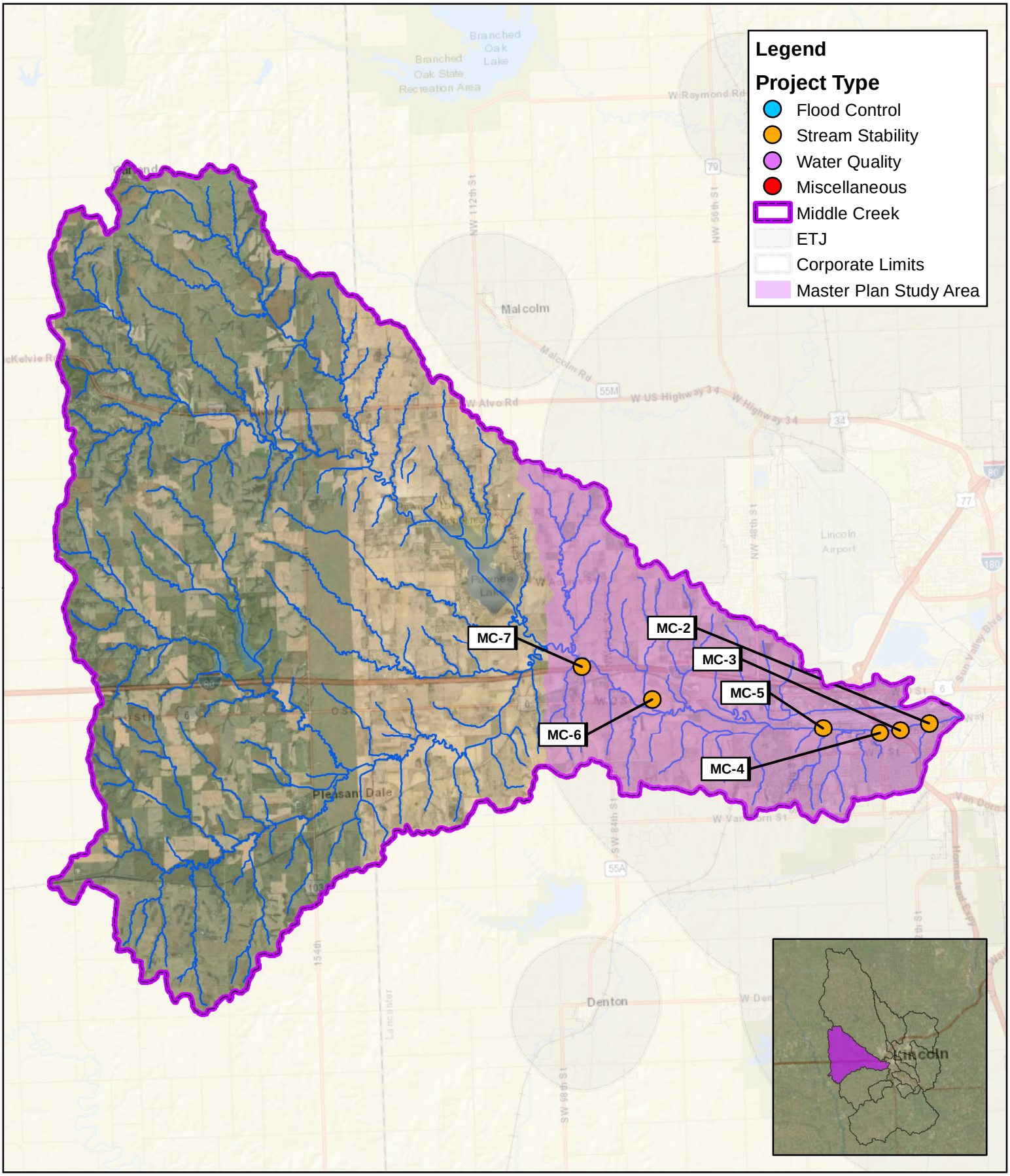
6.8 Middle Creek

Table 12 - Proposed Projects - Middle Creek Watershed

Project ID	Project Type	Project Location	Project Description	2021 Prioritization Score*	2021 Updated Cost**
MC-2	SS	NW of Rosa Parks Way & Folsom St.	Grade Control	135	$96,148
MC-3	SS	North of Rosa Parks Way East of Hwy 77	Pipe Outfall Restoration & Erosion Protection	160	$142,565
MC-4	SS	NE of Coddington Ave. & Millstone Rd.	Bank Stabilization & Grade Controls	170	$193,402
MC-5	SS	East of W. 40th St. north of W. A St.	Grade Controls	160	$652,040
MC-6	SS	South of W. O St. East of W. 84th St.	Bank Stabilization & Stilling Basin & Grade Control	160	$317,179
MC-7	SS	North of I-80 between W. 84th St. & W. 98th St.	Bank Stabilization & Grade Controls	220	$328,230

***These scores were determined in 2021 using concept level data and are subject to change as additional data becomes available**

****Costs are adjusted to 2021 dollars based on inflation since the original master plan was completed**



Created By: MB
Date: 3/15/2022
Software: ArcGIS 10.8.1
File: Lincoln Prioritization CIP Locations.mxd

Figure 12: Proposed Projects
Middle Creek Watershed

Lincoln, NE

0 2,500 5,000 10,000 Feet

Middle Creek: Grade Control | MC-2

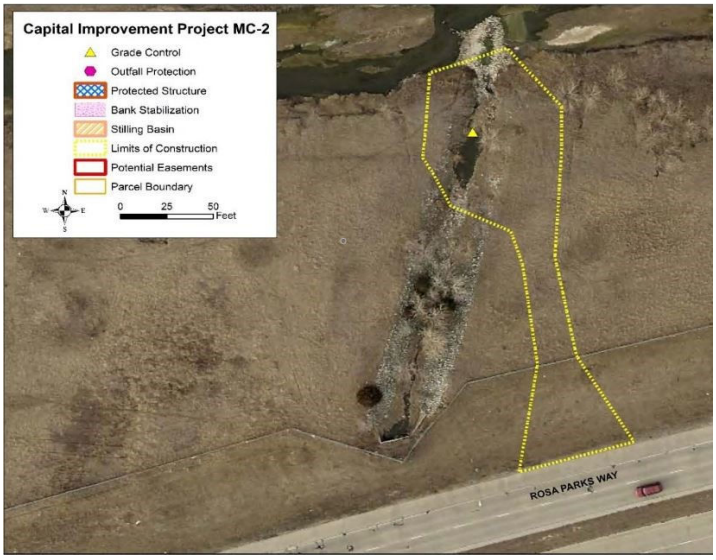
NW of Rosa Parks Way & Folsom St.

Problem Description: The existing tributary MC005R005 grade control and bank armor along the reach immediately upstream of the confluence is failing. The rock appears to be undersized and is placed on top of geo-textile fabric. The rock is washing away and the fabric is becoming exposed. The project site is located 1,000 feet northwest of the S Folsom St and Rosa Parks Way intersection and is partially located within the existing State right-of-way. Potentially affected parcels are public property including Seacrest Park.

Recommendation: Recommend removing the existing grade control and fabric and replacing with an engineered rock grade control to prevent further erosion. This project will be a joint City, NRD and State (NDOT) project and will need participation of all entities.

Impact to Special Areas and Water Quality: Proposed access runs through Seacrest West Park and the project is located in or near potential wetlands. Consideration during design and construction should be provided to minimize disturbance to special areas and reduce impacts to water quality to the greatest extent practical.

Estimated Project Cost: $96,148



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

Middle Creek: Pipe Outfall Restoration & Erosion Protection | MC-3

North of Rosa Parks Way East of Hwy 77

Problem Description: Two pipe outfalls are located high on the slope, away from the main stem channel MCR010 along the Rosa Parks Way ROW fence, is causing erosion on the right descending bank. The project sites are located directly northeast of the Rosa Parks Way and Homestead Parkway interchange and is partially located within the existing State right-of-way. At the east location, a large area of scour and erosion is present at the outfall, and the fence has been undermined. At the west location, the invert of a CMP culvert has rusted out and the outfall beneath the CMP is eroding. The erosion from these outfalls potentially affects parcels which are public property.

Recommendation: Recommend replacing the CMP culvert outfalls and constructing scour protection at each location to stop the erosion. In addition, reshape and rock line the erosion from the pipe outfall to the channel and repair the fence. This project will be a joint City, NRD and State (NDOT) project and will need participation of all entities.

Impact to Special Areas and Water Quality: No special area impacts are anticipated. Consideration during design and construction should be provided to reduce impacts to water quality to the greatest extent practical.

Estimated Project Cost: $142,564

FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

Middle Creek: Bank Stabilization & Grade Controls | MC-4

NE of Coddington Ave. & Millstone Rd.

Problem Description: Bank erosion and channel incision along tributary MC015R005 is threatening S Coddington Ave just north of the S Coddington Ave and W Millstone Rd intersection and is partially located within the existing State right-of-way. At one location, the bank erosion is within 10 feet the edge of S Coddington Ave pavement. In addition, the invert of the existing CMP culvert outfall for this tributary has rusted out and the slope under the CMP is eroding. The CMP is located on the right descending bank at the confluence with the main stem.

Recommendation: Recommend constructing bank stabilization with associated channel modification to stop erosion along the tributary. In addition, replace the rusted CMP outfall and reshape and rock line the erosion from the pipe outfall to the channel. This project will be a joint City, NRD and State (NDOT) project and will need participation of all entities.

Impact to Special Areas and Water Quality: No special area impacts are anticipated. Consideration during design and construction should be provided to reduce impacts to water quality to the greatest extent practical.

Estimated Project Cost: $193,401

FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

Middle Creek: Grade Controls | MC-5

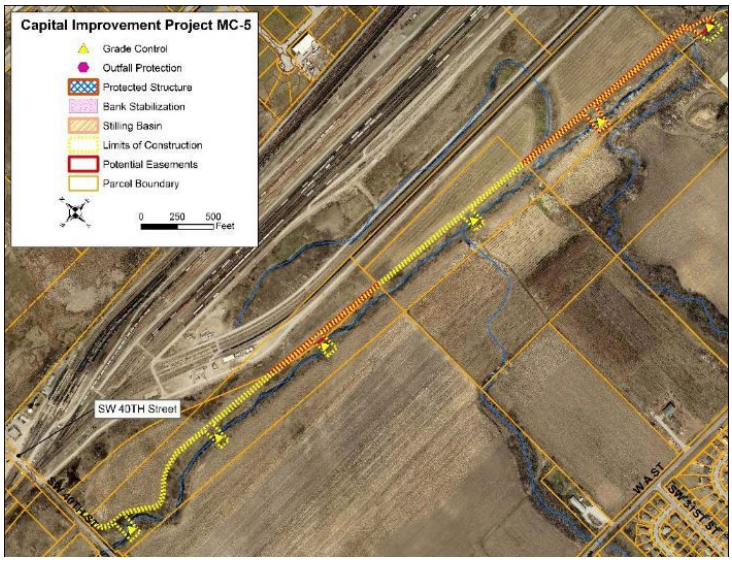
East of W. 40th St. north of W. A St.

Problem Description: The main stem MCR020 along this reach has incised and transitioned into widening. Center bars and active slumps are still present throughout this reach, however this reach also exhibits signs of transition from widening to a stable sediment transport, as indicated by the presence of riffles. The stability appears tenuous based on the presence of multiple knickpoints along the reach. Securing the knickpoints with engineered grade controls will help stabilize this reach by preventing future incision caused by the knickpoints propagating upstream. The reach extends 5,400 feet east of SW 40th St. The access is approximately 0.25 miles north of SW 40th St and West F St. Potentially affected parcels are both publicly and privately owned property. The profile grade is at 1,145 feet at the upstream limits of the project reach and 1,139 feet at the downstream limits. 4 to 6 grade controls appear sufficient to accommodate this 5 feet of grade change.

Recommendation: Recommend installing 4 to 6 engineered grade controls along 5,400 feet of channel along the main stem to halt future incision along this reach. An additional rock grade control is recommended at the tributary on the left descending bank to provide a stabilized construction access. This project will be a joint City, County, NRD and Burlington Northern Santa Fe Railroad project and will need participation of all parcel owners.

Impact to Special Areas and Water Quality: No special area impacts are anticipated. Consideration during design and construction should be provided to reduce impacts to water quality to the greatest extent practical.

Estimated Project Cost: $652,039



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

Middle Creek: Bank Stabilization & Stilling Basin & Grade Control | MC-6

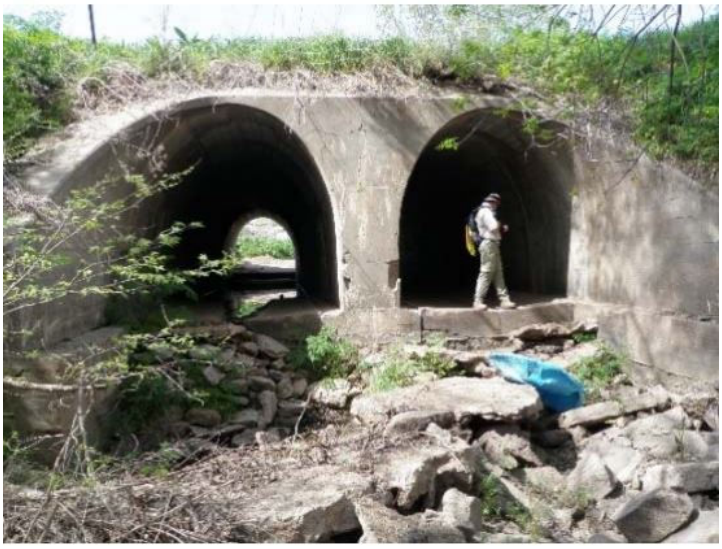
South of W. O St. East of W. 84th St.

Problem Description: The tributary MC60R015 culvert on the 7400 block of W O St is perched, and the culvert footings have been exposed. The project is located 3,800 feet east of the NW 84th St and W O St intersection and is partially located within the existing State right-of-way. Potentially affected parcels are both publicly and privately owned.

Recommendation: Recommend removing the existing dumped rubble and constructing an engineered stilling basin and rock grade control structure to protect the culvert outfall. This project will be a joint City, NRD and State (NDOT) project and will need participation of all parcel owners.

Impact to Special Areas and Water Quality: No special area impacts are anticipated. Consideration during design and construction should be provided to reduce impacts to water quality to the greatest extent practical.

Estimated Project Cost: $317,178



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

Middle Creek: Bank Stabilization & Grade Controls | MC-7

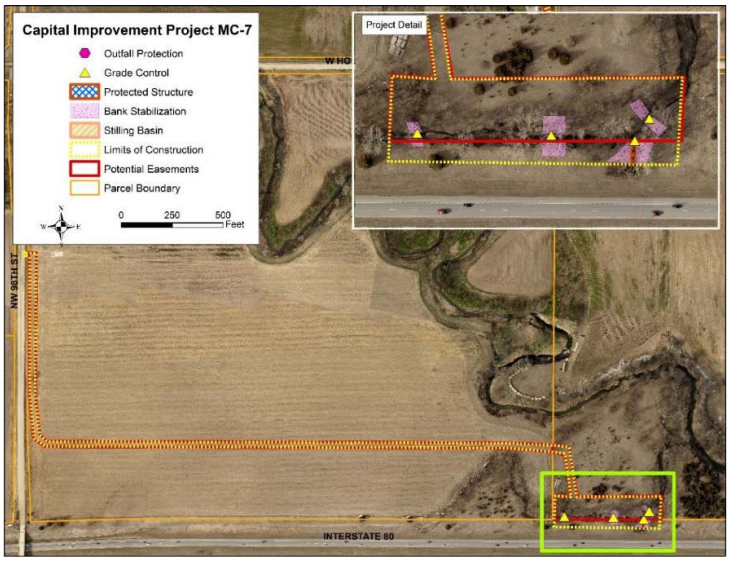
North of I-80 between W. 84th St. & W. 98th St.

Problem Description: A 3 foot knickpoint is located in tributary MC070R005 approximately 2,170 feet west of NW 84th St and 130 feet north of I-80 and is partially located within the existing State right-of-way. In addition, the I-80 culvert outfall at this location is perched from past incision.

Recommendation: Recommend installing grade control structures to stop incision and installing a stilling basin and grade control structure to protect the culvert outfall. This project will be a joint City, NRD and State (NDOT) project and will need participation of all entities.

Impact to Special Areas and Water Quality: Project is located within the Beltway Corridor Protection Area and a woodland corridor. Consideration during design and construction should be provided to minimize disturbance to special areas and reduce impacts to water quality to the greatest extent practical.

Estimated Project Cost: $328,230



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

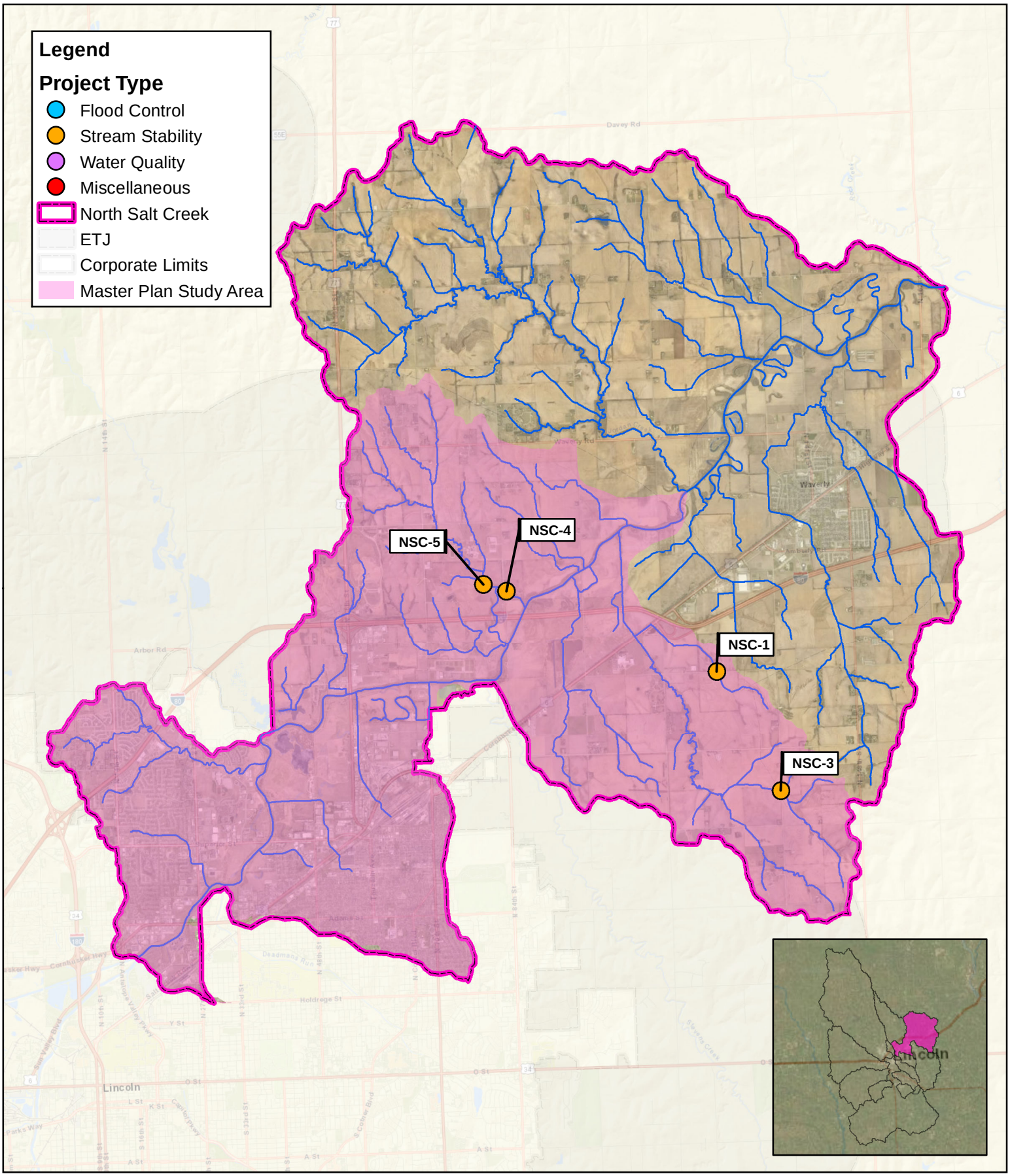
6.9 North Salt Creek

Table 13 - Proposed Projects - North Salt Creek Watershed

Project ID	Project Type	Project Location	Project Description	2021 Prioritization Score*	2021 Updated Cost**
NSC-1	SS	North of Alvo Rd. east of N 120th St.	Armored Plunge Pool	220	$100,819
NSC-3	SS	West of N 134th St. between Fletcher Ave. & Havelock Ave.	Armored Plunge Pool	220	$120,567
NSC-4	SS	East of N 84th St. north of I-80	Bank Stabilization & Grade Control	190	$285,828
NSC-5	SS	NW of McKelvie Rd. & N 70th St.	Grade Control	190	$192,284

***These scores were determined in 2021 using concept level data and are subject to change as additional data becomes available**

****Costs are adjusted to 2021 dollars based on inflation since the original master plan was completed**



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Date: 3/15/2022
Software: ArcGIS 10.8.1
File: Lincoln Prioritization CIP Locations.mxd

This map was prepared using information from record drawings supplied by JEO and/or other applicable city, county, federal, or public or private entities. JEO does not guarantee the accuracy of this map or the information used to prepare this map. This is not a scaled plat.

Figure 13: Proposed Projects North Salt Creek Watershed

Lincoln, NE

North Salt Creek: Armored Plunge Pool | NSC-1

North of Alvo Rd. east of N 120th St.

Problem Description: The Alvo Rd culvert outfall at Tributary NS110R010 is perched from incision. The affected parcel is private.

Recommendation: Construct rock armor, scour protection and grade control the culvert outfall with associated bank stabilization to prevent undermining the structure.

Impact to Special Areas and Water Quality: The project is located in the Beltway Corridor Protection Area and upstream of Saline Wetlands. The grade control will help protect these special areas. Consideration during design and construction should be provided to minimize disturbance to special areas and reduce impacts to water quality to the greatest extent practical.

Estimated Project Cost: $100,819

FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

North Salt Creek: Armored Plunge Pool | NSC-3

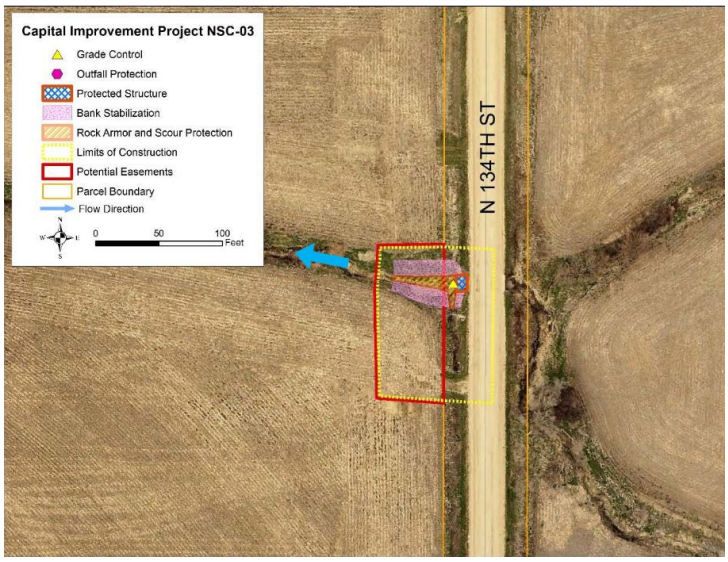
West of N 134th St. between Fletcher Ave. & Havelock Ave.

Problem Description: Past incision along Tributary NS410R005 has perched the N 134th St culvert approximately 2 feet. The affected parcel is private.

Recommendation: Construct rock armor, scour protection and grade control with associated bank stabilization at the culvert outfall to prevent further undermining of the structure.

Impact to Special Areas and Water Quality: This project is not located within any special areas. Consideration during design and construction should be provided to minimize disturbance and reduce impacts to water quality to the greatest extent practical.

Estimated Project Cost: $120,567



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

North Salt Creek: Bank Stabilization & Grade Control | NSC-4

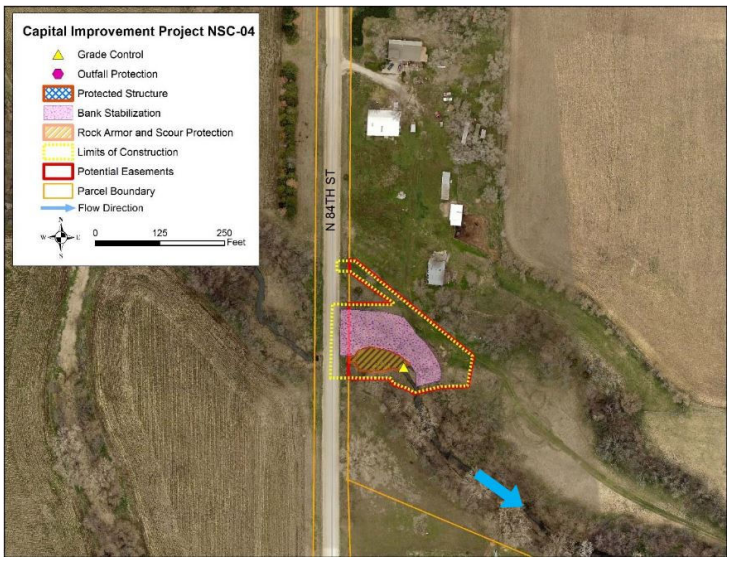
East of N 84th St. north of I-80

Problem Description: Bank erosion is threatening the N 84th St culvert outfall located approximately 1,700 feet north of the N 84th St and Interstate 80 interchange on Tributary NS030R005. The affected parcel is private.

Recommendation: Construct bank stabilization along the left descending bank with associated grade control to stop incision and protect the road. Include rock armor and scour protection at the culvert outfall.

Impact to Special Areas and Water Quality: The project is located in a Saline Wetland. Consideration during design and construction should be provided to minimize disturbance to special areas and reduce impacts to water quality to the greatest extent practical.

Estimated Project Cost: $285,827



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

North Salt Creek: Grade Control | NSC-5

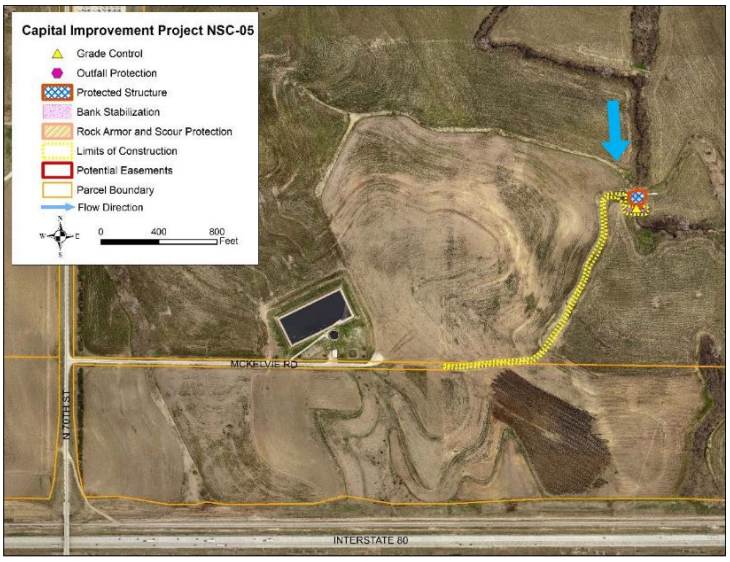
NW of McKelvie Rd. & N 70th St.

Problem Description: A five foot knickpoint is located downstream of a concrete spillway along Tributary NS030R010. The project is located on McKelvie Rd about 4,000 ft east of N 70th St. The affected parcels are public.

Recommendation: Repair existing spillway and add a toewall. Construct rock armor, scour protection and associated grade controls and bank stabilization at the downstream side of the spillway to prevent incision and scour from undermining the structure.

Impact to Special Areas and Water Quality: The project is located in a Saline Wetland. Consideration during design and construction should be provided to minimize disturbance to special areas and reduce impacts to water quality to the greatest extent practical.

Estimated Project Cost: $192,284



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

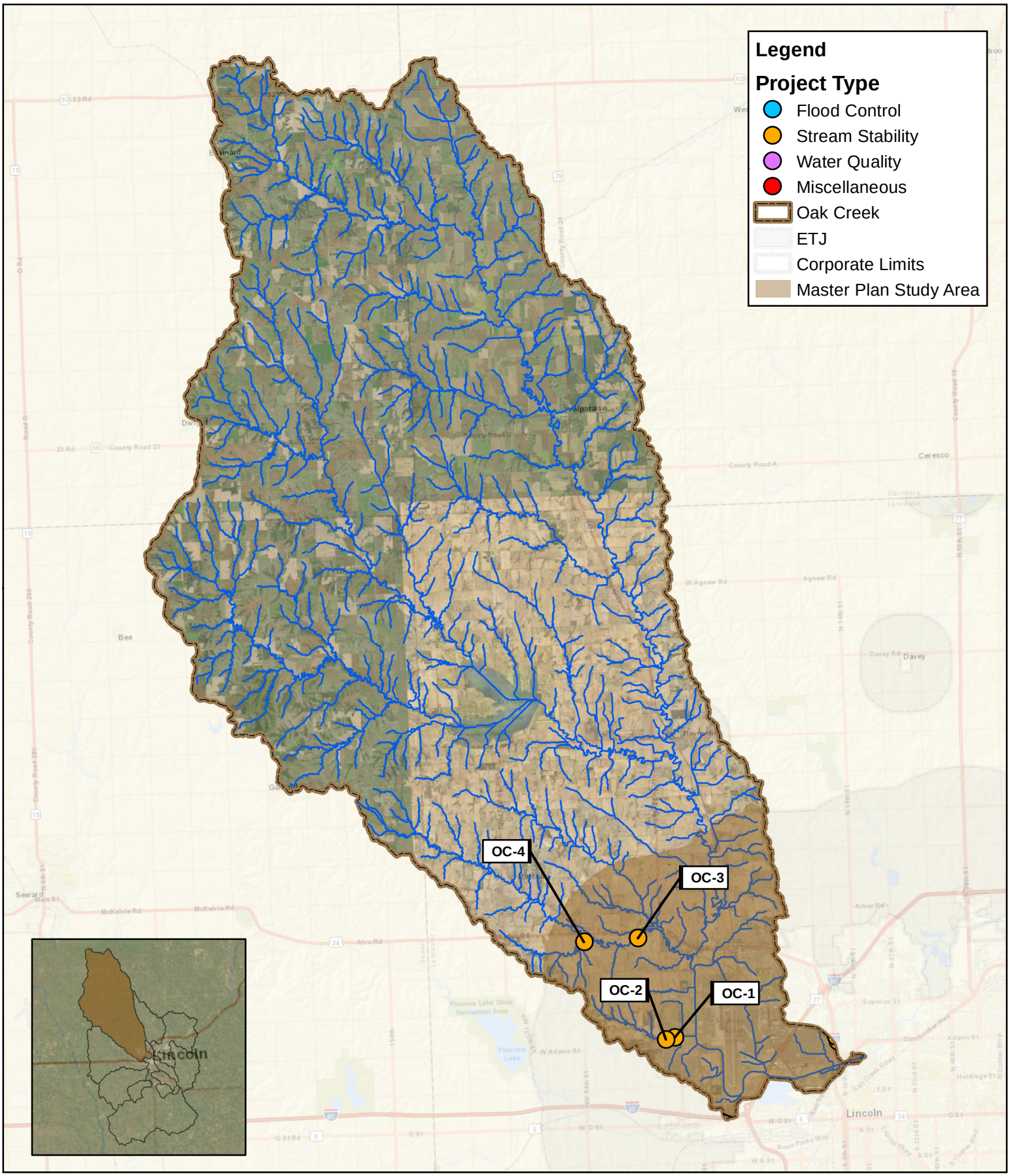
6.10 Oak Creek

Table 14 - Proposed Projects - Oak Creek Watershed

Project ID	Project Type	Project Location	Project Description	2021 Prioritization Score*	2021 Updated Cost**
OC-1	SS	325 ft downstream from the W Craw St culvert.	Grade Control & Pipe Outfall	250	$94,583
OC-2	SS	975 ft upstream of the W Craw St culvert crossing	Grade Control	160	$83,150
OC-3	SS	1,000 ft south of US Highway 34	Grade Control	190	$546,711
OC-4	SS	Approximately 2,600 ft south of the intersection of US Highway 34 and NW 70th St to NW 84th St.	Grade Control	190	$1,063,280

***These scores were determined in 2021 using concept level data and are subject to change as additional data becomes available**

****Costs are adjusted to 2021 dollars based on inflation since the original master plan was completed**



Created By: MB
Date: 3/15/2022
Software: ArcGIS 10.8.1
File: Lincoln Prioritization CIP Locations.mxd

This map was prepared using information from record drawings supplied by JEO and/or other applicable city, county, federal, or public or private entities. JEO does not guarantee the accuracy of this map or the information used to prepare this map. This is not a scaled plat.

Figure 14: Proposed Projects
Oak Creek Watershed

Lincoln, NE

Oak Creek: Grade Control & Pipe Outfall | OC-1

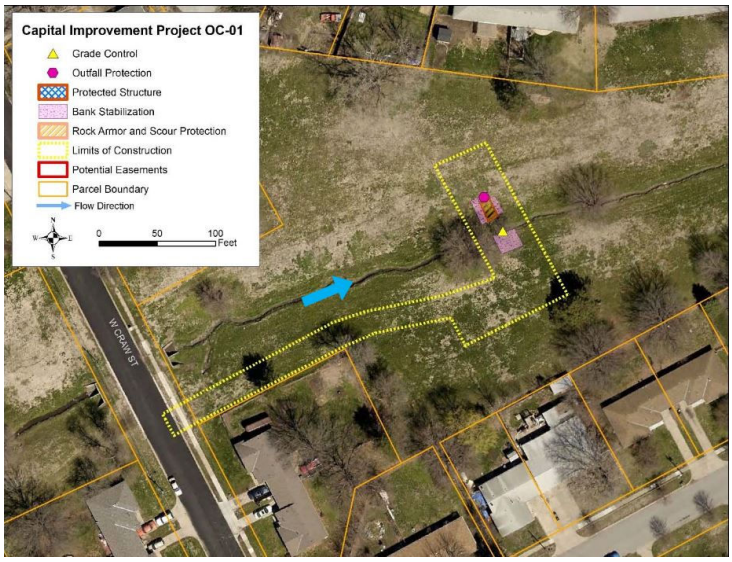
325 ft downstream from the W Craw St culvert.

Problem Description: A pipe outfall is separated with piping and sinkholes evident. The project is located about 325 feet downstream from the W Craw St culvert crossing on Tributary OC020R005. The affected parcel is public.

Recommendation: Reset the pipe to the original connection, and stabilize the outfall with rock armor or grade control to prevent future undermining.

Impact to Special Areas and Water Quality: There are no special areas at this project location. Consideration during design and construction should be provided to minimize disturbance and reduce impacts to water quality to the greatest extent practical.

Estimated Project Cost: $94,583



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

Oak Creek: Grade Control | OC-2

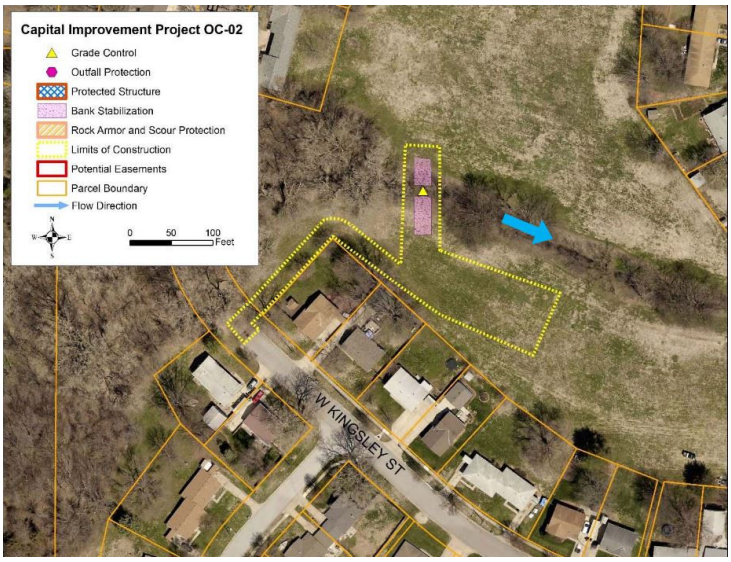
975 ft upstream of the W Craw St culvert crossing

Problem Description: A debris jam is holding up a 3 feet knickpoint on Tributary OC020R005 about 975 ft upstream of the W Craw St culvert crossing. The affected parcel is public.

Recommendation: Construct a grade control structure at the knickpoint to prevent the incision from migrating upstream.

Impact to Special Areas and Water Quality: There are no special areas at this project location. Consideration during design and construction should be provided to minimize disturbance and reduce impacts to water quality to the greatest extent practical.

Estimated Project Cost: $83,149



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

Oak Creek: Grade Control | OC-3

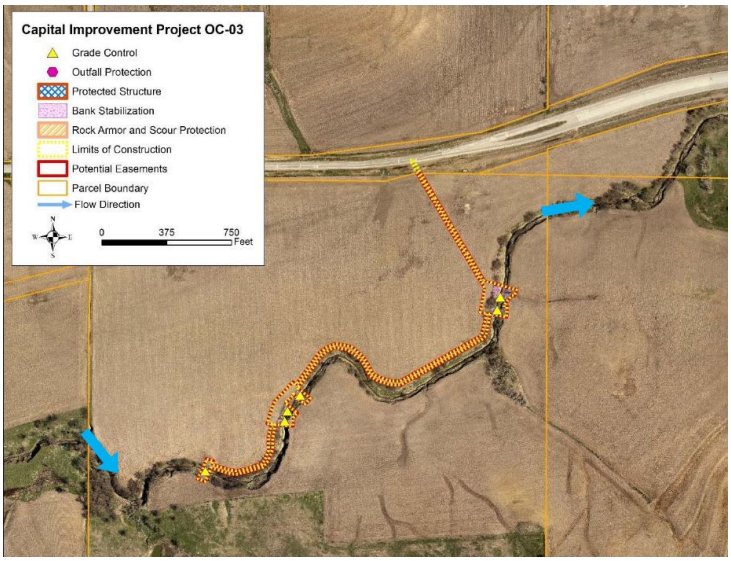
1,000 ft south of US Highway 34

Problem Description: Incision along the Mainstem ECR010 reach has resulted in two knickzones, about 4 feet tall each. The reach is located approximately 1,000 feet south of US Highway 34. The affected parcel is private.

Recommendation: Construct multiple grade controls along active knickzones to prevent further incision.

Impact to Special Areas and Water Quality: There are no special areas at this project location. Consideration during design and construction should be provided to minimize disturbance and reduce impacts to water quality to the greatest extent practical.

Estimated Project Cost: $546,710



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

Oak Creek: Grade Control | OC-4

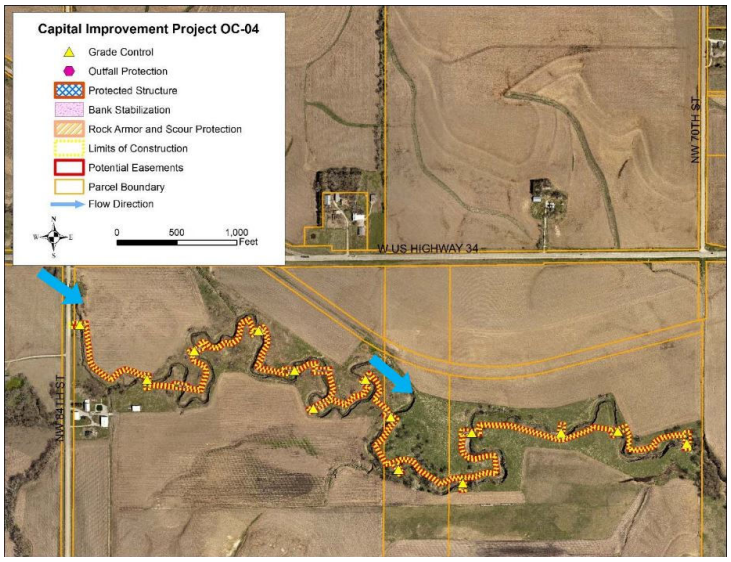
approximately 2,600 ft south of the intersection of US Highway 34 and NW 70th St to NW 84th

Problem Description: Incision is active along Mainstem ECR020 from approximately 2,600 feet south of the intersection of US Highway 34 and NW 70th St to NW 84th St. Affected parcels are private.

Recommendation: Construct multiple grade controls throughout the reach to stop the incision.

Impact to Special Areas and Water Quality: There are no special areas at this project location. Consideration during design and construction should be provided to minimize disturbance and reduce impacts to water quality to the greatest extent practical.

Estimated Project Cost: $1,063,279



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

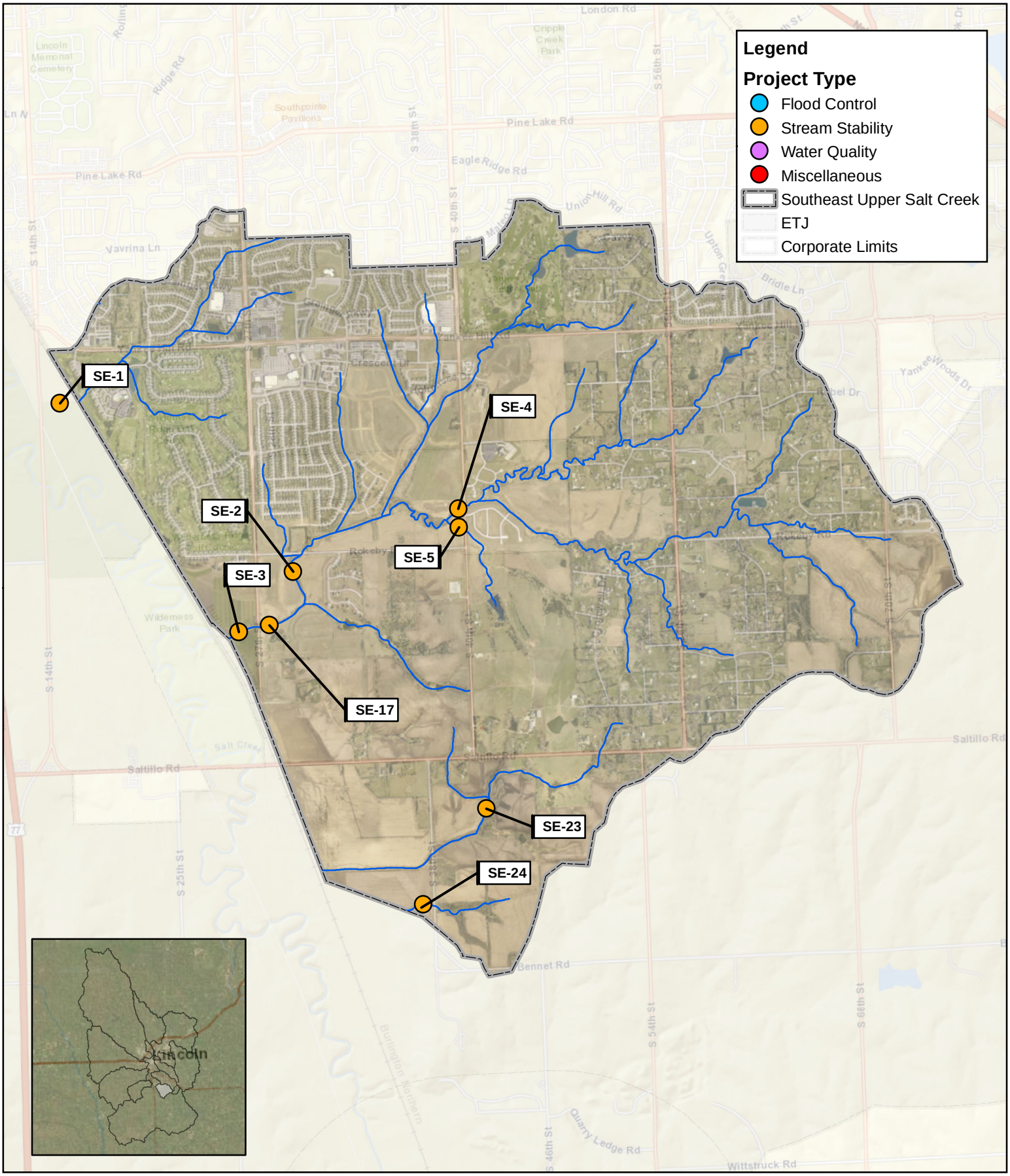
6.11 Southeast Upper Salt Creek

Table 15 - Proposed Projects - Southeast Upper Salt Creek Watershed

Project ID	Project Type	Project Location	Project Description	2021 Prioritization Score*	2021 Updated Cost**
SE-1	SS	East of 14th St. south of Yankee Hill Rd.	Grade Check	105	$111,444
SE-2	SS	South of Rokeby Rd. East of 27th St.	Grade Check	200	$111,444
SE-3	SS	West of 27th St. South of Rokeby Rd.	Grade Check	200	$111,444
SE-4	SS	West of 40th St. North of Rokeby Rd. (north culvert)	Grade Check	180	$111,444
SE-5	SS	West of 40th St. North of Rokeby Rd. (south culvert)	Grade Check	180	$111,444
SE-17	SS	West of 27th St. South of Rokeby Rd.	Stream Stabilization	200	$1,315,177
SE-23	SS	South of Saltillo Rd. East of 40th St.	Stream Stabilization	100	$110,752
SE-24	SS	West of 38th St. north of Bennet Rd.	Stream Stabilization	150	$110,752

***These scores were determined in 2021 using concept level data and are subject to change as additional data becomes available**

****Costs are adjusted to 2021 dollars based on inflation since the original master plan was completed**



Created By: MB
Date: 3/15/2022
Software: ArcGIS 10.8.1
File: Lincoln Prioritization CIP Locations.mxd

Figure 15: Proposed Projects
Southeast Upper Salt Creek Watershed

Lincoln, NE

0 750 1,500 3,000 Feet

Southeast Upper Salt Creek: Grade Check | SE-1

East of 14th St. south of Yankee Hill Rd.

Problem Description: UP Railroad and BNSF Railroad ROWs contain buried fiber optic cable. Head cutting, if allowed to continue, could expose the cable in the UP Railroad ROW. The overhead utilities along 14th Street do not appear to be immediately threatened. The BNSF Railroad box culvert provides a hardpoint in the channel.

Recommendation: Install grade check near 14th Street Bridge or UP Railroad Bridge.

Estimated Project Cost: $111,443

FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

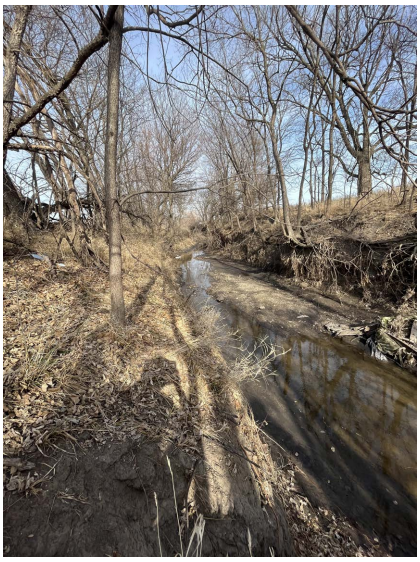
Southeast Upper Salt Creek: Grade Check | SE-2

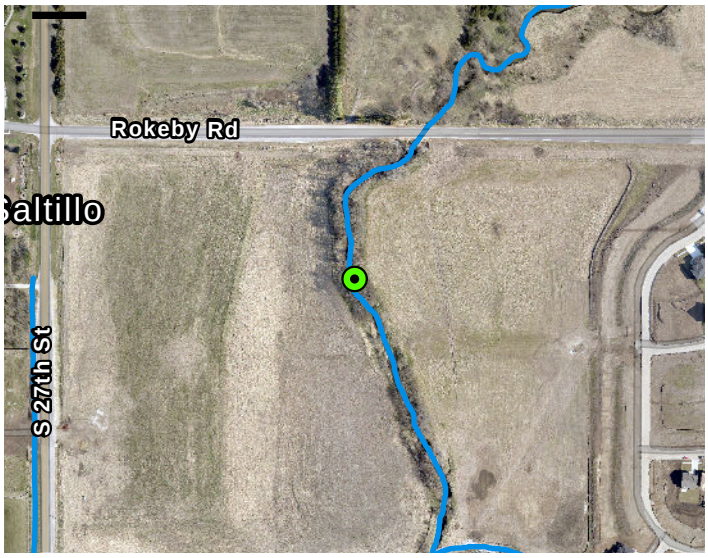
South of Rokeby Rd. East of 27th St.

Problem Description: The channel near the mouth has not been modified. Some evidence of head cutting is apparent downstream of the BNSF Railroad bridge. Minor channel incision has occurred upstream of 27th Street, but the channel appears to have stabilized at its current profile and the headcut is contained at the existing culvert at Rokeby Road.

Recommendation: Install grade check near Rokeby Road bridge.

Estimated Project Cost: $111,443





FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

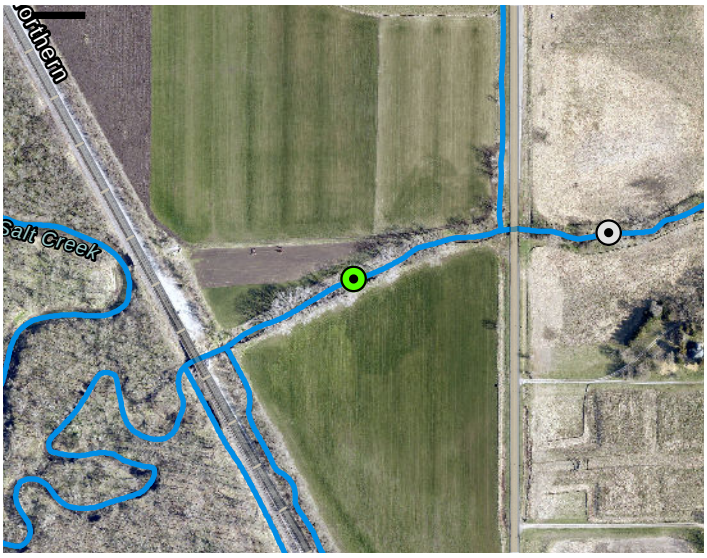
Southeast Upper Salt Creek: Grade Check | SE-3

West of 27th St. South of Rokeby Rd.

Problem Description: The channel near the mouth has not been modified. Some evidence of head cutting is apparent downstream of the BNSF Railroad bridge. Minor channel incision has occurred upstream of 27th Street, but the channel appears to have stabilized at its current profile.

Recommendation: Install grade check near South 27th Street bridge.

Estimated Project Cost: $111,443



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

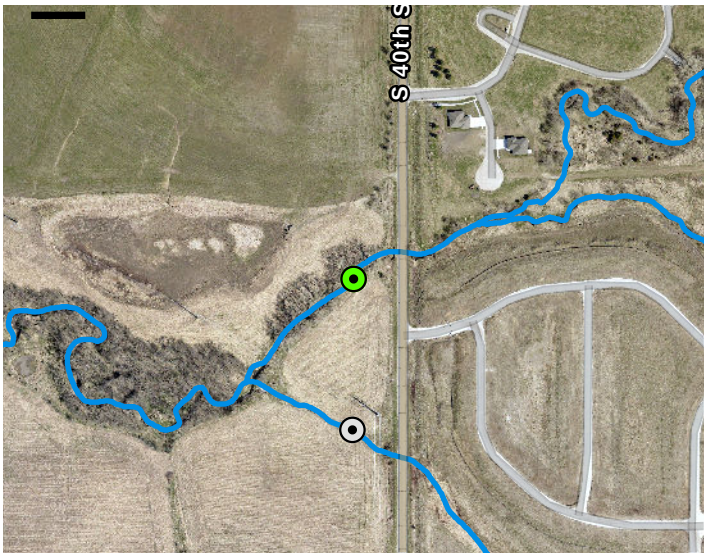
Southeast Upper Salt Creek: Grade Check | SE-4

West of 40th St. North of Rokeby Rd. (north culvert)

Problem Description: The area is currently undeveloped, and flooding is confined to crop land. The South 40th Street crossing on the mainstem, and on the tributary crossing, do not meet current city stormwater criteria (see the hydraulics section for more information). Proposed development in the area will need to meet Lincoln Drainage Criteria Manual requirements. Low openings in buildings adjacent to the channel will need to be one-feet above the 100-year water surface profile for projected flows. The roadways are expected to be widened to meet increased traffic demands as the area develops.

Recommendation: Install grade check near South 40th Street culvert to prevent the current headcut from progressing further upstream.

Estimated Project Cost: $111,443



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

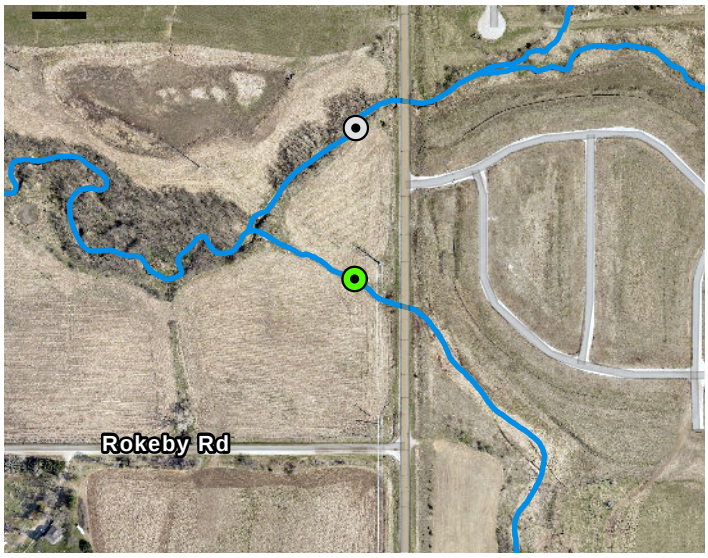
Southeast Upper Salt Creek: Grade Check | SE-5

West of 40th St. North of Rokeby Rd. (south culvert)

Problem Description: The area is currently undeveloped, and flooding is confined to crop land. The South 40th Street crossing on the mainstem, and on the tributary crossing, do not meet current city stormwater criteria (see the hydraulics section for more information). Proposed development in the area will need to meet Lincoln Drainage Criteria Manual requirements. Low openings in buildings adjacent to the channel will need to be one-feet above the 100-year water surface profile for projected flows. The roadways are expected to be widened to meet increased traffic demands as the area develops.

Recommendation: Install grade check near South 40th Street culvert to prevent the current headcut from progressing further upstream.

Estimated Project Cost: $111,443



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

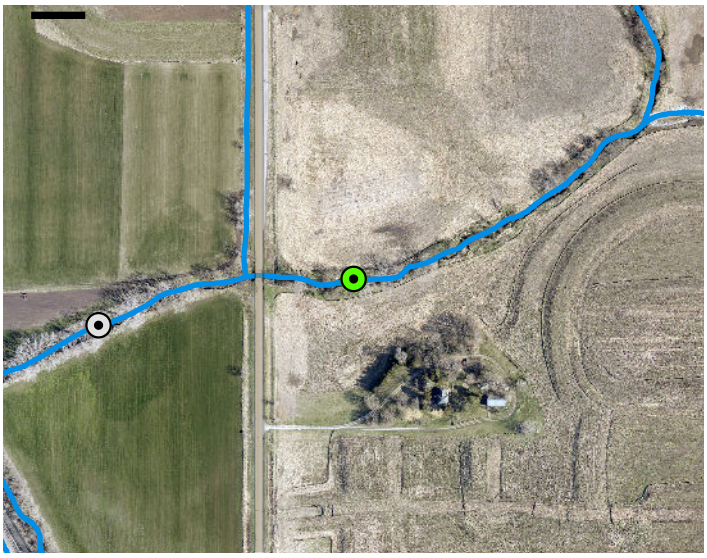
Southeast Upper Salt Creek: Stream Stabilization | SE-17

West of 27th St. South of Rokeby Rd.

Problem Description: The channel near the mouth has not been modified. Some evidence of head cutting is apparent downstream of the BNSF Railroad bridge. Minor channel incision has occurred upstream of 27th Street, but the channel appears to have stabilized at its current profile.

Recommendation: Address stream stability with bioengineering approach and construct water quality wetlands for educational purposes.

Estimated Project Cost: $1,315,177



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

Southeast Upper Salt Creek: Stream Stabilization | SE-23

South of Saltillo Rd. East of 40th St.

Problem Description: Commodity crops along the channel are subject to flood hazard. The channel has less than a 2-year capacity. No buildings appear to be within the limits of the 100-year floodplain.

Recommendation: Address stream stability with bioengineering approach and construct water quality wetlands.

Estimated Project Cost: $110,751

FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

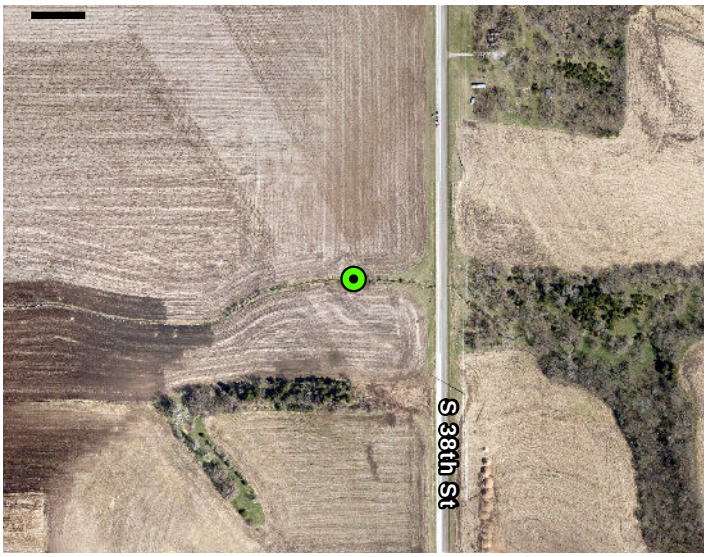
Southeast Upper Salt Creek: Stream Stabilization | SE-24

West of 38th St. north of Bennet Rd.

Problem Description: There are signs of head cutting and stream bank erosion. The stream banks are artificially raised to bypass frequent flows from the upstream watershed.Most of this stream segment is within the Salt Creek floodplain. Commodity crops are subject to flood hazard. South 38th Street does not meet minimum DCM requirements for overtopping. The channel
has about a 2-year capacity.

Recommendation: Address stream stability with bioengineering approach and build double 10' x 8' RC Box culvert.

Estimated Project Cost: $110,751



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

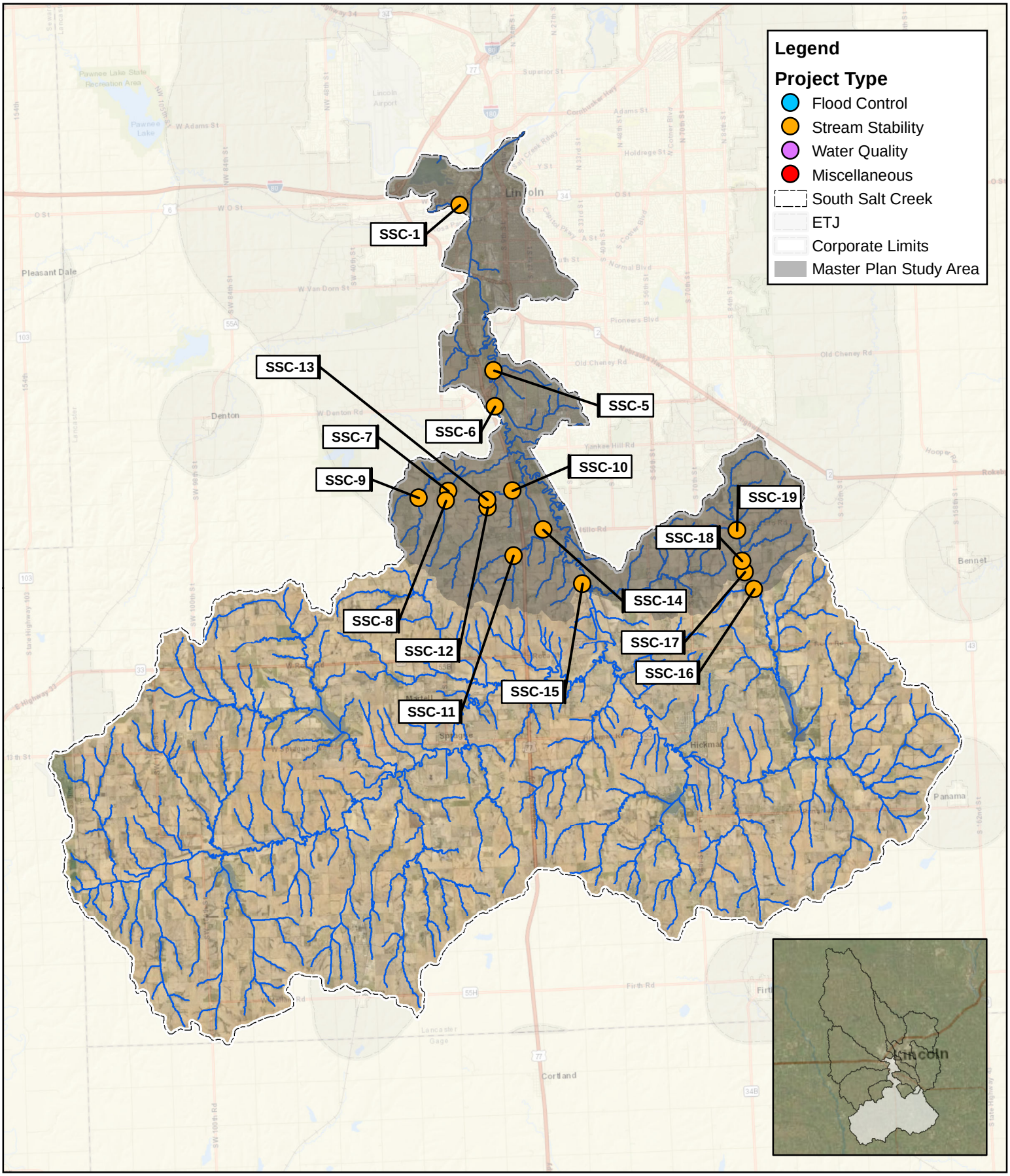
6.12 South Salt Creek

Table 16 - Proposed Projects - South Salt Creek Watershed

Project ID	Project Type	Project Location	Project Description	2021 Prioritization Score*	2021 Updated Cost**
SSC-1	SS	SW of W. O St. & Sun Valley Blvd.	Grade Controls	160	$264,131
SSC-5	SS	South of Old Cheney Rd. East of 1st St.	Bank Stabilization & Grade Controls	310	$359,175
SSC-6	SS	SE of Warlick Blvd. & Hwy 77	Bank Stabilization & Grade Controls	280	$517,211
SSC-7	SS	North of Rokeby Rd. East of W. 12th St.	Bank Stabilization & Stilling Basin & Grade Control	140	$209,979
SSC-8	SS	East of W. 12th St. South of Rokeby Rd.	Stilling Basin & Grade Control	160	$179,035
SSC-9	SS	South of Rokeby Rd. between W. 12th St. & W. 27th St.	Grade Control	140	$116,041
SSC-10	SS	SW of Rokeby Rd. & Hwy 77	Bank Stabilization & Grade Controls	190	$118,251
SSC-11	SS	NW of Hwy 77 & Bennet Rd.	Grade Controls & Wetland Construction	220	$222,136
SSC-12	SS	East of 1st St. South of Rokeby Rd.	Bank Stabilization & Stilling Basin & Grade Control	160	$217,715
SSC-13	SS	East of 1st St. South of Rokeby Rd.	Bank Stabilization & Stilling Basin & Grade Control	160	$172,404
SSC-14	SS	North of Saltillo Rd. between 14th St. & 25th St.	Bank Stabilization & Stilling Basin & Grade Control	140	$151,406
SSC-15	SS	East of 25th St. North of Wittstruck Rd.	Grade Controls	150	$142,565
SSC-16	SS	North of Wittstruck Rd. between 82nd St. & 96th St.	Bank Stabilization & Grade Controls	255	$301,707
SSC-17	SS	South of Bennet Rd. East of 82nd St.	Grade Control	140	$150,301
SSC-18	SS	North of Bennet Rd. East of 82nd St.	Grade Control	140	$86,202
SSC-19	SS	South of Saltillo Rd. East of 82nd St.	Grade Control	140	$93,938

***These scores were determined in 2021 using concept level data and are subject to change as additional data becomes available**

****Costs are adjusted to 2021 dollars based on inflation since the original master plan was completed**



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Date: 3/15/2022
Software: ArcGIS 10.8.1
File: Lincoln Prioritization CIP Locations.mxd

Figure 16: Proposed Projects South Salt Creek Watershed

Lincoln, NE

0 3,750 7,500 15,000 Feet

South Salt Creek: Grade Controls | SSC-1

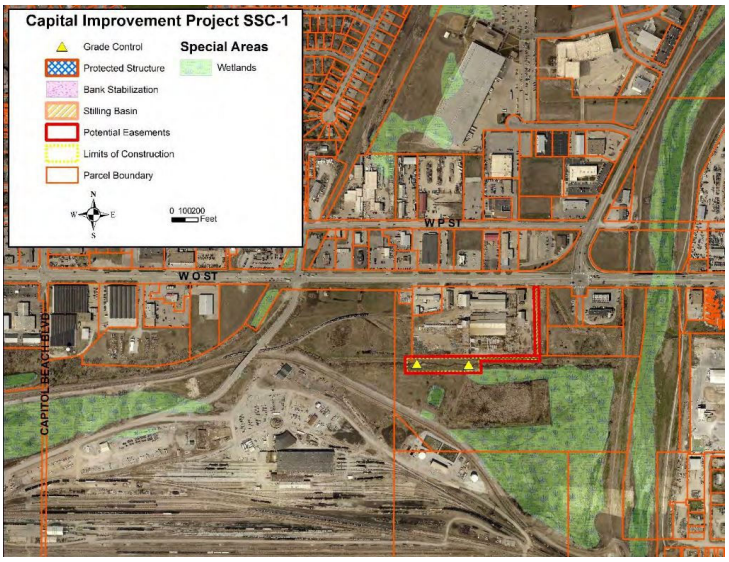
SW of W. O St. & Sun Valley Blvd.

Problem Description: Incision is moving up tributary SC005R005 paralleling W O St north of Rosa Parks Way.

Recommendation: Recommend constructing grade controls along the upper reach at existing knickpoint locations and installing outlet protection below culvert outfalls to maintain the profile grade along this reach and protect the outfall structures.

Impact to Special Areas and Water Quality: Project is located within the Salt Valley Greenway and near wetlands. Consideration during design and construction should be provided to minimize disturbance to these special areas and reduce impacts to water quality to the greatest extent practical.

Estimated Project Cost: $264,131



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

South Salt Creek: Bank Stabilization & Grade Controls | SSC-5

South of Old Cheney Rd. East of 1st St.

Problem Description: Incision and a deep knickzone is actively eroding into the stable upper reach of tributary SC040R005 located approximately 600 feet south of the Old Cheney Rd Bridge over the main stem. The erosion is threatening walking trails in Wilderness Park at this location.

Recommendation: Recommend constructing a series of grade controls and associated bank stabilization to stop the incision, protect the existing pedestrian trails and upstream reach from erosion, and preserve the upstream natural resources. This project includes construction access from Old Cheney Rd along the park trail and crossing tributary SC035R005. The existing rock grade control at this location on tributary SC035R005 is failing and a new grade control at this location to protect the tributary and facilitate construction access is included in this project. In addition, the access route through wooded areas should vary to avoid a straight clear cut path and to minimize tree removal.

Impact to Special Areas and Water Quality: Project is located within Salt Valley Site, Wilderness Park, and in a woodland. Consideration during design and construction should be provided to minimize disturbance and reduce impacts to these special areas and water quality to the greatest extent practical.

Estimated Project Cost: $359,174

FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

South Salt Creek: Bank Stabilization & Grade Controls | SSC-6

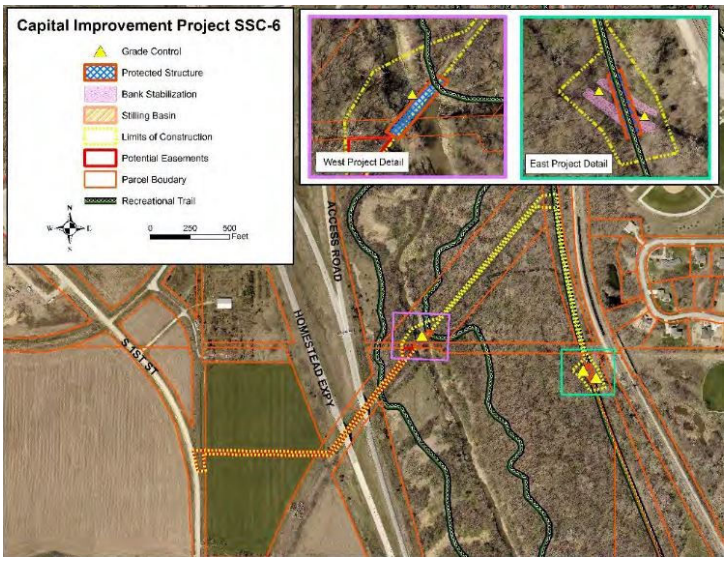
SE of Warlick Blvd. & Hwy 77

Problem Description: There is an existing rock rubble knickzone on the main stem SCR030 at the old railroad bridge located approximately 2,500 feet south of W Denton Rd and 450 feet east of Highway 77. The rubble does not appear to provide reliable stability of the knickzone. Also, incision along tributary SC050R005 is undermining the trail bridge piers and exposing a fiber optic line in channel bed. The bridge is located west of the northwest corner of Lincoln Southwest High School, about 275 feet west of the railroad tracks. MCI plans to lower the exposed cable line and the MCI construction plans are available with the City Parks Department.

Recommendation: Recommend constructing a grade control and associated bank stabilization on the main stem at the old railroad bridge to stop incision from propagating upstream. Also recommend grade controls and associated bank stabilization along approximately 150 feet of the tributary at the trail bridge to stop incision and protect the bridge. The tributary project reach should beginning downstream of the bridge and extending to a point upstream of the bridge to the knickpoint in the channel bed where the exposed fiber optic line is/was located in the channel.

Impact to Special Areas and Water Quality: The project is located within Salt Valley Corridor, Wilderness Park, and within a woodland. Consideration during design and construction should be provided to minimize disturbance and reduce impacts to the special areas and water quality to the greatest extent practical.

Estimated Project Cost: $517,211



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

South Salt Creek: Bank Stabilization & Stilling Basin & Grade Control | SSC-7

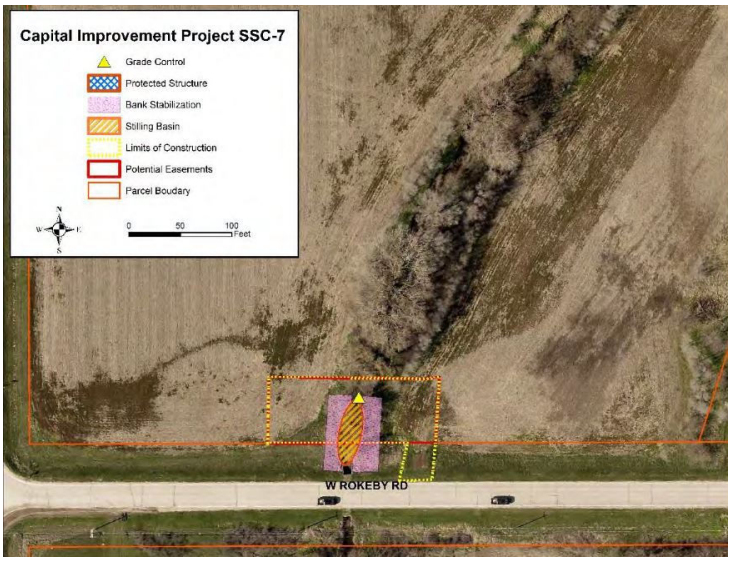
North of Rokeby Rd. East of W. 12th St.

Problem Description: The W Rokeby Rd culvert (County Structure O-48) outfall is perched and a debris jam in the tributary SC155R005 approximately 380 feet downstream of W Rokeby Rd is holding up a 2 foot tall knickpoint. The tributary crossing is located east of SW 12th St.

Recommendation: Recommend constructing a stilling basin and grade control with associated bank stabilization at the perched culvert outfall to protect the culvert. The grade control will need to be deep enough to protect against the 2 foot knickpoint downstream of the culvert. Utility markers indicate the location of a pipeline downstream of the W Rokeby Rd crossing that will need to be considered during design and construction.

Impact to Special Areas and Water Quality: Project is located within a woodland. Consideration during design and construction should be provided to minimize disturbance and reduce impacts to this special areas and water quality to the greatest extent practical.

Estimated Project Cost: $209,978



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

South Salt Creek: Stilling Basin & Grade Control | SSC-8

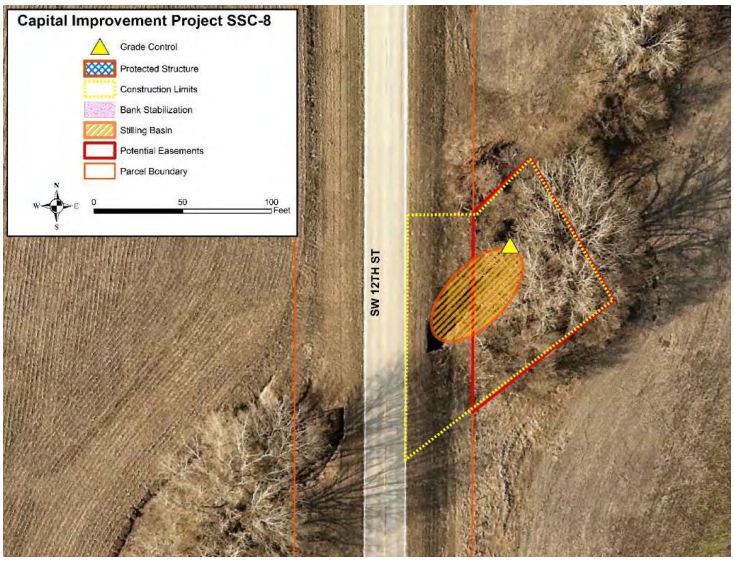
East of W. 12th St. South of Rokeby Rd.

Problem Description: The SW 12th St culvert (County Structure O-155) on tributary SC155R005 located 1070 feet south of W Rokeby Rd is perched.

Recommendation: Recommend constructing a stilling basin and grade control at the culvert outfall.

Impact to Special Areas and Water Quality: Project is located within a woodland. Consideration during design and construction should be provided to minimize disturbance and reduce impacts to this special areas and water quality to the greatest extent practical.

Estimated Project Cost: $179,034



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

South Salt Creek: Grade Control | SSC-9

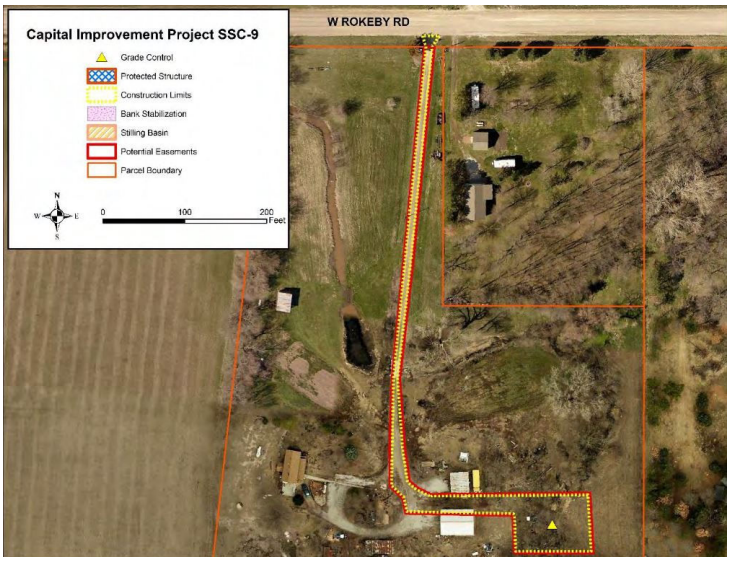
South of Rokeby Rd. between W. 12th St. & W. 27th St.

Problem Description: An eroding farm crossing is holding up a four foot tall knickpoint in the tributary SC055R025 located 750 feet upstream of W Rokeby Rd, east of W Rokeby Rd and SW 27th St.

Recommendation: Recommend replacing or reinforcing the dirt farm crossing with engineered erosion control and rock structure/grade control to prevent erosion of the crossing and stop the knickpoint from propagating upstream.

Impact to Special Areas and Water Quality: There are no special areas at this project location. Consideration during design and construction should be provided to minimize disturbance and reduce impacts to water quality to the greatest extent practical.

Estimated Project Cost: $116,040



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

South Salt Creek: Bank Stabilization & Grade Controls | SSC-10

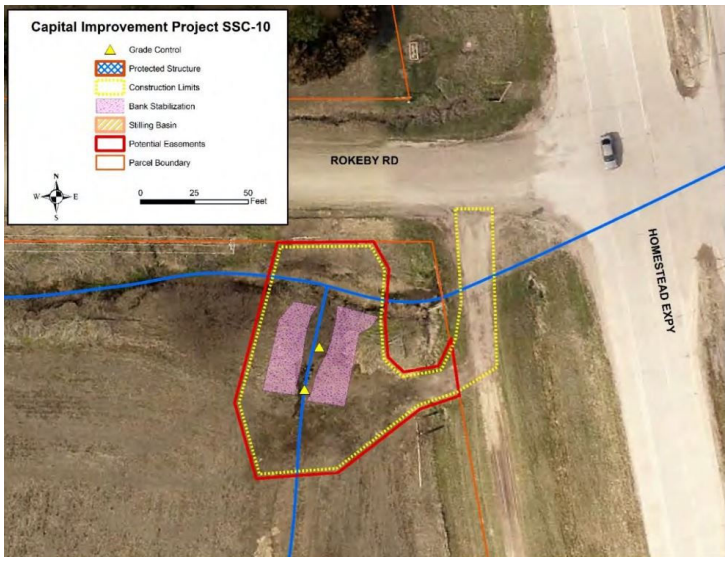
SW of Rokeby Rd. & Hwy 77

Problem Description: A 4 foot tall knickpoint is moving up the tributary SC265R005 located just west of Rokeby Rd and Homestead Expressway.

Recommendation: Recommend grade controlling the knickpoint and associated bank stabilization to halt propagation of the knickpoint and to protect the upstream tributary. This project is in the location of the new beltway construction, will require access across State ROW and needs to be coordinated with the future South Beltway plans anticipated in 2020.

Impact to Special Areas and Water Quality: Project is located in Salt Valley Corridor. Consideration during design and construction should be provided to minimize disturbance and reduce impacts to this special areas and water quality to the greatest extent practical.

Estimated Project Cost: $118,251



FOR MORE INFORMATION

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**Refer to the original Master Plan for all Figure and Table Callouts*

South Salt Creek: Grade Controls & Wetland Construction | SSC-11

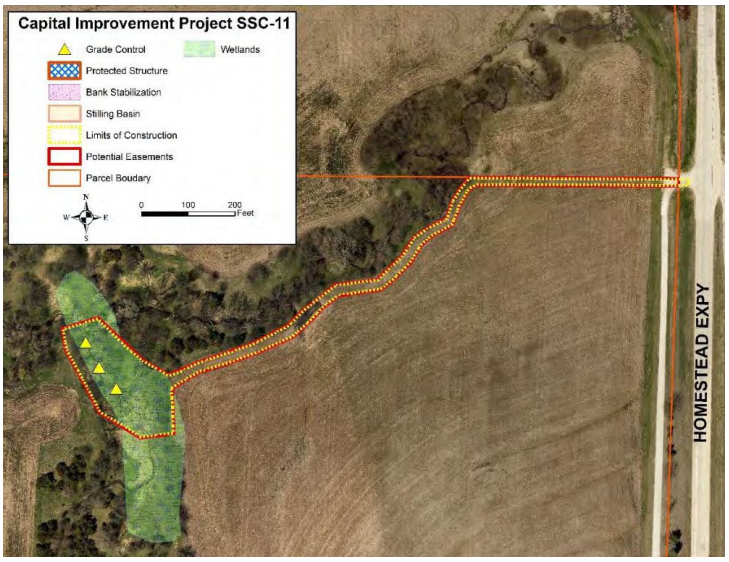
NW of Hwy 77 & Bennet Rd.

Problem Description: A 4 foot tall knickzone in the tributary SC435R005 near the confluence is actively eroding into the un-incised upstream reach. The project is located approximately 1,300 feet west of Homestead Expressway and 2,300 feet north of Bennet Rd.

Recommendation: Recommend constructing grade controls and associated bank stabilizations along the incising reach to protect the tributary by prevent the propagation of incision upstream.

Impact to Special Areas and Water Quality: Project is located within a woodland and a potential wetland area. This project will protect potential wetlands from degradation of hydrology caused by channel incision. Consideration during design and construction should be provided to minimize disturbance and reduce impacts to water quality to the greatest extent practical.

Estimated Project Cost: $222,135



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**Refer to the original Master Plan for all Figure and Table Callouts*

South Salt Creek: Bank Stabilization & Stilling Basin & Grade Control | SSC-12

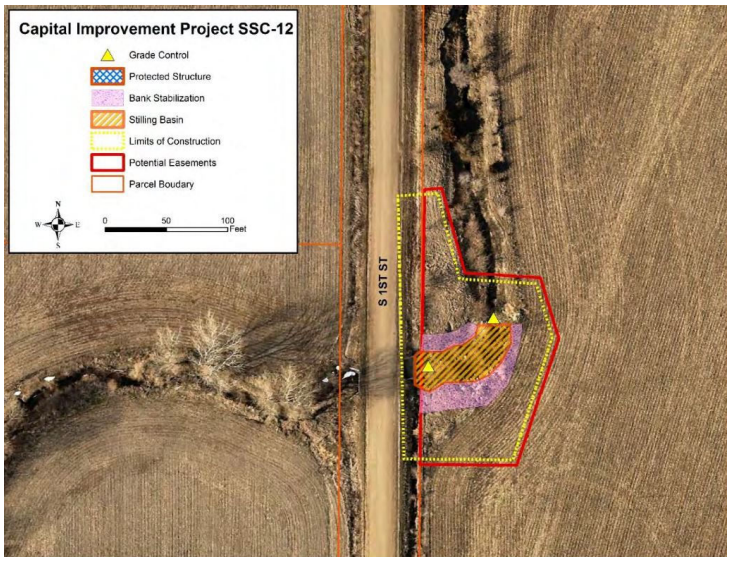
East of 1st St. South of Rokeby Rd.

Problem Description: The S 1st St culvert (County Structure O-204) is perched at the tributary SC365R005 crossing located approximately 1,150 feet south of Rokeby Rd.

Recommendation: Recommend constructing a grade control, stilling basin and associated bank stabilization to protect the S 1st St culvert.

Impact to Special Areas and Water Quality: There are no special areas at this project location. Consideration during design and construction should be provided to minimize disturbance and reduce impacts to water quality to the greatest extent practical.

Estimated Project Cost: $217,715



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**Refer to the original Master Plan for all Figure and Table Callouts*

South Salt Creek: Bank Stabilization & Stilling Basin & Grade Control | SSC-13

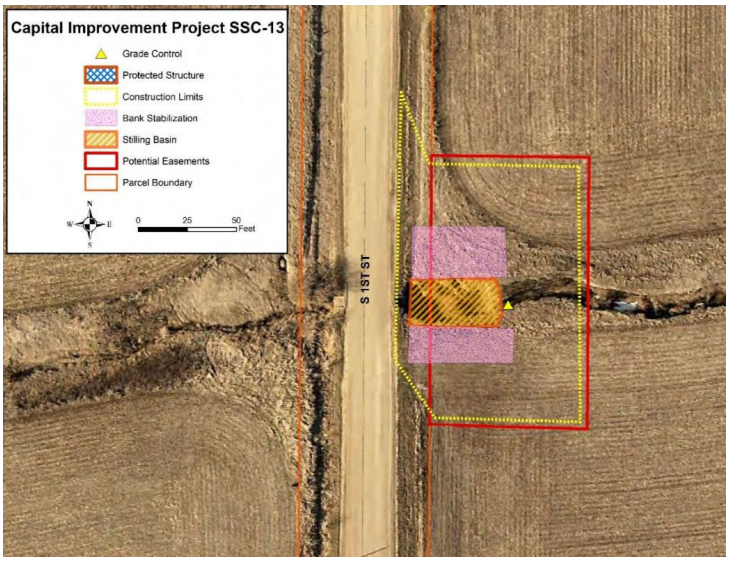
East of 1st St. South of Rokeby Rd.

Problem Description: The S 1st St culvert (County Structure O-203) on tributary SC165R010 located approximately 2,090 feet South of Rokeby Rd is perched.

Recommendation: Recommend removing dumped rubble and constructing a grade control, stilling basin and associated bank stabilization to protect the S 1st St culvert. This project will be a joint City, NRD and State (NDOT) project and will need participation of all entities.

Impact to Special Areas and Water Quality: There are no special areas at this project location. Consideration during design and construction should be provided to minimize disturbance and reduce impacts to water quality to the greatest extent practical.

Estimated Project Cost: $172,403



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**Refer to the original Master Plan for all Figure and Table Callouts*

South Salt Creek: Bank Stabilization & Stilling Basin & Grade Control | SSC-14

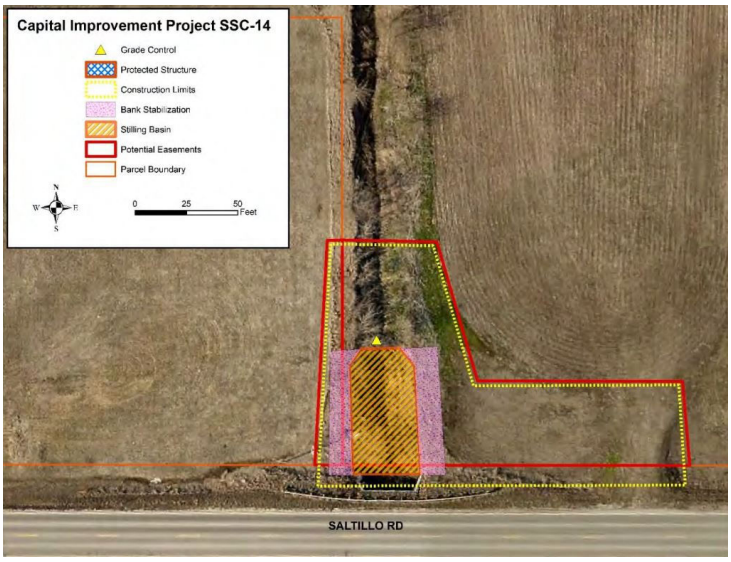
North of Saltillo Rd. between 14th St. & 25th St.

Problem Description: The Saltillo Rd culvert on tributary SC065R010 located approximately 1,270 feet east of the intersection of S 14th St is perched.

Recommendation: Recommend constructing a grade control, stilling basin and associated bank stabilization to protect the culvert.

Impact to Special Areas and Water Quality: There are no special areas at this project location. Consideration during design and construction should be provided to minimize disturbance and reduce impacts to water quality to the greatest extent practical.

Estimated Project Cost: $151,405



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**Refer to the original Master Plan for all Figure and Table Callouts*

South Salt Creek: Grade Controls | SSC-15

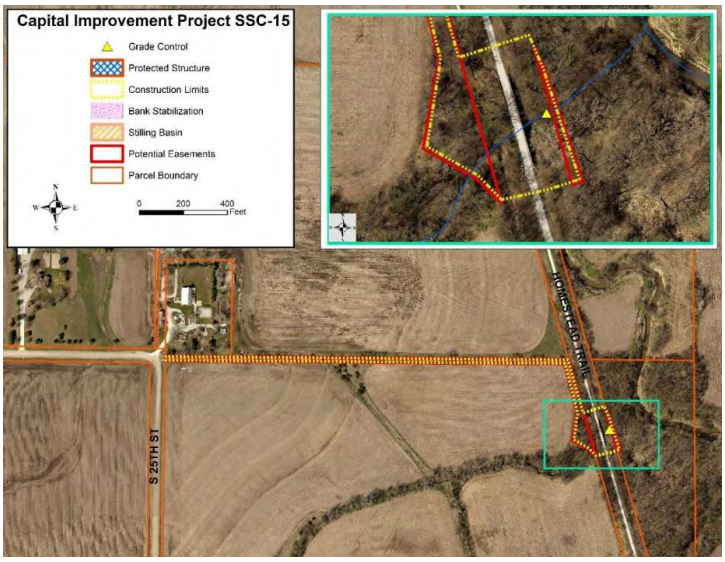
East of 25th St. North of Wittstruck Rd.

Problem Description: Tributary SC095R005 is incising beneath the existing Homestead trail bridge located 180 feet upstream of the tributary's confluence with the main stem of South Salt Creek. The project site is approximately 4,200 feet northeast of the Wittstruck Rd and S 25th St intersection.

Recommendation: Recommend constructing grade control and associated bank stability to stop incision and protect the trail bridge.

Impact to Special Areas and Water Quality: Project is located within Salt Valley Corridor and a woodland. Consideration during design and construction should be provided to minimize disturbance and reduce impacts to the special areas and water quality to the greatest extent practical.

Estimated Project Cost: $142,564



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**Refer to the original Master Plan for all Figure and Table Callouts*

South Salt Creek: Bank Stabilization & Grade Controls | SSC-16

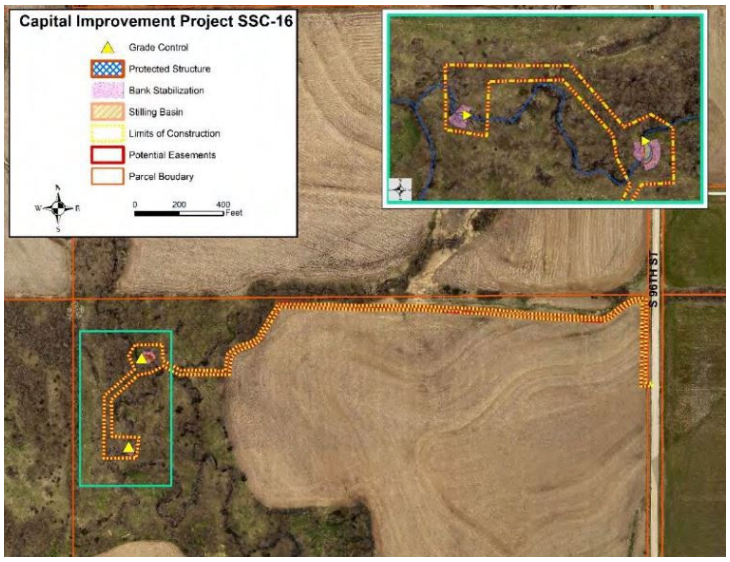
North of Wittstruck Rd. between 82nd St. & 96th St.

Problem Description: Existing tree root mass is holding up a 3 foot knickpoint on Wagon Train main stem WTR005 approximately 1,950 feet upstream of Wittstruck Rd between S 82nd St and S 96th St. At this location, the main stem is approximately 37 feet from an adjacent tributary and this tributary's flowline is approximately a foot deeper than the flowline of the main stem. Continued incision, potential lateral migration and flowline elevations of the tributary present the potential that the main stem may erode to the tributary and subsequently flow down the tributary.

Recommendation: Recommend constructing a grade control and stilling basin with associated bank stabilization immediately downstream of the root mass to stop the incision and protect the channel.

Impact to Special Areas and Water Quality: Project is located in Salt Valley Greenway and a woodland. Consideration during design and construction should be provided to minimize disturbance and reduce impacts to these special areas and water quality to the greatest extent practical.

Estimated Project Cost: $301,706



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**Refer to the original Master Plan for all Figure and Table Callouts*

South Salt Creek: Grade Control | SSC-17

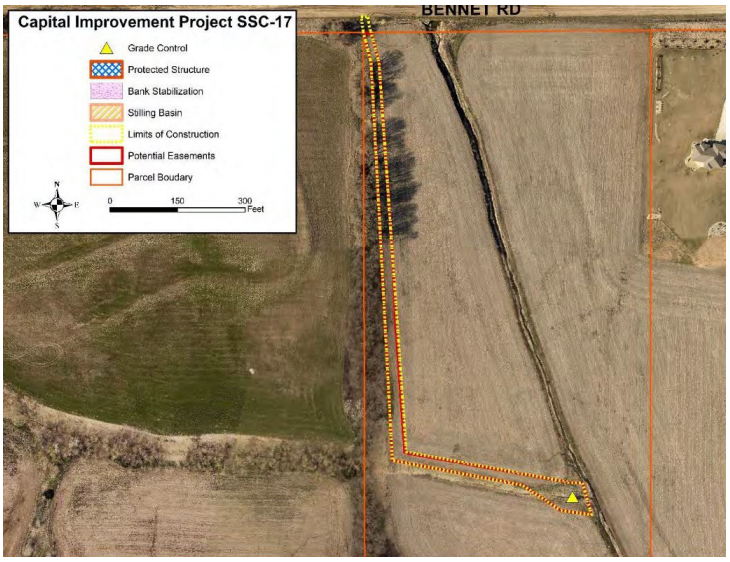
South of Bennet Rd. East of 82nd St.

Problem Description: A 2 foot knickpoint is propagating up the tributary WT010R005 approximately 1,000 feet south of Saltillo Rd and east of S 82nd St.

Recommendation: Recommend installing a grade control to stop the propagation of incision and protect the tributary.

Impact to Special Areas and Water Quality: Project is located within the Salt Valley Corridor. Consideration during design and construction should be provided to minimize disturbance and reduce impacts to this special areas and water quality to the greatest extent practical.

Estimated Project Cost: $150,300



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**Refer to the original Master Plan for all Figure and Table Callouts*

South Salt Creek: Grade Control | SSC-18

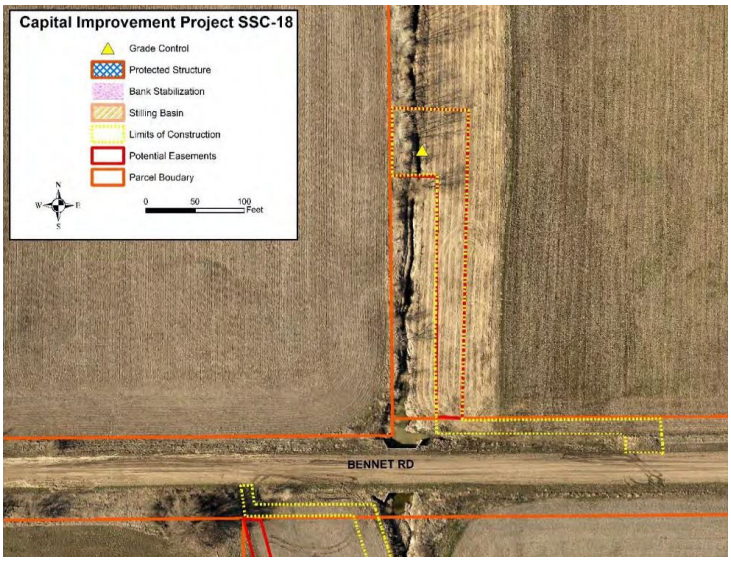
North of Bennet Rd. East of 82nd St.

Problem Description: A 1 foot knickpoint is held by tree roots on the main stem WTR010 upstream from Bennet Rd, approximately 0.3 miles east of Bennet Rd and S 82nd St.

Recommendation: Recommend installing a grade control and associated bank stabilization immediately downstream of the tree to stop incision and protect the upstream reaches.

Impact to Special Areas and Water Quality: Project is located within the Salt Valley Corridor. Consideration during design and construction should be provided to minimize disturbance and reduce impacts to the special areas and water quality to the greatest extent practical.

Estimated Project Cost: $86,201



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**Refer to the original Master Plan for all Figure and Table Callouts*

South Salt Creek: Grade Control | SSC-19

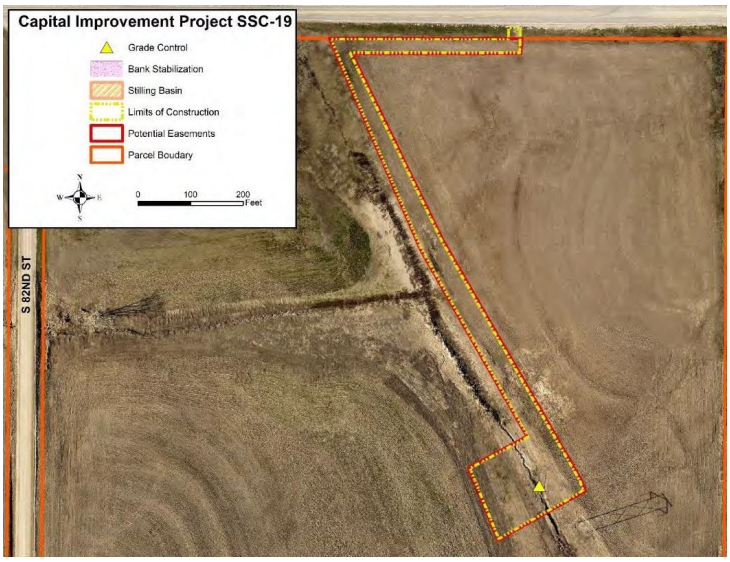
South of Saltillo Rd. East of 82nd St.

Problem Description: Debris jam holding up 2 foot knickpoint on main stem WTR015 located 960 feet downstream of Saltillo Rd.

Recommendation: Recommend removing the debris jam and installing a grade control and associated bank stabilization to stop incision and protect the upstream reaches.

Impact to Special Areas and Water Quality: There are no special areas at this project location. Consideration during design and construction should be provided to minimize disturbance and reduce impacts to water quality to the greatest extent practical.

Estimated Project Cost: $93,937



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**Refer to the original Master Plan for all Figure and Table Callouts*

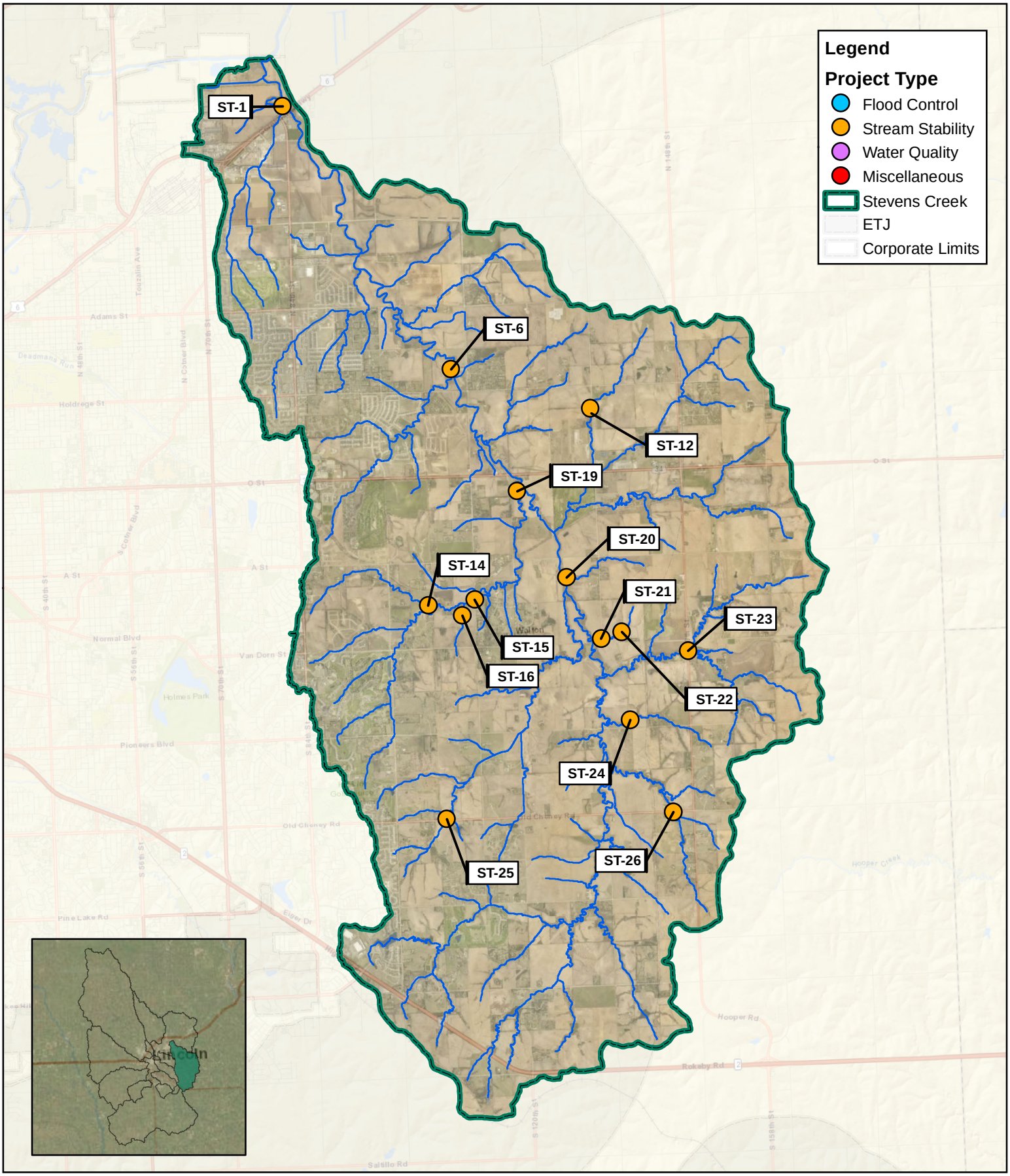
6.13 Stevens Creek

Table 17 - Proposed Projects - Stevens Creek Watershed

Project ID	Project Type	Project Location	Project Description	2021 Prioritization Score*	2021 Updated Cost**
ST-1	SS	NW of 84th & Hwy 6	Bank Stabilization & Grade Controls	235	$713,575
ST-6	SS	NW of 112th St. & Holdrege St.	Bank Stabilization & Grade Controls	150	$617,721
ST-12	SS	West of 134th St. South of Holdrege St.	Bank Stabilization & Grade Controls	160	$1,488,389
ST-14	SS	East of 98th St. between A St. & Van Dorn St.	Bank Stabilization & Grade Controls	120	$523,199
ST-15	SS	East & West of 112th St. North of Secretariat Dr.	Bank Stabilization & Grade Controls	120	$713,575
ST-16	SS	West of 112th St. South of Secretariat Dr.	Grade Control	120	$57,246
ST-19	SS	SE of 120th St. & O St.	Bank Stabilization & Grade Controls	120	$71,890
ST-20	SS	SW of 134th St. & A St.	Bank Stabilization & Grade Controls	150	$756,176
ST-21	SS	NW of 134th St. & Van Dorn St.	Armored Plunge Pool	120	$248,952
ST-22	SS	NE of 138th St. & Van Dorn St.	Bank Stabilization & Grade Controls	150	$599,083
ST-23	SS	East of 148th St. South of Van Dorn St.	Bank Stabilization & Longitudinal Weir	120	$129,136
ST-24	SS	West of 138th St. North of Pioneers Blvd.	Rock Stilling Basin	180	$248,952
ST-25	SS	North of Old Cheney Rd. between 98th St. & 112th St.	Armored Plunge Pool	195	$163,749
ST-26	SS	North & South of Old Cheney Rd. West of 148th St.	Bank Stabilization & Grade Controls	100	$366,106

***These scores were determined in 2021 using concept level data and are subject to change as additional data becomes available**

****Costs are adjusted to 2021 dollars based on inflation since the original master plan was completed**



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Date: 3/15/2022
Software: ArcGIS 10.8.1
File: Lincoln Prioritization CIP Locations.mxd

Figure 17: Proposed Projects
Stevens Creek Watershed

Lincoln, NE

0 2,500 5,000 10,000 Feet

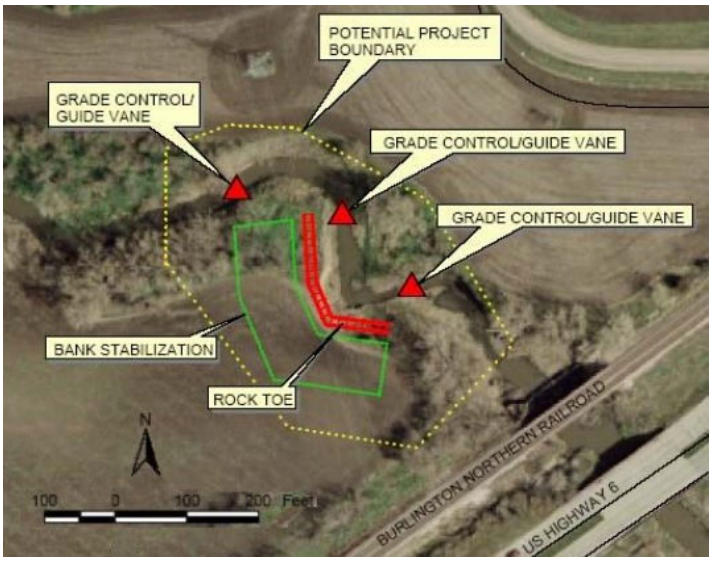
Stevens Creek: Bank Stabilization & Grade Controls | ST-1

NW of 84th & Hwy 6

Problem Description: Meander adjustment is common along Stevens Creek Lower Main Stem, downstream of Nebraska Highway 6 and the Burlington Northern Railroad crossing. Adjustments in channel plan form have resulted in tall, alternating cutbanks, standing nearly 30 feet tall, between River Mile 1.222 and 1.167. Bank erosion continues to liberate large, toppled chunks of silty clay soils. The addition of such large amounts of sediment is troubling because it further degrades water quality and because the channel bars formed by the sediment aggravates the meander adjustment. This problem is not likely to resolve itself without substantial further damage.

Recommendation: The primary function of this intervention is managing and dissipating hydraulic energy immediately downstream of the railroad bridge. Deflecting scouring flows away from the streambanks is an appropriate first step. A series of rock guide vanes or rock grade control structures placed to focus flow in the center of the stream will significantly reduce stress on the streambanks (Figure 9-3). Rock toe armor reinforced with woody vegetation along the left descending bank provides continuity of treatment. Critical design features here are maintenance of sufficient hydraulic roughness to dissipate scouring energy and careful alignment of the rock structures. These are erodible soils and an overly acute angle will induce excessive scour at the apex of the structure while an overly flat angle will induce scour at the root of the structure. While reducing the stress on the streambank alleviates much of the driving force for bank failure, further treatment has merit. Flattening the slope of the left descending bank reduces the likelihood of bank failures whether geotechnical or fluvial in origin. Re-establishmentof native vegetation provides additional stabilization.

Estimated Project Cost: $713,574



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**Refer to the original Master Plan for all Figure and Table Callouts*

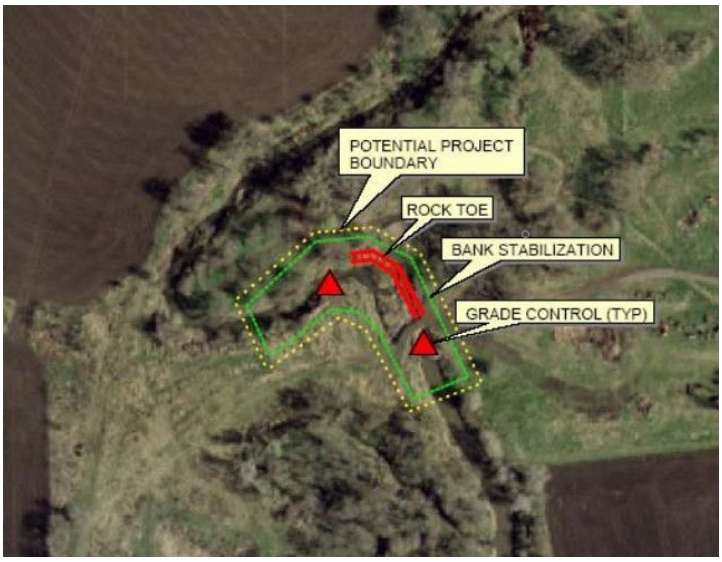
Stevens Creek: Bank Stabilization & Grade Controls | ST-6

NW of 112th St. & Holdrege St.

Problem Description: The combined influence of in-stream excavation, failed cattle crossings, and concrete rubble dumping has induced the propagation of a headcut and localized channel widening along 200 feet of Stevens Creek Lower Main Stem. Along the failed crossing, the stream is drastically over-widened. Random actions including rubble dumping often worsen the problem they may have been intended to solve. The channel is severely degraded and aggravating the systemic channel adjustments downstream.

Recommendation: This project lies in a sharp meander bend with high stress downstream of the apex of the bend. In addition to a series of designed rock grade control structures, treatment includes rock toe armor along the outside bend and reshaping the channel to restore a more stable geometry (Figure 9-8). The radius of curvature should be slightly flattened. Concrete rubble with no exposed rebar may be broken up and used in the grade controls. In this badly damaged reach, it is also necessary to stabilize the streambank. This task requires reshaping the slopes, installing erosion control blanket and establishing a vigorous stand of woody vegetation.

Estimated Project Cost: $617,721



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**Refer to the original Master Plan for all Figure and Table Callouts*

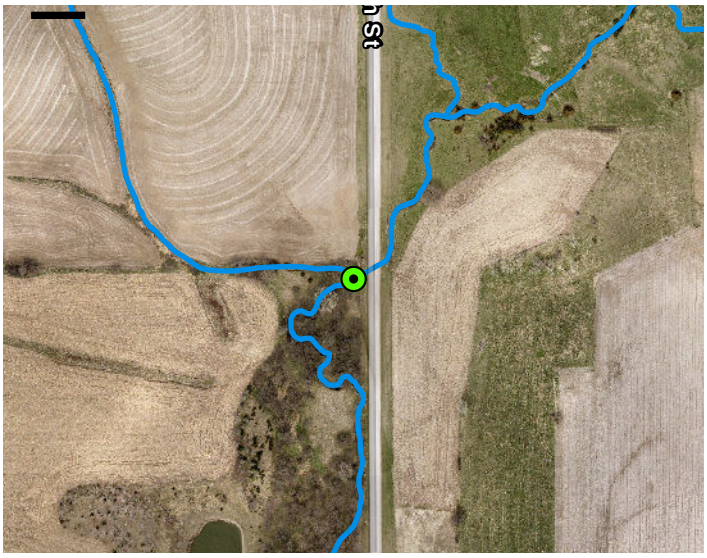
: Bank Stabilization & Grade Controls | ST-12

West of 134th St. South of Holdrege St.

Problem Description: Located southwest of 134th Street and Holdrege Street, bank erosion extends downstream along Tributary 250 as a result of channel incising.

Recommend installing a series of rock grade control structures to mitigate any future incision and address erosion issues. Have the channel grade be controlled and scouring energy be dissipated for the site.

Estimated Project Cost: $1,488,389



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**Refer to the original Master Plan for all Figure and Table Callouts*

Stevens Creek: Bank Stabilization & Grade Controls | ST-14

East of 98th St. between A St. & Van Dorn St.

Problem Description: Tributary 445 is an incising stream, with several knickpoints occurring between the confluence with Tributary 45 and the headwaters reach of the tributary. Although previous incision and occasional bank scour is apparent in the tributary, this stream also exhibits signs of recovery. Parts of the reach are now metastable and barring additional insult, should self-manage.However, the receiving waters, Tributary 45 is continuing to incise and a knickpoint in Tributary 445 indicates that this grade change is propagating up the sub-tributary.Unless arrested, another wave of incision will move through this sub-basin.

Recommendation: The active knickpoints should be arrested. A series of rock grade controls is an appropriate treatment (Figure 9-16). In the relatively erodible soils of the Stevens Creek Watershed, Newbury-style structures effectively manage grade changes without inducing scour. The change in grade should be distributed over a series of structures with no one grade control dropping more than approximately one foot. The structures should be hydraulically rough and should be shaped in plan, section and profile to focus the flow towards the center of the channel. The focus of the bank stabilization is repair of areas disturbed by grade control construction.

Estimated Project Cost: $523,199

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**Refer to the original Master Plan for all Figure and Table Callouts*

Stevens Creek: Bank Stabilization & Grade Controls | ST-15

East & West of 112th St. North of Secretariat Dr.

Problem Description: Channel incision has resulted in widespread bank scouring and erosion between Tributary 45, River Mile 2.727 and 2.254. Circular and wedge failures continue to introduce large volumes of sediment and woody debris into the channel. Several woody debris jams appear to have slowed the advance of incision. However, the effects of incision do not subside upstream, and continued damage to surrounding farm fields and riparian corridor is likely without intervention.

Recommendation: Constructing a series of rock grade controls is necessary to halt channel incision and prevent systemic bank erosion. As is the case throughout the watershed, relatively flat, Newbury-style rock structures effectively manage the grade change through the reach without inducing excessive scour downstream of the structure. A drop of one foot or less across each rock structure and construction of a gently sloped tail ramp should be sufficient. Vegetating the edges of the structures provides additional scour protection and manages the transition between native channel material and installed structure (Figure 9-17).

Estimated Project Cost: $713,574

FOR MORE INFORMATION

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**Refer to the original Master Plan for all Figure and Table Callouts*

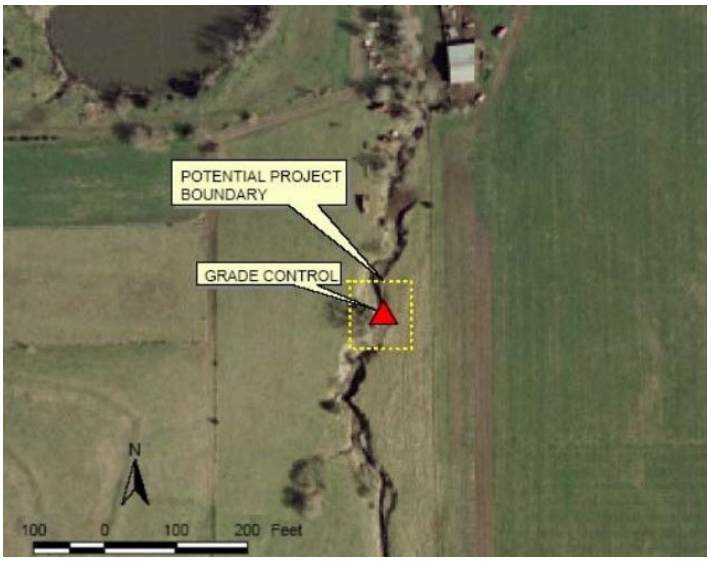
Stevens Creek: Grade Control | ST-16

West of 112th St. South of Secretariat Dr.

Problem Description: A 3.5-foot headcut occurs in silty clay bed material along Tributary 345, near River Mile 12.406. The advancing headcut has precipitated widespread bank erosion downstream. Upstream of the headcut, past channel incision has resulted in a deep, “V”-shaped channel with banks very near critical bank height. Should the headcut continue to advance unimpeded, this would likely aggravate existing erosion problems upstream as banks exceeded critical bank height.

Recommendation: A rock grade control is recommended to halt the advancing headcut and maintain a stable channel grade upstream. A single, strategically placed grade control will alleviate the driving force for bank failure and avert an otherwise costly stream restoration effort in the future, as banks fail catastrophically once they have exceeded critical bank height (Figure 9-18).

Estimated Project Cost: $57,245



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**Refer to the original Master Plan for all Figure and Table Callouts*

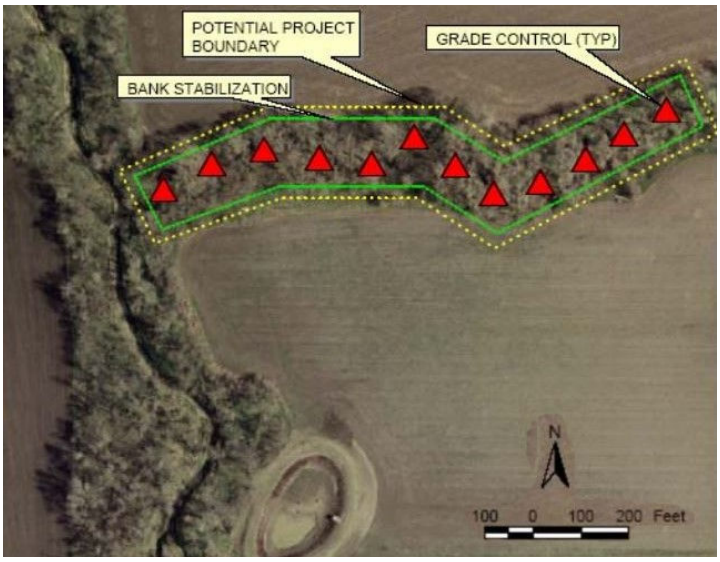
Stevens Creek: Bank Stabilization & Grade Controls | ST-20

SW of 134th St. & A St.

Problem Description: Tributary 55 is a deeply incised channel with several severe knickpoints occurring along the lower 1,400 feet of channel. The largest and most dramatic example is a 4-foot headcut in consolidated clay or till bed material near River Mile 11.472. In contrast to other incising reaches encountered in the Stevens Creek Watershed, woody debris and toppled trees have failed to slow incision along Tributary 55. It appears that incision will continue unimpeded, resulting in substantial damage to the stream, without additional interventions.

Recommendation: Arresting the incision in this reach requires a series of Newbury-style rock grade controls. Vegetating the downstream edges of the rock structures provides additional energy dissipation and protection for the interface between rock and native bank (Figure 9-22). The poor condition of the woody corridor and the extensive grade control required along this reach also necessitates restoration of 100% of the streambank. This effort includes both areas disturbed by grade control construction as well as the establishment of trees and shrubs along the entire intervention reach.

Estimated Project Cost: $756,176



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**Refer to the original Master Plan for all Figure and Table Callouts*

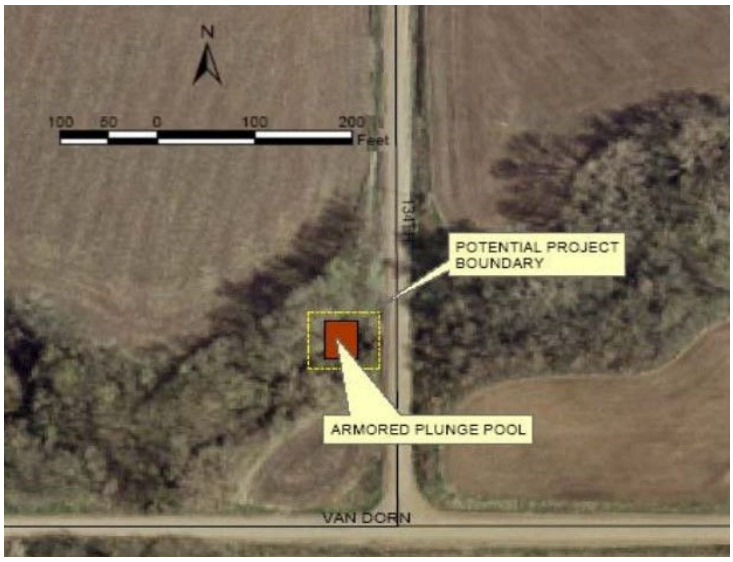
Stevens Creek: Armored Plunge Pool | ST-21

NW of 134th St. & Van Dorn St.

Problem Description: The 134th Street culvert has an exceptionally steep grade and, as a result, the bed and banks at the culvert outfall are severely scoured. In addition, incision up to the culvert outfall has aggravated bank erosion immediately downstream.

Recommendation: Constructing an armored plunge pool at the culvert outfall will dissipate hydraulic energy and prevent continued bank erosion at the culvert outfall (Figure 9-23). The armored plunge pool should be sized to release flows at shear stresses below the critical shear strength of the native channel material. A critical design feature of the armored plunge pool is the addition of a grade control outfall, keyed-in deep into the channel bed to prevent channel incision from potentially undermining the structure. The grade control outfall will also focus flow toward the center of the channel, thereby reducing stress along both banks.

Estimated Project Cost: $248,952



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**Refer to the original Master Plan for all Figure and Table Callouts*

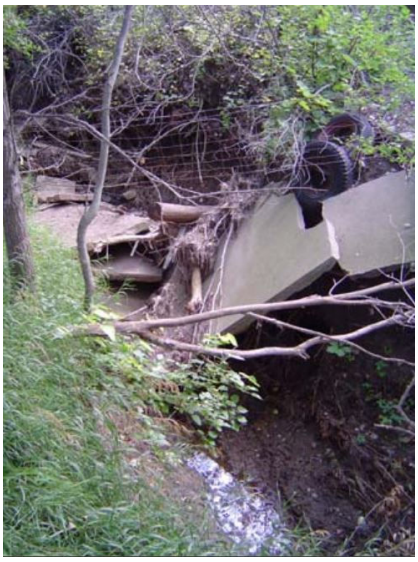
Stevens Creek: Bank Stabilization & Grade Controls | ST-22

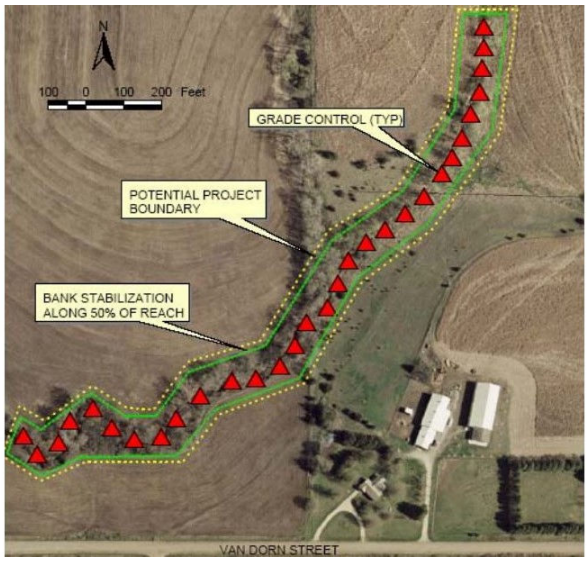
NE of 138th St. & Van Dorn St.

Problem Description: The extent of channel incision along Tributary 65 is marked by a 5-foot headcut near Tributary 65, River Mile 12.949. The upstream advance of the headcut appears to have been temporarily slowed by dumped concrete slabs and debris acting as a de facto grade control. Continued incision along this reach will eventually undermine the concrete slabs and debris that are currently supporting a stable channel grade upstream, liberating additional sediment, and posing a threat to channel stability and water quality.

Recommendation: The existing concrete rubble and debris should be removed and replaced with a series of grade controls extending downstream to Tributary 65, River Mile 12.911 (Figure 9-24). Small, Newbury-style rock structures should be designed to establish a stable slope. The drops at major knickpoints should be distributed over multiple rock structures. Although the banks along Tributary 65 are in poor condition, once incision is stopped, they may begin to self-heal.

Estimated Project Cost: $599,083





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**Refer to the original Master Plan for all Figure and Table Callouts*

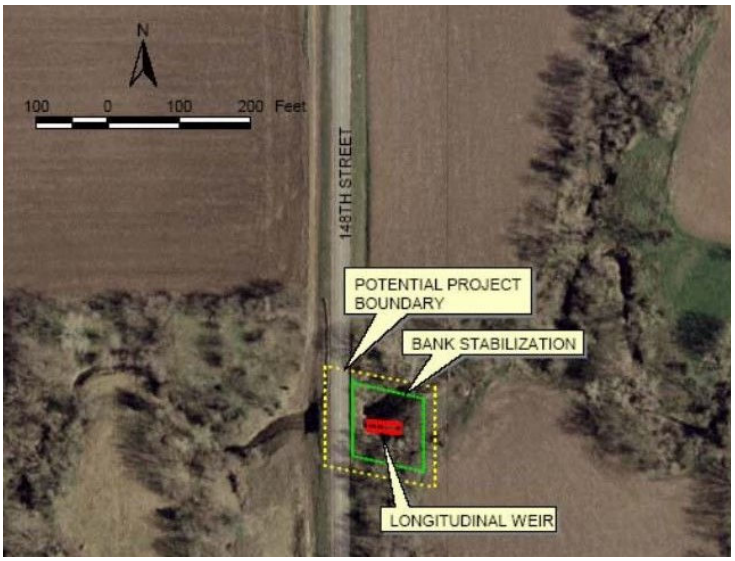
Stevens Creek: Bank Stabilization & Longitudinal Weir | ST-23

East of 148th St. South of Van Dorn St.

Problem Description: Deposition and accumulation of large woody debris in the right descending box of the 148th Street culvert has reduced hydraulic capacity and poses an increased flood risk. While simply removing the deposition and debris may temporarily increase capacity through the culvert, it would also induce upstream erosion as the stream re-establishes a stable hydraulic grade, and eventually replace the removed material with freshly eroded sediment and debris.

Recommendation: The long-term solution is to remove the accumulated debris upstream of the culvert and to replace it with a longitudinal weir (Figure 9-25). The weir would be designed to direct low flow through a single box, maintaining sediment transport continuity during stream-forming flow, but allowing for additional flow capacity through the second box during higher flood flows.

Estimated Project Cost: $129,135



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**Refer to the original Master Plan for all Figure and Table Callouts*

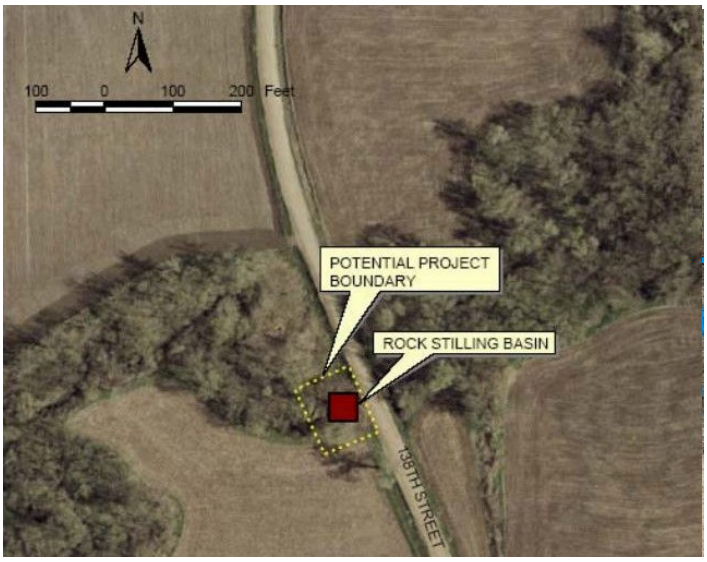
Stevens Creek: Rock Stilling Basin | ST-24

West of 138th St. North of Pioneers Blvd.

Problem Description: Past incision has scoured the channel bed along Tributary 75, leaving the 138th Street culvert outfall perched 4.5 feet above the channel bed. In addition, a series of knickpoints downstream of the culvert, near the confluence with Stevens Creek Upper Main Stem, indicates more recent channel incision advancing upstream, posing an added threat to the already undermined culvert.

Recommendation: Constructing an armored stilling basin at the culvert outfall will dissipate hydraulic energy and protect the bed and banks from the effects of localized scour (Figure 9-26). The stilling basin should be sized so that the applied shear stress at the downstream edge does not exceed the critical shear strength of the bed. Similar to previously described outfall protection, a key design element of the stilling basin is the addition of a grade control outfall. The grade control outfall must be keyed-in deep into the channel bed to prevent channel incision from undermining the structure.

Estimated Project Cost: $248,952



FOR MORE INFORMATION

Visit lincoln.ne.gov/watershed or email watershed@lincoln.gov

**Refer to the original Master Plan for all Figure and Table Callouts*

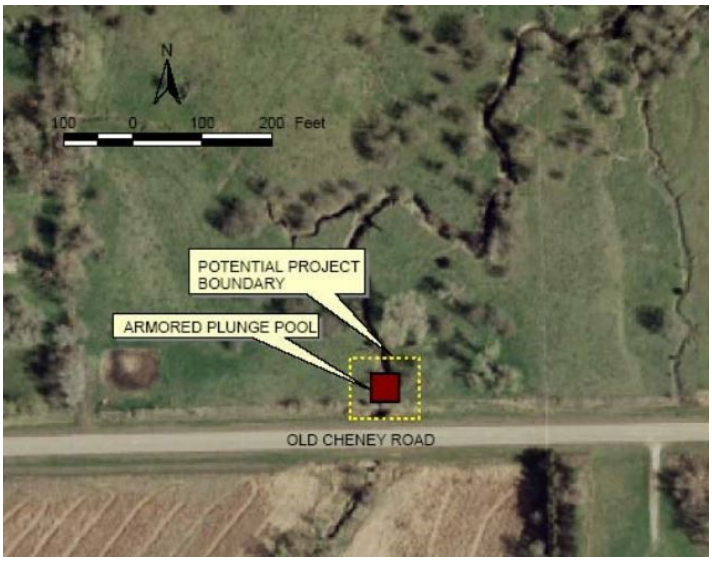
Stevens Creek: Armored Plunge Pool | ST-25

North of Old Cheney Rd. between 98th St. & 112th St.

Problem Description: Tributary 60 is currently widening subsequent to channel incision. The extent of past incision is indicated by the 4-foot culvert invert at Old Cheney Road. Localized scouring at the culvert outfall and a lack of hydraulic roughness along both banks has left both the bed and banks severely eroded.

Recommendation: Constructing an armored stilling basin at the culvert outfall will dissipate hydraulic energy and reduce the driving force for localized widening downstream of the culvert (Figure 9-27). The stilling basin should be sized so that the applied shear stress at the downstream edge does not exceed the critical shear strength of the bed. Vegetating the riprap along the banks and at the downstream end of the proposed stilling basin will provide additional hydraulic roughness and reduce shear stress along the banks and at the downstream end of the basin.

Estimated Project Cost: $163,749



FOR MORE INFORMATION

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**Refer to the original Master Plan for all Figure and Table Callouts*

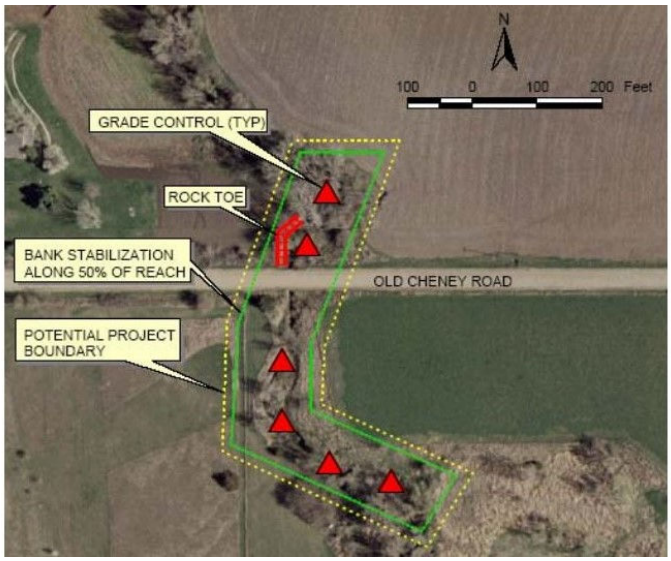
Stevens Creek: Bank Stabilization & Grade Controls | ST-26

North & South of Old Cheney Rd. West of 148th St.

Problem Description: Channel incision upstream of Old Cheney Road has resulted in extensive bank failures between Tributary 85, River Mile 17.810 and 17.852. Bank erosion is particularly severe immediately upstream from the Old Cheney Road culvert, where wedge failures continue to erode the bank no more than 8 feet from a fence along the top of the right descending bank. Downstream of the Old Cheney Road culvert both banks are eroded as a result of localized scouring and a lack of hydraulic roughness at the culvert outfall.

Recommendation: Arresting channel incision upstream of Old Cheney Road requires a series of rock grade controls (Figure 9-28). Newbury-style grade structures with gradually sloping tail ramps are appropriate here. Vegetating the downstream edges of the rock structures provides additional energy dissipation and protection for the interface between rock and native bank. Additional bank stabilization includes streambanks immediately upstream of Old Cheney Road. Rock toe armor along the right descending bank will deflect flow away from the bank and reduce stress at the bank toe. Downstream of the Old Cheney Road culvert requires construction of a riprap-lined scour pool and grade controls to dissipate energy properly. The scour pool should be sized so that the applied shear stress at the downstream edge does not exceed the critical shear strength of the bed.

Estimated Project Cost: $366,106



FOR MORE INFORMATION

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**Refer to the original Master Plan for all Figure and Table Callouts*

6.14 Upper Wagon Train

Upper Wagon Train Watershed Master Plan was developed for the purposes of development management and meeting New Growth Area standards. No CIPs have been developed for this watershed.