Environmental Assessment - Appendices

City of Kingman, KS
City of Kingman Parks Repair and Flood Hazard Mitigation

Public Assistance Program

Project Number PA-07-KS-4449-PW-00760(0)- GM-137376

September 2022

U.S. Department of Homeland Security
Federal Emergency Management Agency, Region VII
11224 Holmes Rd, Kansas City, Missouri 64131

WILSON & COMPANY

FEMA

LIST OF APPENDICES

FEMA has worked to ensure that this EA document is accessible to persons with disabilities, in compliance with Section 508 of the Rehabilitation Act of 1973. Regarding the EA's Appendices, which are provided in a separate document, this EA has reported what was done and how those results affect the decision that will be made based on the totality of the EA findings. In case any of these appendices poses a challenge to be read electronically by persons with disabilities, each appendix is briefly described and summarized below, rather than being simply listed.

Appendix A. *Wetland Documentation.* This report is a compilation prepared by Wilson & Company of wetland documentation prepared by Mr. Bert Wilson of Marshland Environmental Consulting. His fieldwork was completed in June 2022. The document includes text, aerial photos, ground-level photos of potential wetlands, and USACE wetland determination forms.

Appendix B. *Ninnescah River Mitigation Study – Mitigation Hydrologic & Hydraulic Report*. This 65-page memorandum is dated March 26, 2022. It was prepared by Charles Loughman, P.E., of Wilson & Company, Inc. Engineers and Architects, and was addressed to FEMA Region VII – Resilience and Infrastructure Branch. It bears an inked impression of Mr. Loughman's Professional Engineer seal, indicating that it is accurate and complete in his professional opinion. This document is comprised of 16 pages of memorandum supplemented by Appendices A through G, including results of a technical model called HEC RAS 2D. HEC RAS stands for Hydrologic Engineering Center's River Analysis System, developed by the U.S. Army Corps of Engineers.

Appendix C. *Section 7 Informal Consultation between FEMA and the U.S. Fish and Wildlife Service.* This letter is 11 pages long and dated May 24, 2022. It was written by Lois H. Coulter Environmental and Historic Preservation Advisor, Readiness Branch, Office of Environmental Planning and Historic Preservation, Washington, DC, who is currently deployed to FEMA Region 7. It was addressed to Jason Luginbill, Kansas Field Supervisor, U.S. Fish and Wildlife Service, Kansas Ecological Services Field Office, in Manhattan, Kansas. It describes the Action Area, the Proposed Action, justification for the action, and the anticipated effects and proposed mitigation regarding the Peppered Chub, Northern Long Eared Bat, and Monarch Butterfly.

Appendix D: *USFWS Concurrence Letter*. This letter is two pages longs and is dated June 21, 2022. It was signed by Gibran Suleiman on behalf of Jason Luginbill, Kansas Field Supervisor, U.S. Fish and Wildlife Service, Kansas Ecological Services Field Office, in Manhattan, Kansas. It was addressed to Jason Luginbill, Kansas Field Supervisor, U.S. Fish and Wildlife Service, Kansas Ecological Services Field Office, in Manhattan, Kansas. The letter concluded: "Our office has reviewed the action area and the scope and nature of the proposed work to be completed as well as the avoidance and minimization measures to be implemented, that you provided. We concur with your determination of No Effect for the Whooping Crane and May Effect, Not Likely to Adversely Affect for the Peppered Chub and Northern Long-eared Bat."

Appendix E: *Kansas Department of Wildlife and Parks Letter regarding State-Listed Threatened and Endangered Species*. This letter is two pages long and dated May 5, 2022. It was written by Mark Van Scoyoc, Biodiversity Survey Coordinator/Ecologist, Ecological Services Section, KDWP, in Pratt, Kansas. It was addressed to Bert Wilson, Marshlands Environmental Consulting, in Topeka, Kansas. It identifies four fish species of concern and provides eight mitigation recommendations. The letter states that an Action Permit will be required from KDWP. Permit conditions will primarily consist of work date restrictions to avoid the spawning seasons for protected species of fish in the Ninnescah River. Project activity should not begin until application for the Action Permit has been received and signed by both parties.

Appendix F*: Section 106 Consultation between FEMA and the Kansas State Historic Preservation Officer.* This letter is 11 pages long and dated May 23, 2022. It was signed by Lois H. Coulter Environmental & Historic Preservation Advisor, Readiness Branch, Office of Environmental Planning and Historic Preservation, Washington, DC, who is currently deployed to FEMA Region 7. It was addressed to Patrick Zollner, Director, Cultural Resources Division, Deputy State Historic Preservation Officer, Kansas Historical Society, in Topeka, Kansas. The letter discusses a Finding of No Adverse Effect to Historic Properties for the project. It describes the Undertaking, the Area of Potential Effect (APE), Identification and Evaluation of Resources (including four standing structures), Tribal Involvement, and Determination of Effect. Its Conclusion requests SHPO concurrence with the finding.

Appendix G. *National Register Eligibility Determination*. This is a 21-page document prepared by FEMA that was an attachment to the Section 106 Consultation letter which is Appendix B. The paper presents Determinations of NRHP eligibility, including current photos and in some cases historic photos or maps, for the following sites:

- Kingman Fairgrounds
- Kingman Riverside Park
- Storage Shed, Riverside Park
- Kingman City Mechanic Shop
- Kingman Mill Race
- Two bridges along KS Highway-14 accessing Kingman Fairgrounds/Riverside Park

Appendix H. *SHPO Letter of Concurrence with FEMA Section 106 Findings*. This is a one-page letter signed by Patrick Zollner, Director, Cultural Resources Division, Deputy State Historic Preservation Officer, Kansas Historical Society, in Topeka, Kansas. It is addressed to Claudia Vines, FEMA Environmental Specialist, via email. The letter states: "The SHPO has determined that the proposed project will not adversely affect any property listed or determined eligible for listing in the National Register. As far as this office is concerned, the project may proceed."

Appendix I*: Example of FEMA Tribal Consultation Letter*. This 10-page letter is one of three tribal consultation letters that was sent by FEMA to Native American Tribes with a known interest in the Kingman, Kansas, area. It was signed by Kate Stojsavljevic, Regional Environmental Officer, FEMA Region VII, in Kansas City, MO. This example was addressed to Dr. Andrea Hunter, Director and Tribal Historic Preservation Officer of the Osage Nation, in Pawhuska, Oklahoma. It describes the Undertaking, the Area of Potential Effects (APE), and Identification and Evaluation of Resources (including four standing structures). The letter requested input from the Tribe regarding the Undertaking and reported a proposed Finding of Effect as follows: "Based on FEMA's identification and evaluation efforts, unless any of the Tribes contacted have concerns or object, FEMA will conclude the Section 106 review with a finding of **No Adverse Effect to Historic Properties**."

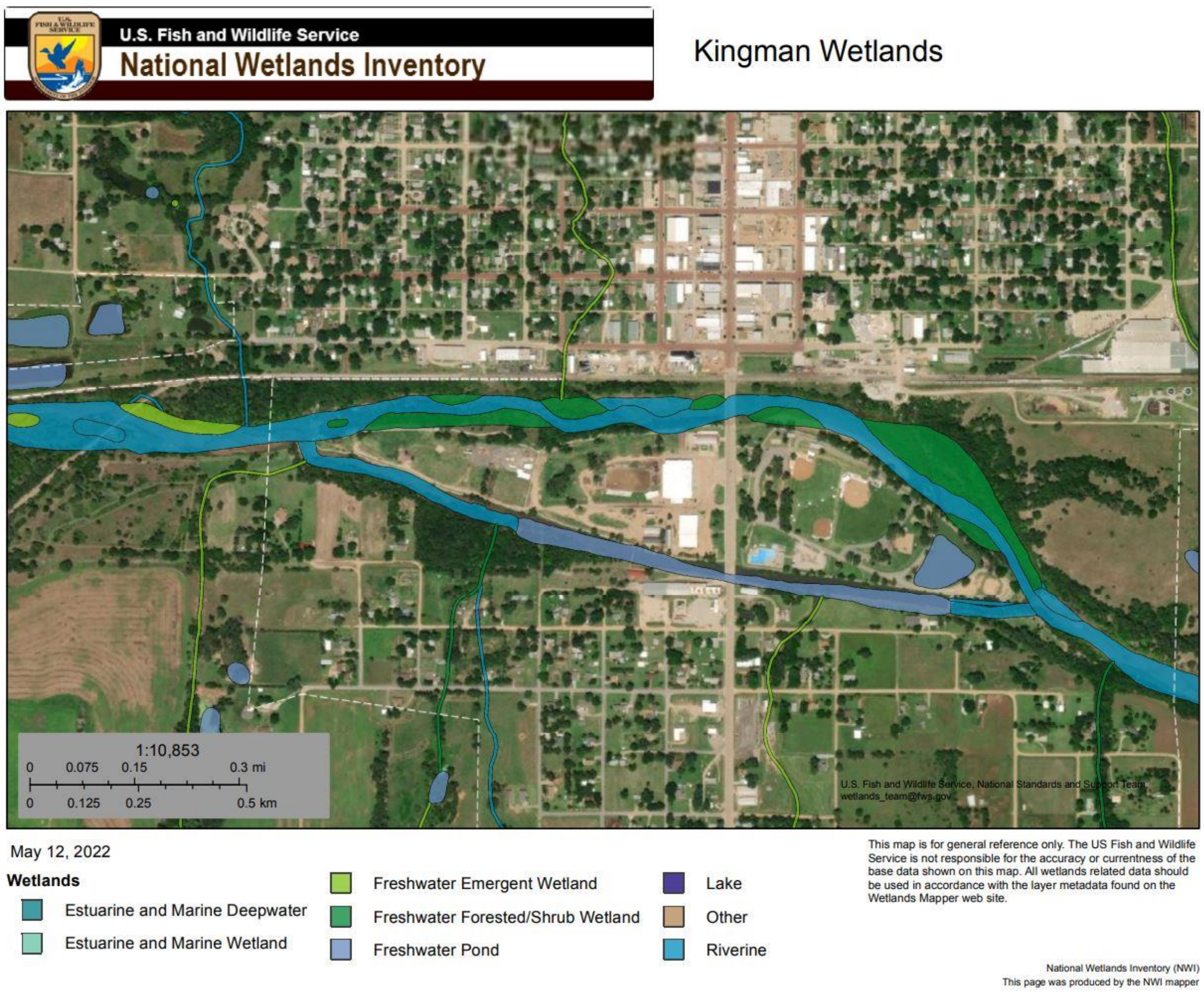
Appendix J*: Phase 1 Environmental Site Assessment for Kingman, Kansas.* This 32-page July 2022 technical report was prepared by ppB enviro-solutions of Topeka, Kansas. It reports the results of its research regarding hazardous material sites with the potential to be a Recognized Environmental Condition affecting the Ninnescah River island flood mitigation project. The major sections of this report are titled: Executive Summary; Introduction; User Supplied Information; Records Review; Site Reconnaissance; Interviews; Evaluation and Conclusions; Non-Scope Services; and References. An additional 599 pages of database search results are available but have been excluded from this appendix for public accessibility, as they are adequately summarized in the first 32 pages of the report.

Appendix A. *Wetland Documentation*

This report is a compilation of work prepared by Mr. Bert Wilson of Marshland Environmental Consulting. His fieldwork was completed in June 2022. The document includes text, aerial photos, ground-level photos of potential wetlands, and USACE wetland determination forms.

KINGMAN (KS) NINNESCAH RIVER ISLAND WETLANDS

The USFWS's National Wetlands Inventory (NWI) Mapper (USFWS 2020b) indicates that the Kingman City Parks project area overlaps with two narrow linear wetlands associated with the stream bank of the Ninnescah River. Based on aerial imagery (Figure 1), the linear wetlands are largely congruent with existing stream channel. These wetlands exist at or slightly above the ordinary high-water mark of the river, as determined by qualified biologist Bert Wilson of Marshlands Environmental Consulting, who conducted a site visit in June 2022 to assess potential wetlands in the project area.



West End of the Island

The wetland located at the Kingman Fairgrounds West End has a 10-inch layer of river sand over an under layer of dark clay soil. This supports several species of obligate wetland plants (Figure 2). Preliminary construction plans indicate this wetland may not be within the construction limits and not disturbed by the activity. It exists at the edge of the river approximately 75 feet from the bank at the sidewalk (Figure 3).

West River Wetland

West River Wetland

West River Wetland 3

Biologist Bert Wilson examined the soil. Vegetation and hydrology at this west-end site and documenting the results that confirm this sampling site to be located within a wetland.

Soil Pit West River Wetland

Sample Site West River

In Bert's figure, at left, north is not "up".

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Great Plains Region
See ERDC/EL TR-10-1; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT: (Authority: AR 335-15, paragraph 5-2a)

Project/Site: City of Kingman Ninnescah River Project City/County: Kingman Sampling Date: ______
Applicant/Owner: Wilson Company for City of Kingman State: KS Sampling Point: West River
Investigator(s): Bert Wilson Section, Township, Range: sec 06 T028Sr008W
Landform (hillside, terrace, etc.): River Local relief (concave, convex, none): convex Slope (%): ______
Subregion (LRR): LRR H, MLRA 79 Lat: 37.64048 Long: -98.12167 Datum: WGS84
Soil Map Unit Name: Waldeck fine sandy loam, occasionaly flooded NWI classification: Freshwater Forested
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features

Hydrophytic Vegetation Present? Yes x No ____		**Is the Sampled Area within a Wetland? Yes X No ____**
Hydric Soil Present? Yes X No ____		
Wetland Hydrology Present? Yes X No ____		

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot size: 20sf)			
1. Sophora	1	No	
2.			
3.			
4.			
5.			
	1	= Total Cover	
Herb Stratum (Plot size: 4800sqft)			
1. Scirpus atrovirens	10	No	OBL
2. Typha latifolia	10	No	OBL
3. Phragmites australis	80	Yes	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100	= Total Cover	
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
		= Total Cover	
% Bare Ground in Herb Stratum ______			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100.0%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	20	x 1 =	20
FACW species	80	x 2 =	160
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals	100 (A)		180 (B)
Prevalence Index = B/A =	1.80		

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
X 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes x No ____

Remarks:

ENG FORM 6116-5, JUL 2018 Great Plains – Version 2.0

WEST ISLAND LOW WATER CROSSING SITES

Mr. Wilson next examined two locations on the western end of the island where water crossed from south to north during the 2019 flood event. Both sampling sites were determined to not have wetlands.

In Bert's figure, at left, north is not "up".

Low Water Crossing East

Soil Pit Low Water Crossing East

West River Low Water Crossing

At both sampling sites for the low water crossing, all three factors needed for a wetland (vegetation, soils and hydrology) were not present.

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Great Plains Region
See ERDC/EL TR-10-1; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT: (Authority: AR 335-15, paragraph 5-2a)

Project/Site Kingman Fair Grounds West Low Water Crossing City/County: Kingman/Kingman Sampling Date: 6/20/2022

Applicant/Owner: City of Kingman State: KS Sampling Point: W Low Water

Investigator(s) ____ Section, Township, Range: 06 T028S R007W

Landform (hillside, terrace, etc.) River bank Local relief (concave, convex, none): concave Slope (%): 30

Subregion (LRR): LRR H, MLRA 79 Lat: 37 38 27 N Long: -98 07 10 W Datum: WGS84

Soil Map Unit Name: Water NWI classification: Freshwater Foested

Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes x No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feature

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area within a Wetland?** Yes ____ No X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes 0	No x	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot size: 6250 sf)			
1. Sorghum halepense	50	Yes	FACU
2. Bromus tectorum	40	Yes	UPL
3.			
4.			
5.			
	90	= Total Cover	
Herb Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
		= Total Cover	
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
		= Total Cover	
% Bare Ground in Herb Stratum 50			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	50	x 4 =	200
UPL species	40	x 5 =	200
Column Totals	90 (A)		400 (B)
Prevalence Index = B/A =	4.44		

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporti data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks:

SOIL

Sampling Point: W Low Water

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
1-12	10YR 8/3	100					Sandy	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) **(LRR F)**
___ 1 cm Muck (A9) **(LRR F, G, H)**
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G, H)**
___ 5 cm Mucky Peat or Peat (S3) **(LRR F)**
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ High Plains Depressions (F16)
(MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric So

___ 1 cm Muck (A9) **(LRR I, J)**
___ Coast Prairie Redox (A16) **(LRR F, G,**
___ Dark Surface (S7) **(LRR G)**
___ High Plains Depressions (F16)
(LRR H outside of MLRA 72 &
___ Reduced Vertic (F18)
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (F22)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):
Type: ________
Depth (inches): ________

Hydric Soil Present? **Yes** ____ **No** X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
x Dry-Season Water Table (C2)
___ Oxidized Rhizospheres on Living Roots (C3) **(where not tilled)**
___ Presence of Reduced Iron (C4)
___ Thin Muck Surface (C7)
___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

___ Surface Soil Cracks (B6)
? Sparsely Vegetated Concave Surface (B8)
___ Drainage Patterns (B10)
___ Oxidized Rhizospheres on Living Roots (C3) **(where tilled)**
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ FAC-Neutral Test (D5)
___ Frost-Heave Hummocks (D7) **(LRR F)**

Field Observations:

Surface Water Present?	Yes ____	No x	Depth (inches): ____
Water Table Present?	Yes ____	No x	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No x	Depth (inches): ____

Wetland Hydrology PresenYes ____ **No** x

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
The site is a river sand bar which is slightly above ordinary high water.

LOW WATER CROSSING SAMPLE SITE #2

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Great Plains Region
See ERDC/EL TR-10-1; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT: (Authority: AR 335-15, paragraph 5-2a)

Project/Site: City of Kingman Ninnescah River Project City/County: Kingman/ Kingman Sampling Date: 6/20/2022

Applicant/Owner: Wilson Company for City of Kingman State: KS Sampling Point: WaterLowWater2

Investigator(s): Bert Wilson Section, Township, Range: 06 T028 R008W

Landform (hillside, terrace, etc.): River Bank Local relief (concave, convex, none): concave Slope (%): 0

Subregion (LRR): LRR H, MLRA 79 Lat: 37.64048 Long: -98.12167 Datum: WGS84

Soil Map Unit Name: Water NWI classification: Freshwater Forested

Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes x No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features

Hydrophytic Vegetation Present? Yes ___ No X	Is the Sampled Area within a Wetland? Yes ___ No X
Hydric Soil Present? Yes ___ No X	
Wetland Hydrology Present? Yes ___ No X	

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ___)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 7200)			
1. Populus deltoides	20	Yes	FAC
2.			
3.			
4.			
5.			
= Total Cover	20		
Herb Stratum (Plot size: 7200)			
1. Elymus canadensis	40	Yes	FACU
2. Sorghum halepense	30	Yes	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
= Total Cover	70		
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
= Total Cover			
% Bare Ground in Herb Stratum 20			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33.3% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	20	x 3 =	60
FACU species	70	x 4 =	280
UPL species	0	x 5 =	0
Column Totals	90 (A)		340 (B)

Prevalence Index = B/A = 3.78

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No X

Remarks:
This is a river sand bar at or slightly above ordinary high water.

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SOIL

Sampling Point: WestLeaWater2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
1-12	10yr 8/3	100						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) **(LRR F)**
___ 1 cm Muck (A9) **(LRR F, G, H)**
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G, H)**
___ 5 cm Mucky Peat or Peat (S3) **(LRR F)**
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ High Plains Depressions (F16)
(MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric So

___ 1 cm Muck (A9) **(LRR I, J)**
___ Coast Prairie Redox (A16) **(LRR F, G, I**
___ Dark Surface (S7) **(LRR G)**
___ High Plains Depressions (F16)
(LRR H outside of MLRA 72 &
___ Reduced Vertic (F18)
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (F22)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):
Type: ____________
Depth (inches): ____________

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Dry-Season Water Table (C2)
___ Oxidized Rhizospheres on Living Roots (C3)
(where not tilled)
___ Presence of Reduced Iron (C4)
___ Thin Muck Surface (C7)
___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

___ Surface Soil Cracks (B6)
___ Sparsely Vegetated Concave Surface (B8)
___ Drainage Patterns (B10)
___ Oxidized Rhizospheres on Living Roots (C3)
(where tilled)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ FAC-Neutral Test (D5)
___ Frost-Heave Hummocks (D7) **(LRR F)**

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___
Water Table Present?	Yes ___	No x	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No x	Depth (inches): ___

Wetland Hydrology PresenYes ___ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
River sand bar at or slightly above ordinary high water

MILL RACE SAMPLE SITE

The NWI map shows no emergent wetlands in the Mill Race portion of the project. Field investigation has identified a wetland of less than 100 square feet at the west end of the construction site (Figure 5). Most of this wetland is below the ordinary high-water of the Race but has dry periods long enough to support the growth of hydrophytic vegetation. The soil is silty clay loam capable of supporting a wetland hydrology. This wetland may be outside the construction limits of the project. Field survey found no other wetlands in this portion of the project.

In Bert's figure, at left, north is not "up".

MILL RACE SITE photo

MILL RACE SOIL PIT

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		=Total Cover	
Sapling/Shrub Stratum (Plot size: 100sf)			
1. Salix exigua	25	Yes	FACW
2.			
3.			
4.			
5.			
	25	=Total Cover	
Herb Stratum (Plot size: 100 sf)			
1. Sagittaria latifolia	40	Yes	OBL
2. Scirpus atrovirens	30	Yes	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	70	=Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
		=Total Cover	
% Bare Ground in Herb Stratum 5			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	70	x 1 =	70
FACW species	25	x 2 =	50
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	95 (A)		120 (B)

Prevalence Index = B/A = 1.26

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks:

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SOIL

Sampling Point: Mill Race

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
1-12	2.5yr 3/2	100					Muck	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) **(LRR F)**
___ 1 cm Muck (A9) **(LRR F, G, H)**
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G, H)**
___ 5 cm Mucky Peat or Peat (S3) **(LRR F)**
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
_x_ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ High Plains Depressions (F16)
(MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric So

___ 1 cm Muck (A9) **(LRR I, J)**
___ Coast Prairie Redox (A16) **(LRR F, G,**
___ Dark Surface (S7) **(LRR G)**
___ High Plains Depressions (F16)
(LRR H outside of MLRA 72 &
___ Reduced Vertic (F18)
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (F22)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):
Type: ________
Depth (inches): ________

Hydric Soil Present? **Yes** _X_ **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

_x_ Surface Water (A1)
_X_ High Water Table (A2)
_x_ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Dry-Season Water Table (C2)
___ Oxidized Rhizospheres on Living Roots (C3) **(where not tilled)**
___ Presence of Reduced Iron (C4)
___ Thin Muck Surface (C7)
___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

___ Surface Soil Cracks (B6)
___ Sparsely Vegetated Concave Surface (B8)
___ Drainage Patterns (B10)
___ Oxidized Rhizospheres on Living Roots (C3) **(where tilled)**
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
_X_ FAC-Neutral Test (D5)
___ Frost-Heave Hummocks (D7) **(LRR F)**

Field Observations:

Surface Water Present? Yes _x_ No ___ Depth (inches): 0.01
Water Table Present? Yes _x_ No ___ Depth (inches): 0.1
Saturation Present? Yes _x_ No ___ Depth (inches): ___
(includes capillary fringe)

Wetland Hydrology Presen Yes _X_ **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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EAST END OF THE ISLAND

The other wetland identified on the NWI map located in the Riverside Park in the east construction area. The soils are well drained river sand over 12 inches deep - not capable of supporting a wetland hydrology (Figure 4). The USACE Wetland Determination Data Sheet for the East River sand bar concludes that there is no presence of hydrophytic vegetation, hydric soil, or wetland hydrology at the location. Therefore, it is concluded that no wetland was observed at this location.

In Bert's figure, at left, north is not "up".

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Great Plains Region
See ERDC/EL TR-10-1; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: City of Kingman Ninnescah River Project City/County: Kingman/ Kingman Sampling Date: 6/20/2022

Applicant/Owner: Wilson Company for City of Kingman State: KS Sampling Point: River East Sand bar

Investigator(s): Bert Wilson Section, Township, Range: 05 T028 R008W

Landform (hillside, terrace, etc.): River Bank Local relief (concave, convex, none): concave Slope (%): 0

Subregion (LRR): LRR H, MLRA 79 Lat: 37 38 24N Long: -98 06 37W Datum: WGS84

Soil Map Unit Name: Water NWI classification: Freshwater Forested

Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes x No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___	No X
Hydric Soil Present?	Yes ___	No X
Wetland Hydrology Present?	Yes ___	No X

Is the Sampled Area within a Wetland? **Yes** ___ **No** X

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ___)			
1.			
2.			
3.			
4.			
		=Total Cover	
Sapling/Shrub Stratum (Plot size: 1200)			
1. *Populus deltoides*	5	Yes	FAC
2. *Salix exigua*	5	Yes	FACW
3.			
4.			
5.			
	10	=Total Cover	
Herb Stratum (Plot size: 1200)			
1. *Sorghum halepense*	20	Yes	FACU
2. *Rudbeckia hirta*	10	No	FACU
3. *Verbena stricta*	25	Yes	UPL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	55	=Total Cover	
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
		=Total Cover	
% Bare Ground in Herb Stratum 30			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	2	(A)
Total Number of Dominant Species Across All Strata:	4	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	50.0%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	5	x 2 =	10
FAC species	5	x 3 =	15
FACU species	30	x 4 =	120
UPL species	25	x 5 =	125
Column Totals:	65 (A)		270 (B)
Prevalence Index = B/A =			4.15

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks:

SOIL

Sampling Point: River East Sand bar

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
1-12	10yr 8/3	100					Sandy	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
__ Hydrogen Sulfide (A4)
__ Stratified Layers (A5) **(LRR F)**
__ 1 cm Muck (A9) **(LRR F, G, H)**
__ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Sandy Mucky Mineral (S1)
__ 2.5 cm Mucky Peat or Peat (S2) **(LRR G, H)**
__ 5 cm Mucky Peat or Peat (S3) **(LRR F)**
__ Sandy Gleyed Matrix (S4)
__ Sandy Redox (S5)
__ Stripped Matrix (S6)
__ Loamy Mucky Mineral (F1)
__ Loamy Gleyed Matrix (F2)
__ Depleted Matrix (F3)
__ Redox Dark Surface (F6)
__ Depleted Dark Surface (F7)
__ Redox Depressions (F8)
__ High Plains Depressions (F16) **(MLRA 72 & 73 of LRR H)**

Indicators for Problematic Hydric Soils[3]:

__ 1 cm Muck (A9) **(LRR I, J)**
__ Coast Prairie Redox (A16) **(LRR F, G, H)**
__ Dark Surface (S7) **(LRR G)**
__ High Plains Depressions (F16) **(LRR H outside of MLRA 72 & 73)**
__ Reduced Vertic (F18)
__ Red Parent Material (F21)
__ Very Shallow Dark Surface (F22)
__ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):
Type: ____
Depth (inches): ____

Hydric Soil Present? Yes __ No X

Remarks:
Area is a river sand bar at or slightly above ordinary high water

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

__ Surface Water (A1)
__ High Water Table (A2)
__ Saturation (A3)
__ Water Marks (B1)
__ Sediment Deposits (B2)
__ Drift Deposits (B3)
__ Algal Mat or Crust (B4)
__ Iron Deposits (B5)
__ Inundation Visible on Aerial Imagery (B7)
__ Water-Stained Leaves (B9)
__ Salt Crust (B11)
__ Aquatic Invertebrates (B13)
__ Hydrogen Sulfide Odor (C1)
__ Dry-Season Water Table (C2)
__ Oxidized Rhizospheres on Living Roots (C3) **(where not tilled)**
__ Presence of Reduced Iron (C4)
__ Thin Muck Surface (C7)
__ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

__ Surface Soil Cracks (B6)
__ Sparsely Vegetated Concave Surface (B8)
__ Drainage Patterns (B10)
__ Oxidized Rhizospheres on Living Roots (C3) **(where tilled)**
__ Crayfish Burrows (C8)
__ Saturation Visible on Aerial Imagery (C9)
__ Geomorphic Position (D2)
__ FAC-Neutral Test (D5)
__ Frost-Heave Hummocks (D7) **(LRR F)**

Field Observations:

Surface Water Present?	Yes __	No x	Depth (inches): __
Water Table Present?	Yes __	No x	Depth (inches): __
Saturation Present? (includes capillary fringe)	Yes __	No x	Depth (inches): __

Wetland Hydrology Present? Yes __ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Summary of Findings
Field investigation was conducted in the vicinity of all areas expected to be disturbed, including both areas where the National Wetlands Inventory indicated possible presence of wetlands and areas where the NWI did not suggest wetland presence.

- West River site – wetland exists as indicated by NWI, but is expected to be outside the construction limits, so not affected.
- West Island Low Water Crossing Site #1 – no wetland suggested by NWI, but evaluated for due diligence, and no wetland found
- West Island Low Water Crossing Site #2 – no wetland suggested by NWI, but evaluated for due diligence, and no wetland found
- Mill Race site - no wetland suggested by NWI, but a small wetland (under 100 square feet) was found; most of this wetland is below the ordinary high-water of the Mill Race but has dry periods long enough to support the growth of hydrophytic vegetation. This wetland may be outside the construction disturbance limits of the project.
- East Island sand bar site - wetland potential suggested by NWI, but field evaluation determined that no wetland is present.

No Action Alternative

Under the No Action Alternative, the damage of the previous flood would go unrepaired. The wetlands which have developed since the last flood would remain intact until the next flood. Wetlands of this nature are subject to being destroyed by floods and reestablishing during the dry periods. The construction does not alter the flooding regime of the river. Since the construction does not change the stream flow the factors which created the wetlands after the last flood will reestablish the after the flood. The No Action Alternative does create an opportunity for future flood events to alter the river area landscape by destroying more of the existing structures and creating new river high water flow patterns between the Ninnescah River and the Mill Race. The effect on the future of wetlands here is unknown.

Proposed Action

No permanent impacts to wetlands are anticipated. Because existing wetlands within the project areas are restricted to areas within or immediately adjacent to existing stream channels, the proposed action could have short-term minor effects on wetlands. The impacts would occur when construction activities might move outside the construction limits. Any construction impacts to wetlands would be mitigated during the next high-water event. The wetlands would reestablish when the river water level recedes.

Additionally, the proposed action would reduce the risk that a major flood event would alter the river channel enough to damage wetland vegetation within and surrounding the project areas; hence, there would be minor, long-term beneficial effects on wetlands.

Appendix B. *Ninnescah River Mitigation Study – Mitigation Hydrologic & Hydraulic Report.*

This 65-page memorandum is dated March 26, 2022. It was prepared by Charles Loughman, P.E., of Wilson & Company, Inc. Engineers and Architects, and was addressed to FEMA Region VII – Resilience and Infrastructure Branch. It bears an inked impression of Mr. Loughman's Professional Engineer seal, indicating that it is accurate and complete in his professional opinion. This document is comprised of 16 pages of memorandum supplemented by Appendices A through G, including results of a technical model called HEC RAS 2D. HEC RAS stands for Hydrologic Engineering Center's River Analysis System, developed by the U.S. Army Corps of Engineers.

WILSON & COMPANY

Memorandum

CHARLES DANIEL LOUGHMAN LICENSE 24810 KANSAS PROFESSIONAL ENGINEER 4/11/2022

To: FEMA Region VII – Resilience and Infrastructure Branch

From: City of Kingman, Kansas; Wilson & Company, Inc., Engineers & Architects

Date: 3/26/2022 **Wilson File Number:** 19-600-505-02

Re: Ninnescah River Mitigation Study – Mitigation Hydrologic & Hydraulic Report

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Project Site Description

The City of Kingman, Kansas tasked Wilson & Company with the investigation of the Ninnescah River flood disaster conditions for the Kingman County Fairgrounds for FEMA disaster DR4449 from the Spring 2019 storm events. Before this current disaster the facility has been subject to 3 other disasters:

- DR4287 (2016)
- DR4403 (2018)
- DR4417 (2018)

The basic limits of the project facility / site is from the west end to the east end of the Kingman Mill Race on the south side of Kingman in the Kingman County Activity Center (See Figure 1). Here are the general site location conditions for the facility:

- Approximate Address: 121 South Main Street, Kingman, Kansas 67068
- Location: 0.5-miles south on K-14 from the US-400 / K-14 junction
- Lattitude / Longitude: 37°38’24” N 98°06’58” W

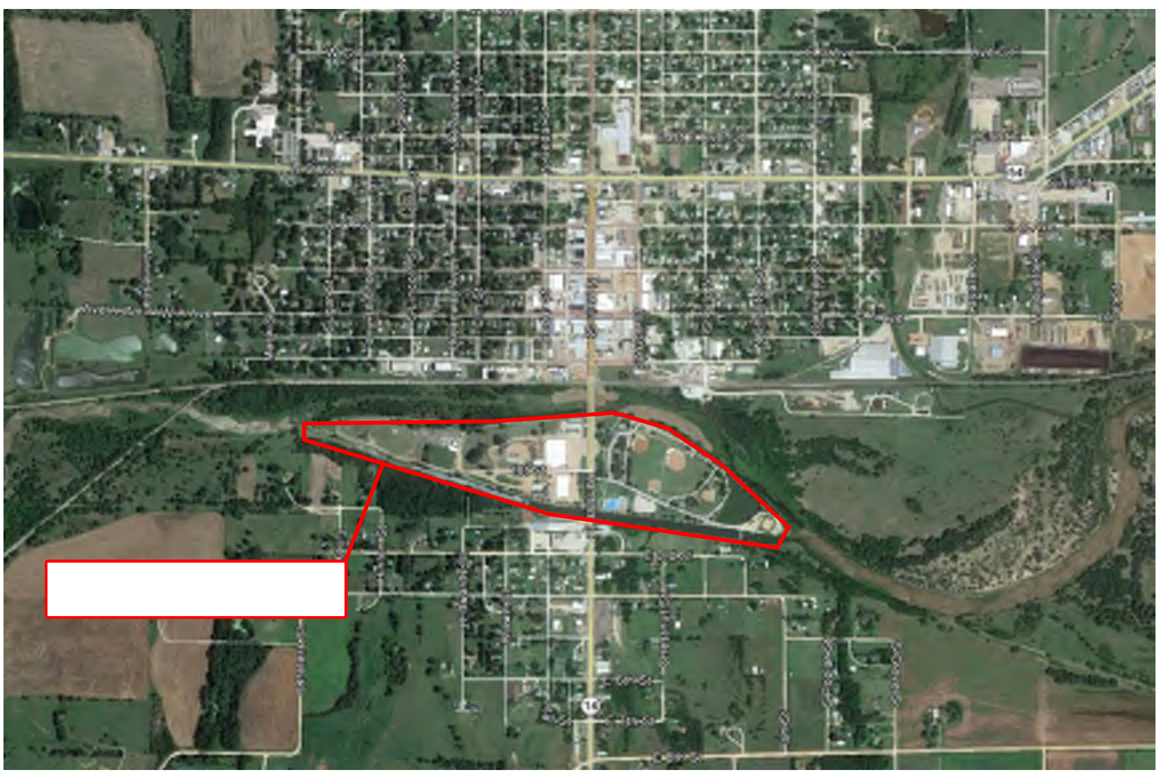


Figure 1: Project Location Map

Generally, the site is the location of the County Fairgrounds and City Park, which primarily contain large areas of flat land with generally uninhabitable structures associated with fair or park activities. The facility is located within a FEMA regulated Zone A6 floodplain for the North Fork Ninnescah River. A FEMA Zone A6 floodplain See Appendix A for the FEMA Federal Insurance Rate Map (FIRM) for the location.

The drainage area for the Ninnescah River at Main Street has a drainage area of approximately 440.0 square miles per both the FEMA Flood Insurance Study (FIS) from December 1979 and the current USGS StreamStats measurements. The drainage area closely follows the US-400 corridor and primarily consists of agricultural farmland along with Pratt, KS and other small municipalities. See Figure 2 for a

Figure 2: South Fork Ninnescah River Drainage Basin at Kingman, Kansas

Existing Condition Observations – West Site

The Kingman County Fairgrounds, Kingman Park, the Mill Race, and the Ninnescah River are owned and/or maintained by the City of Kingman, Kansas and furthermore will be considered as the Facility. The Facility experienced a major flooding event in spring of 2019, declared by FEMA as a Major Disaster. This disaster caused significant damage to the west 950 feet of the Kingman Park and Fairgrounds. Large amounts of sediment were deposited on the park grounds, sections of sidewalk were damaged, two multi-unit culverts were damaged, and the north bank of the Mill Race was eroded to within 5-feet of the sidewalk in some locations. A previous project was conducted to remove sediment and damaged tree from the facility. As a result, no sediment or tree debris removal will be included in this project.

Wilson & Company staff preformed a survey of the existing facility and rivers. 2012 Elevation and LiDAR data was collected from Kansas Data Access & Support Center (KDASC) and used as Pre-Disaster Conditions for comparison. Based on ground surface or aerial image comparisons and site observations/measurement, the following repairs are required to return the site to pre-disaster conditions (graphical representation of the repairs are shown in the exhibit in Appendix B):

- Station 6+00.00 to Station 8+00.00 – Replace 35 cubic yards of Sidewalk Embankment, which was washed away during the flood events. Replacement will consist of 3-feet of sidewalk shoulder at 6” and then slope down at a 3:1 side slope to existing ground.
- Station 7+06.60 to Station 7+87.31 – Replace 45 cubic yards of Mill Race North Bank, which washed back approximately 5-feet during to flood events. Replacement will consist of a 2:1 slope to existing bank toe at 6.5-feet high.
- Station 8+67.38 to Station 9+94.19 – Replace 155 cubic yards of Mill Race North Bank, which washed back approximately 5-feet during to flood events. Replacement will consist of a 2:1 slope to existing bank toe at 6-feet high.
- Station 11+31.17 to Station 12+01.23 – Replace 80 cubic yards of Mill Race North Bank, which washed back approximately 5-feet during to flood events. Replacement will consist of a 2:1 slope to existing bank toe at 6-feet high.
- Station 12+50.00 to Station 12+69.08 – Replace 50 square feet of 6” Concrete Sidewalk, which cracked at several locations due to removal of gravel base by storm events. Replacement will consist of 5-feet wide 6” standard KDOT sidewalk concrete.
- Station 12+54.89 to Station 13+30.06 – Replace 145 cubic yards of Mill Race North Bank, which washed back approximately 10-feet during to flood events. Replacement will consist of a 2:1 slope to existing bank toe at 7-feet high.
- Station 12+96.98 to Station 13+29.19 – Replace 2 cubic yards of Sidewalk Embankment, which was washed away behind the park bench foundation during the flood events. Replacement will consist of 3-feet of sidewalk shoulder at 6” and then slope down at a 3:1 side slope to existing ground.
- Station 13+43.16 to Station 13+64.71 – Replace 2 cubic yards of Sidewalk Embankment, which was washed away behind the park bench foundation during the flood events. Replacement will consist of 3-feet of sidewalk shoulder at 6” and then slope down at a 3:1 side slope to existing ground.
- Station 13+75.15 to Station 14+00.00 – Replace 125 square feet of 6” Concrete Sidewalk, which was completed undermined and displaced through the entire length due to removal of gravel base by storm events. Replacement will consist of 5-feet wide 6” standard KDOT sidewalk concrete.
- Station 15+90.00 to Station 16+50.00 – Replace 300 square feet of 6” Concrete Sidewalk, which was completed undermined and displaced through the entire length due to removal of gravel base by storm events. Replacement will consist of 5-feet wide 6” standard KDOT sidewalk concrete.
- Station 20+85.64 to Station 21+08.01 – Replace 3 cubic yards of Sidewalk Embankment, which was washed away during the flood events. Replacement will consist of 3-feet of sidewalk shoulder at 6” and then slope down at a 3:1 side slope to existing ground.

- Station 21+03.97 to Station 21+50.00 – Replace 670 square feet of 6" Concrete Slope Profection, which was cracked and foundation was undermined during the storm events to the point where the concrete needs to be removed and the base reset to maintain the structural integrity of the concrete. Replacement will consist of 6" standard KDOT sidewalk concrete reinforcing and installation methodology for this slope protection. The slope protection shall also connect with existing culvert end sections.
- Station 21+50.00 to Station 21+95.00 – Replace 90 cubic yards of Sidewalk Embankment, which was washed away during the flood events. Replacement will consist of 3-feet of sidewalk shoulder at 5-feet high and then slope down at a 3:1 side slope to existing ground.
- Station 20+85.64 to Station 21+95.00 – Replace 550 square feet of 6" Concrete Sidewalk, which was completed undermined and displaced through the entire length due to removal of gravel base by storm events. Replacement will consist of 5-feet wide 6" standard KDOT sidewalk concrete.
- Station 25+35.00 – Replace 120 linear feet of 24" Corrugated Metal Pipe, which was removed during flood events. Replace with 24" Corrugated Metal Pipe and upstream concrete headwall.
- Station 25+65.00 – Replace 20 linear feet of 24" Corrugated Metal Pipe, which was removed during flood events. Replace with 24" Corrugated Metal Pipe and Flared End Section on the upstream and downstream side of the culverts.
- Station 25+00.00 to Station 25+95.14 – Replace 120 cubic yards of Sidewalk Embankment, which was washed away during the flood events. Replacement will consist of 3-feet of sidewalk shoulder at 4-feet high and then slope down at a 3:1 side slope to existing ground.
- Station 20+85.64 to Station 21+95.00 – Replace 475 square feet of 6" Concrete Sidewalk, which was completed undermined and displaced through the entire length due to removal of gravel base by storm events. Replacement will consist of 5-feet wide 6" standard KDOT sidewalk concrete.

Appendix A provides ground levels photos that depict the existing facility and bank conditions after the 2019 event. Appendix B provides an aerial image of the site layout for improvements to bring the site back to pre-disaster conditions. As shown in the photos, the extent of damage described above is portrayed.

Provide below is a cost estimate for the restoration activities outlined in the above bullet list. The unit prices were obtained from the KDOT statewide bid tab estimates for 2020.

Pre-Disaster Engineer Cost Estimate – West Site

No.	Item Description	Quantity	Unit	Unit Price	TOTAL PRICE
1	Concrete Removal	245	SY	$20.00	$4,900.00
2	Embankment	677	CY	$ 8.00	$ 5,416.00
3	6" Concrete Sidewalk	170	SY	$ 65.00	$ 11,050.00
4	6" Concrete Slope Protection	75	SY	$ 65.00	$ 4,875.00
5	Storm Sewer Pipe (24" CMP)	140	LF	$ 75.00	$ 10,500.00
6	6" Concrete Headwall	1	EA	$ 4,000.00	$ 4,000.00
7	24" Flared End Sections	2	EA	$ 1,000.00	$ 2,000.00
8	Electrical Lighting Conduit	1500	LF	$ 8.00	$12,000.00
9	Seeding and Restoration	1	ACRE	$ 500.00	$ 500.00
				Subtotal Probable Construction Cost	*$ 55,241.00*
				Construction Contingency (30%)	*$ 16,572.30*
				TOTAL PROBABLE CONSTRUCTION COST	***$ 71,813.30***

Existing Condition Observations – East Site

The Kingman County Fairgrounds, Kingman Park, the Mill Race, and the Ninnescah River are owned and/or maintained by the City of Kingman, Kansas and furthermore will be considered as the Facility. The Facility experienced a major flooding event in spring of 2019, declared by FEMA as a Major Disaster. This disaster caused significant damage to the west 950 feet of the Kingman Park and Fairgrounds and these damages are captured within the 3/1/2021 Pre-Disaster report for this site. During a site investigation on winter 2021, it was discovered that an additional area of damage had occurred on the eastern portion of the park. The portion of the park in question is location on the southern slope of the Ninnescah River, about 650 feet west of the Ninnescah River and Mill Race confluence.

Based on aerial images (See Figure 2) of the site prior to the disaster, it appears that the slope prior to 2019 has a large tree that is no longer on the slope. This removal of the tree has created a 30-ft hole on the slope that is within 3-feet of impacting the sidewalk and park pond embankment (See Figure 3). If this slope The City has indicated that this hole is continuing to grow along the embankment to impact other sections. The geographical limits of the damage is included in Figure 2 below.

Figure 3: Damage Location Map

Figure 4: Ground Level Photo of the 2021 Slope Conditions

Along with rebuilding the embankment, riprap will need to be replaced on the slope. The image below shows that riprap is located on the slope to protect against the Ninnescah River velocities. The Engineers estimate listed on the next page will outline the requirements to bring the slope back to pre-disaster conditions.

Pre-Disaster Engineer Cost Estimate – East Site

No.	Item Description	Quantity	Unit	Unit Price	TOTAL PRICE
1	Mobilization	1	LS	$ 5,000.00	$ 5,000.00
2	Clearing & Grubbing	1	LS	2,500.00	$ 2,500.00
3	Embankment	240	CY	$ 10.00	$ 2,400.00
4	Bank Protection (Stone Riprap)	70	SY	$ 150.00	$ 10,500.00
				Subtotal Probable Construction Cost	*$ 20,400.00*
				Construction Contingency (30%)	*$ 6,120.00*
				TOTAL PROBABLE CONSTRUCTION COST	***$ 26,520.00***

Existing Condition Hydrologic Results

Peak discharges were found with both the FEMA FIS report and the USGS StreamStats program, which utilizes the State of Kansas USGS regression equations. Additional peak discharges were found at USGS Stream Gages at Murdock, KS, which is located approximately 22 miles downstream of the facility with approximately 150 additional square miles of drainage area. converted to exceedance frequencies using the USGS PeakFQ program.

Table 1: South Fork Ninnescah River Peak Discharges

Discharge Source	Drainage Area (sq miles)	Peak Discharge (cfs) 10-year	50-year	100-year	500-year
FEMA Flood Insurance Study	440.0	15,600	28,200	34,100	48,900
USGS StreamStats	441.2	11,600	22,900	28,500	45,700
USGS Stream Gage near Murdock, KS	597.0	15,730	27,295	32,660	45,925

Based on direct discharge comparisons between the three calculations/methodologies, the peak discharge from the 1979 FEMA FIS report provides results that are significantly higher than either of the other two methodologies, which could most likely be attributed to using methodologies from over 40 years ago. Therefore, these values should not be used to develop the modeling for this location. When comparing the USGS StreamStats and Stream gage results, you can see that the values match very well on lower-level (10-year) storms when reducing the peak discharge for the Murdock gage based on the drainage area ratio. However, that same methodology does not hold true when looking at the large-level storms as the 500-year discharges are nearly the same for the two methodologies. After looking at other stream gages along the river, it was determined that calibrating the USGS Stream Gage at Murdock, KS to the facility location would result in the most realistic representation of the true Ninnescah River peak discharges. Those peak discharges used in the model are shown below in Table 2.

Table 2: Facility Peak Discharges

Discharge Source	Drainage Area (sq miles)	Peak Discharge (cfs) 10-year	50-year	100-year	500-year
South Fork Ninnescah River at Main Street in Kingman, Kansas	440.0	11,590	20,120	24,070	33,850

DR4449 Event Hydrologic Analysis

FEMA disaster declaration DR-4449-KS began in April 28, 2019 and was officially declared a disaster on June 20, 2019. The peak discharge at the Murdock gage during that time was 8,900 cfs, which is significantly lower than the 10-year event discharge. When compared against lower-level storm frequencies at this location, the storm frequency for the event within the South Fork of the Ninnescah River more directly aligns with approximately a 5-year storm event from USGS Stream Stats and USGS PeakFQ for the Murdock gage calculations. It will be important to consider that the damage inflicted on this facility was from a 5-year storm and therefore it could be assumed that larger level storm could create significantly larger impacts on the facility.

Existing Condition Hydraulic Modeling

Based on a general overview of the ground surface elevations, it appears that the Mill Race bank quickly overtops at approximately the 2-year event and flows naturally flow across the west end of the park until it discharges into the Ninnescah River. Based on this observation, a HEC-RAS 2-dimensional model was determined to be the most appropriate modeling approach to establishing the existing conditions for the facility and determining the effectiveness of the proposed improvements on the site performance. Additionally, no FEMA digital hydraulic model has been developed for this community so there was not ability to utilize a FEMA product for this location.

The base of the model was a combination of LiDAR and ground surface information. LiDAR was obtained from the Kansas Data Access & Support Center (DASC) that is provided and maintained by the University of Kansas Geological Services. The extents of the LiDAR surface were extensive enough to contain the entire facility and the extents of the existing 100-year floodplain per the current effective. FEMA FIRM. Ground surface and sonar survey was obtained for the South Fork Ninnescah River and the Mill Race from the western to the eastern end of the survey to ensure that the river corridor was accurately modeled after the 2019 storm event as the LiDAR surface doesn't provide ground elevations below the water surface or show more recent channel migrations. The combination of these surfaces were used to establish a 20'x20 grid surface to navigate the water through.

In addition to the LiDAR and survey data, land cover data was gathered from the Natural Resource Conservation Services (NRCS) National Land Cover Database (NLCD) to use as the base for the manning's n values for the model. These values were slightly modified within the channel and some overbank locations to represent the natural conditions of the land cover more accurately. Refinement regions were developed for the channel banks and Main Street to ensure that the embankment stream bottom and roadway overtopping elevations were accurately modeled. Bridges over the Ninnescah River and Mill Race were modeled as SA/2D Connectors using the best available bridge data and elevations.

100-year Model Results/Calibration

After the existing geometry was developed, the existing model geometry was ran using the 10-year, 50-year, and 100-year storm events for the South Fork Ninnescah River discharges that were established in the previous section. The 100-year storm event results were compared against the current effective floodplain elevations at Main Street and the extents as shown on FEMA FIRM. See Appendix A for the FEMA Federal Insurance Rate Map and Appendix D for the 100-year Existing Conditions Model map. The following calibration points were reviewed as part of this process.

- The extent of the current effective floodplain extends to Avenue A to the north and 3rd Street to the south at Main Street. The model floodplain was found to nearly match as the floodplain extends to Avenue A to the north and 3rd Street to the south. The approximate floodplain widths for the current effective and modeled extents are 2,000 feet and 2,200 feet, respectively.
- The elevations upstream and downstream of the Main Street embankment for the current effective floodplain are 1508 and 1505, respectively. The elevations upstream and downstream of the Main Street embankment for the modeled floodplain are approximately 1507.5 and 1505, respectively. While the upstream elevation does not match exactly with the current effective elevation, it was not anticipated that the difference in modeling techniques would be result in the same elevations. However, the close connection in water surface elevations would indicate that the floodplain on a macro scale is being modeled in nearly the same manner.

Proposed Mitigation Improvements

After witnessing 4 disaster events within a 4 year span and reviewing the existing hydraulic modeling for the facility, it became very clear that preventing flooding within the facility was not an option without raising the ground within the facility, providing robust slope protection on those new river banks and significantly impacting the floodplain. Therefore, the next step was to determine the locations that sustained the most damage over the several disasters and provide simple solutions in those locations that would allow flood flows to pass with little damage or future maintenance concerns. The following improvements were determined to provide the most long-term benefit and be the most cost effective for the community. All proposed improvements described in the next sections are shown in detail in Appendix E.

West Park Facility Interior Conditions

The area west of the main Kingman County fairgrounds has sustained the most damage since 2016. Multiple sections of sidewalk, riverbank, and drainage structures have been damaged or removed since 2016. The existing conditions hydraulic model indicates that the water surface during the 100-year event is between 4 to 6 feet deep through the improvement area, which extend from the western point of the facility to nearly 1,000 feet west of the point. Improvements to prevent flooding of this facility where not environmentally or economically feasible for the community for the 100-year event. When looking at the 10-year event in this location, generally depth ranged between 1 foot and 2 feet deep with a portion of the area having depths less than 1 foot. This area of low water surface depth is down in Figure 3 below with a red polygon. At the 10-year event it also became clear that there were three distinct discharge point that help convey discharge from the Mill Race to South Fork Ninnescah River during events larger than the 2-year event. The western location has not drainage structures to convey flow to the river and the eastern 2 locations have a series of 24" corrugated metal pipes to convey the discharge. All these locations were damaged in the 2019 event as the sidewalk and/or culverts were swept away by the river flows. These areas of discharge to the South Fork Ninnescah River are shown in Figure 3 below with yellow pins.

Figure 5: West Park Facility Key Areas of Improvement

The area where the 10-year discharge is not very deep will be raised approximately 2-ft with a sidewalk on top to reduce the risk of storm events below the 10-year from entering the fairground area to damage those assets. The improvement does not appear to cause any identifiable impact to the 100-year floodplain water surface elevations.

The three discharge areas identified will have either the sidewalk or culvert crossings replaced with low water crossings. The low water crossing is a 12-ft wide concrete paved section of the sidewalk with 3 foot toe walls on either end to reduce the risk of scour and 12 feet of riprap will be placed upstream and downstream of the structure to further reduce the scour risk of the crossing and embankment. The western location will have the sidewalk lowered approximately 2.5 feet to accommodate the low water crossing and the eastern 2 locations will remove the culvert embankment to install the crossings. The sidewalk will be installed ADA compliance to ensure that pedestrian safety is maintained. These low water crossing provide a relatively low maintenance option for the frequent flood conditions as the city staff can easily clean sediment off the path after a flood occurs and monitor the scour conditions to add more riprap as necessary.

West Park Bank Conditions

In addition to improving the interior park conditions on the western portion of the facility, nearly 100 feet of the Ninnescah River south bank and over 900 feet of the Mill Race north bank should be protected as erosion is continuing to encroach on the park facilities in these locations. Ground level photos in Figures 4 and 5 show the disaster conditions from 2019 at the Ninnescah River and Mill Race, respectively.

Figure 6: 2019 South Fork Ninnescah River South Bank Damage Conditions

Figure 7: 2019 Mill Race North Bank Damage Conditions

Velocities within the western 100 feet of the Ninnescah River after splits with the Mill Race exceed 15 feet per second (fps) through the Rocky Dam location due to the slope of the dam at the split. After the western discharge location, the Ninnescah River southern bank moves over 100 feet away from the park sidewalk and the infrastructure is no longer at a high risk of failure from the main river channel velocities. Due to the high velocities through the Rock Dam location, the 100 feet after the split need to be protected with rock riprap to provide substantial reduced risk of future erosion along the embankment. Riprap placement would be similar to the riprap that was place at the point in 2017 as that design has held up well to the flow conditions of the Ninnescah River.

Velocities within the Mill Race after splits with the Ninnescah River are all less than 9 fps for the first 1,000 feet of the channel after the split. After the first 1,000 feet, the channel velocities reduce further to all being less than 8 fps, the sidewalk pulls further away from the river bank, and the erosion risk due to bank overtopping is significantly reduced. Due to the bank overtopping frequency of storm events larger than the 2-year event, the bank will be protected with a combination of a riprap stone protection at the toe of the slope to reduce the risk for future erosion from undermining the improvements and a vegetated geogrid slope with native slope plantings to stabilize the slope above the ordinary high water mark. The lower velocities within the Mill Race channel allows for this more environmentally advantageous bank protection. The goal for the overall bank slope would be to maintain the past slope conditions of approximately 1.5:1, which were obtained from the LiDAR before the disaster. No upstream water surface increases from these improvements are anticipated as the channel bank overtops at the 2-year event.

East Overbank Grading

The east overbank grading improvements is located on the South Fork Ninnescah River south bank in between 250 feet and 1,200 feet downstream of the Main Street bridge. Nearly 25% of this overbank has seen elevation increases of 0.5 feet to 4 feet from 2012 to 2019. Most all the increases are found on the eastern portion of the overbank as can be seen in Figure 6 below. In addition to the elevation increases, there has been an increase in heavy timber vegetation in the overbank that is changing the overbank manning's n values. The overbank is proposed to be graded down approximately 1.5 feet across the overbank and seeded with native vegetation to assist with a consistent elevation and manning's n value in the overbank to ensure that flow backups are not created in the future.

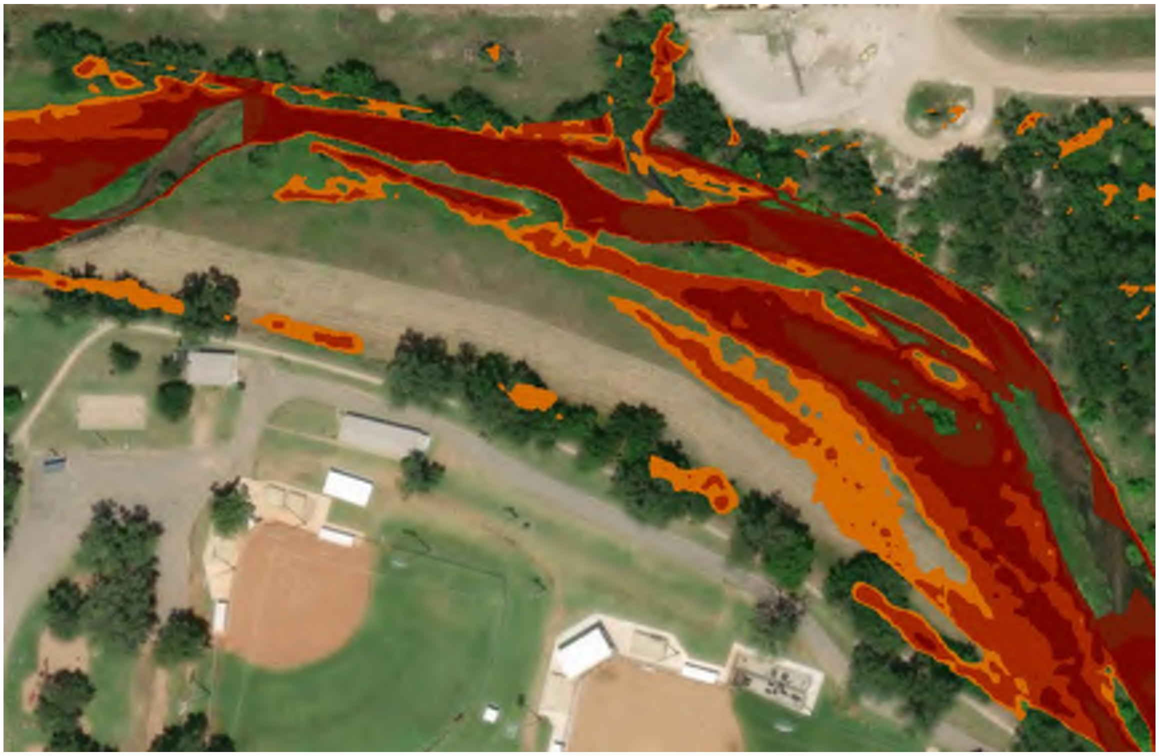


Figure 8: Overbank Elevation Increases

The overbank grading impacts to the Ninnescah River hydraulics a dependent on the size of the storm event. Floodplain impacts associated with the 100-year event show water surface decreases in the South Fork Ninnescah River between 0.05 feet than 0.15 feet between the downstream face of the Main Street bridge to approximately 1,000 feet downstream of the bridge. However, the floodplain impacts associated with the 10-year event show water surface decreases in the South Fork Ninnescah River between 0.05 feet and 0.20 feet between the 150 feet upstream of the Main Street bridge to approximately 1,200 feet downstream of the bridge. Additional water surface decreases are found on the South Fork Ninnescah River upstream of these limits throughout the project but these decreases are less than 0.05 feet. All floodplain impact comparisons can be found in Appendix G.

While the impacts are relatively localized to the section of the river between the bridge and 1,200 feet downstream for larger storm events (100-year and 50-year events), floodplain impacts associated with these improvements for lower-level events (similar to the DR4449 peak discharges) show that more efficient flow through this area of the channel would provide water surface decreases for the South Fork Ninnescah River from the western to eastern edge of the facility through sediment removal and appropriate vegetation cover.

These improvements are as much to ensure that overbank conditions do not get progressively worse over the years as it is to improve the current conditions. The improvements will allow the City to more easily and frequently monitor the overbank to ensure that conditions are maintained on a recurring basis. An inspection and maintenance schedule will be developed for post-grading to ensure that overbank conditions are maintained in the future.

East River Bank Stabilization

While not originally included in the damaged area for this disaster, it was discovered that this area of the South Ninnescah River bank was in danger of failure in the future. After walking the South Ninnescah River bank from western edge to eastern edge of the facility, it was observed that a nearly 300 foot portion of the South Ninnescah River bank is significantly encroaching on the embankment for the Riverside

Park pond on the eastern portion of the facility. Aerial images from 2016, shown in Figure 7, show that significant large trees were established on the bank with at least 6-ft of distance between the northern edge of the sidewalk and the top of bank. Ground level photos from 2021, shown in Figure 8, show that a large portion of the bank has either been removed by the removal of a tree with large roots or erosion and the top of bank is now within 3 feet of the edge of sidewalk. Outside of this being a pedestrian safety hazard, there is significant concern that the existing pond embankment would be breached is this embankment were to fail.

Figure 9: 2016 Aerial Image of the Eastern Bank Stabilization Conditions

Figure 10: 2021 Ground Level Photos at Eastern End of Eastern Bank Conditions

The proposed improvement to stabilize this bank would be to use a combination of a longitudinal peaked stone toe protection (LPSTP) at the toe of the slope to reduce the risk for future erosion from undermining the improvements and a vegetated geogrid slope with native slope plantings to stabilize the slope above the ordinary high water mark. The velocities within the channel section are between 7 fps and 10 fps. The LPSTP improvements below the ordinary high water mark would help to reduce the risk for toe erosion in the future where the velocities would be the highest and the vegetate geogrid slope will be able to withstand the lower velocities along the upper bank. The goal for the overall bank slope would be to maintain the past slope conditions of approximately 1.5:1 to 2:1, which were obtained from the LiDAR before the disaster. Any potential upstream water surface increases from these improvements would be mitigated by the channel overbank grading immediately upstream of the location.

Future Facility Maintenance

Overall, the entire facility from western to eastern end along both the Ninnescah River and Mill Race banks need to be inspected and photo documents annually in January and May to ensure that all river bank erosion conditions are documents and addressed. The following future maintenance activities are anticipated to ensure the proposed improvements are properly maintained:

- *Sidewalk and Low Water Crossings* – Sidewalk embankments and low water crossings will require annual inspections in January and May at a minimum to assess and document current conditions. Additional inspections will also be required after every storm event that overtops the Mill Race bank. Anticipated maintenance activities include cleaning sediment off pavement annual or after every storm event over a 2-year frequency. Based on annual or storm inspections, additional rock riprap may be required where riprap is displaced, or additional scour has occurred in these locations.
- *Ninnescah River Western Bank Improvements* – The western Ninnescah River southern bank will require annual inspections in January and May at a minimum to assess and document current conditions. Additional inspections will also be required after every storm event at or above the 5-year event. Based on annual or storm inspections, additional rock riprap may be required where riprap is replaced or additional scour has occurred in these locations.
- *Mill Race Western Bank Improvements* – The western Mill Race northern bank will require annual inspections in January and May at a minimum to assess and document current conditions. Additional inspections will also be required after every storm event that overtops the Mill Race bank. Based on annual or storm inspections, additional rock riprap at the toe, vegetation reestablishment, or geogrid replacement may be required where bank is displaced, or additional scour has occurred in these locations.
- *East Overbank Grading* – The eastern overbank location will require inspections every 3 months to ensure that sediment accumulation and vegetation overgrowth are documented. Period surveys of the overbank may be required if it is determined that new sediment accumulation is developing within the overbank. After substantial native vegetation can be established in the overbank, monthly mowing from April through October will be required to eliminate the heavy tree and vegetation growth that would reduce the floodplain capacity.
- *Ninnescah River Eastern Bank Improvements* – The eastern Ninnescah River southern bank will require annual inspections in January and May at a minimum to assess and document current conditions. Additional inspections will also be required after every storm event after every storm event at or above the 5-year event. Based on annual or storm inspections, additional rock riprap at the toe, vegetation reestablishment, or geogrid replacement may be required where bank is displaced, or additional scour has occurred in these locations.

Appendix A: FEMA Federal Insurance Rate Map

Appendix B: Existing Ground Level Photos

Appendix C: Site Layout Exhibit

Appendix D: Existing Condition HEC-RAS 2D Results

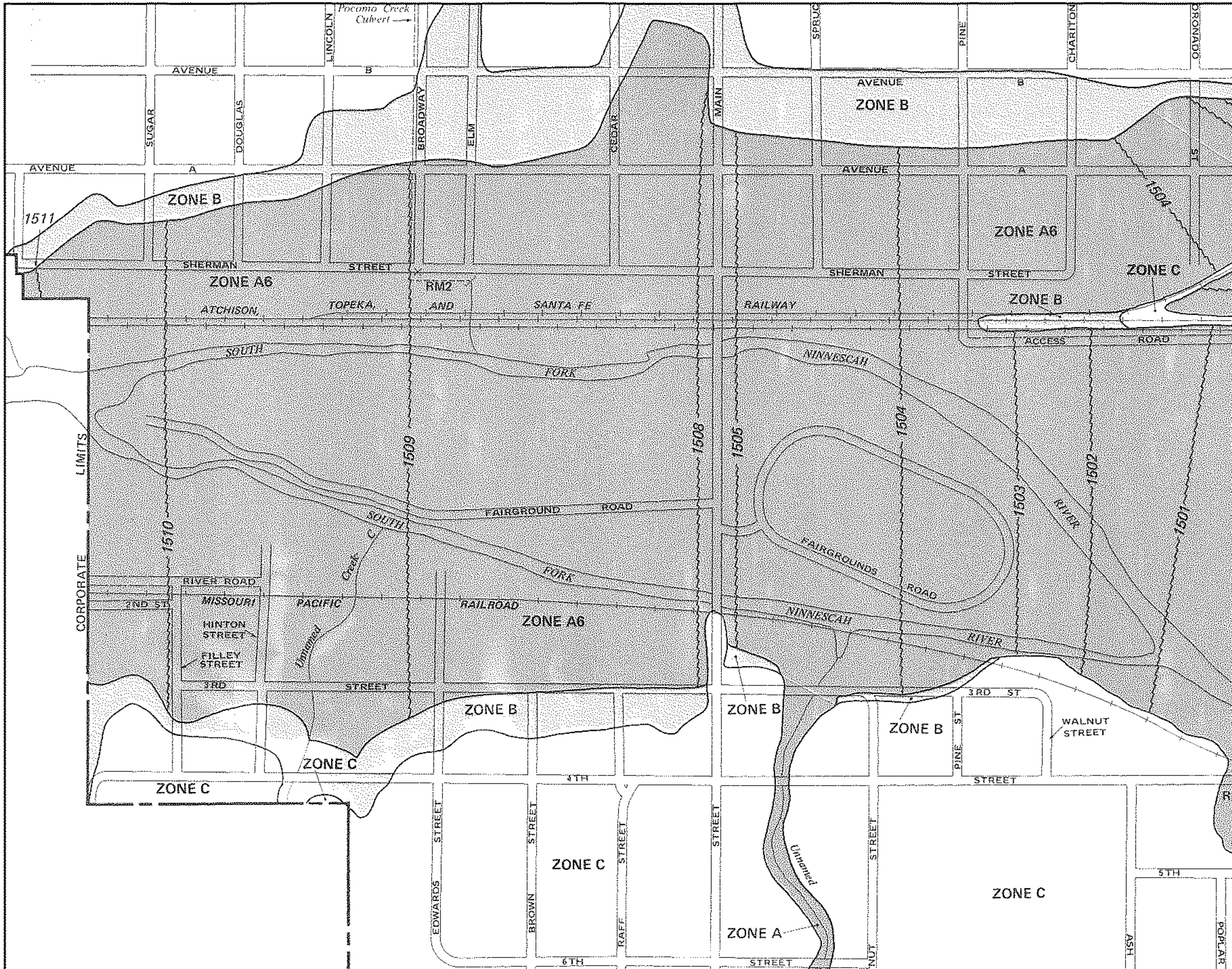
Appendix E: Proposed Improvement Plan

Appendix F: Proposed Condition HEC-RAS 2D Results

Appendix G: HEC-RAS 2D Results Comparison

Appendix A

FEMA Federal Insurance Rate Map



APPROXIMATE SCALE

400 0 400 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

CITY OF
KINGMAN,
KANSAS
KINGMAN COUNTY

PANEL 2 OF 2

COMMUNITY-PANEL NUMBER
200183 0002 B

EFFECTIVE DATE:
JUNE 18, 198

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
FEDERAL INSURANCE ADMINISTRATION

This is an official FIRMette showing a portion of the above-referenced flood map created from the MSC FIRMette Web tool. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For additional information about how to make sure the map is current, please see the Flood Hazard Mapping Updates Overview Fact Sheet available on the FEMA Flood Map Service Center home page at https://msc.fema.gov.

Appendix B

Existing Ground Level Photos

Photo 1

Station 6+00.00 to Station 8+00.00

Replace 35 cubic yards of Sidewalk Embankment

Photo 2

Station 7+06.60 to Station 7+87.31

Replace 45 cubic yards of Mill Race North Bank

Photo 3

Station 8+67.38 to Station 9+94.19

Replace 155 cubic yards of Mill Race North Bank

Photo 4

Station 11+31.17 to Station 12+01.23

Replace 80 cubic yards of Mill Race North Bank

Photo 5

Station 12+50.00 to Station 12+69.08

Replace 50 square feet of 6" Concrete Sidewalk

Photo 6

Station 12+54.89 to Station 13+30.06

Replace 145 cubic yards of Mill Race North Bank

Photo 7

Station 12+96.98 to Station 13+29.19

Replace 2 cubic yards of Sidewalk Embankment

Photo 8

Station 13+43.16 to Station 13+64.71

Replace 2 cubic yards of Sidewalk Embankment

Photo 9

Station 13+75.15 to Station 14+00.00

Replace 125 square feet of 6” Concrete Sidewalk

Photo 10

Station 15+90.00 to Station 16+50.00

Replace 300 square feet of 6” Concrete Sidewalk

Photo 11

Station 20+85.64 to Station 21+08.01

Replace 3 cubic yards of Sidewalk Embankment

Photo 12

Station 21+03.97 to Station 21+50.00

Replace 670 square feet of 6” Concrete Slope Protection

Replace 90 cubic yards of Sidewalk Embankment

Replace 550 square feet of 6” Concrete Sidewalk

Photo 13

Station 25+35.00

Replace 120 linear feet of 24” Corrugated Metal Pipe with Concrete Headwall

Photo 14

Station 25+65.00

Replace 20 linear feet of 24" Corrugated Metal Pipe with Flared End Sections

Photo 15

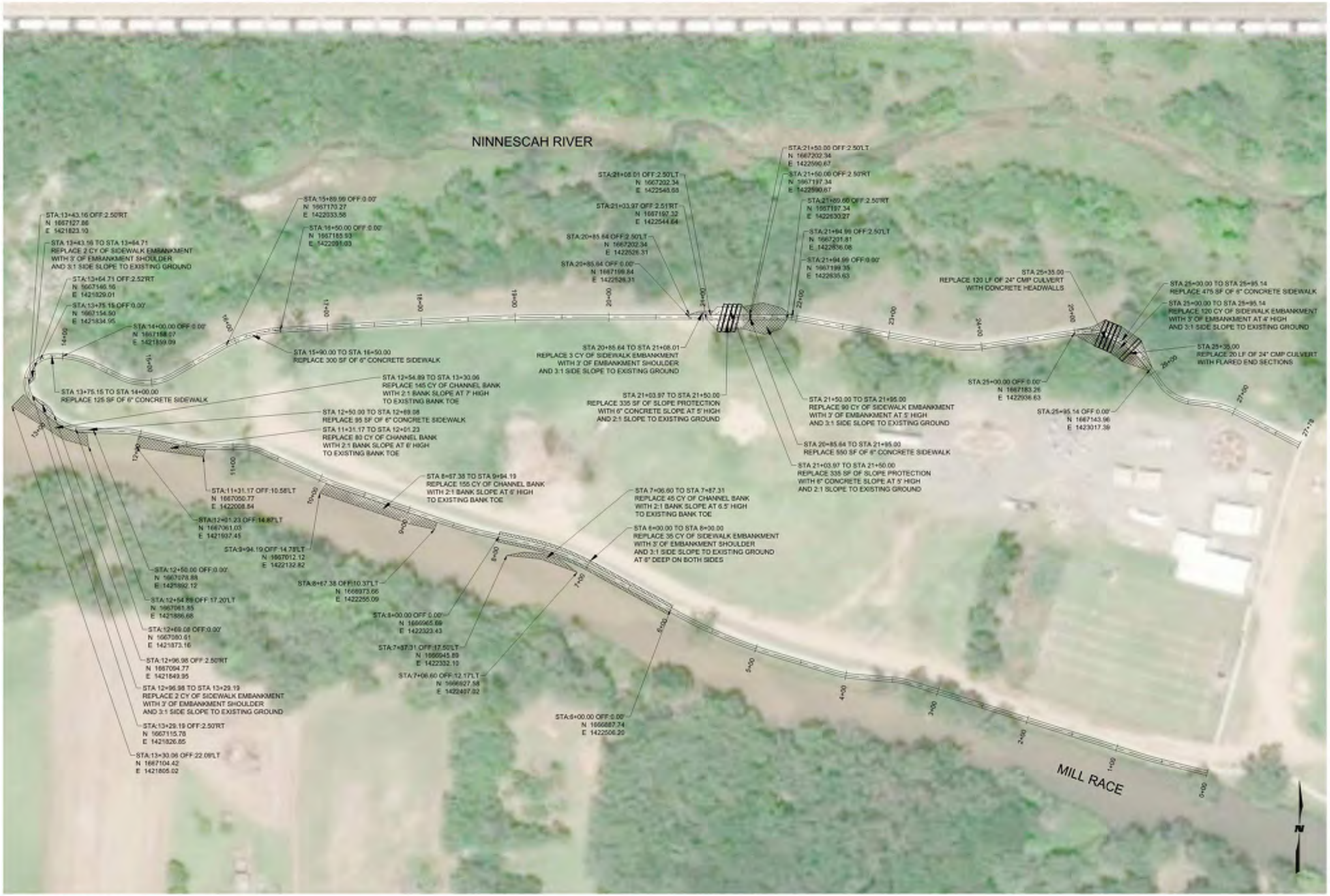
Station 25+00.00 to Station 25+95.14

Replace 120 cubic yards of Sidewalk Embankment

Replace 475 square feet of 6” Concrete Sidewalk

Appendix C

Pre-Disaster Site Layout Exhibit



A1 SITE LAYOUT

SCALE: 1" = 50'

0 50' 100'

C:\Users\cdoughman\Desktop\Kingman River Bank_REFERENCES\SITE LAYOUT EXHIBIT.DWG

3/1/2021

WILSON & COMPANY

800 EAST 101ST TERRACE, SUITE 200
KANSAS CITY, MO 64131
PHONE: 816-701-3100
FAX: 816-942-3013
www.wilsonco.com

PROJECT NAME

CITY OF KINGMAN, KS
NINNESCAH RIVER
MITIGATION STUDY
PRELIMINARY STUDY

REV.	DATE	DESCRIPTION	BY

PROJECT NO:	19-600-505-02
DESIGNED BY:	CLP
DRAWN BY:	CLP
CHECKED BY:	CDL
DATE:	1/8/2020

SHEET TITLE

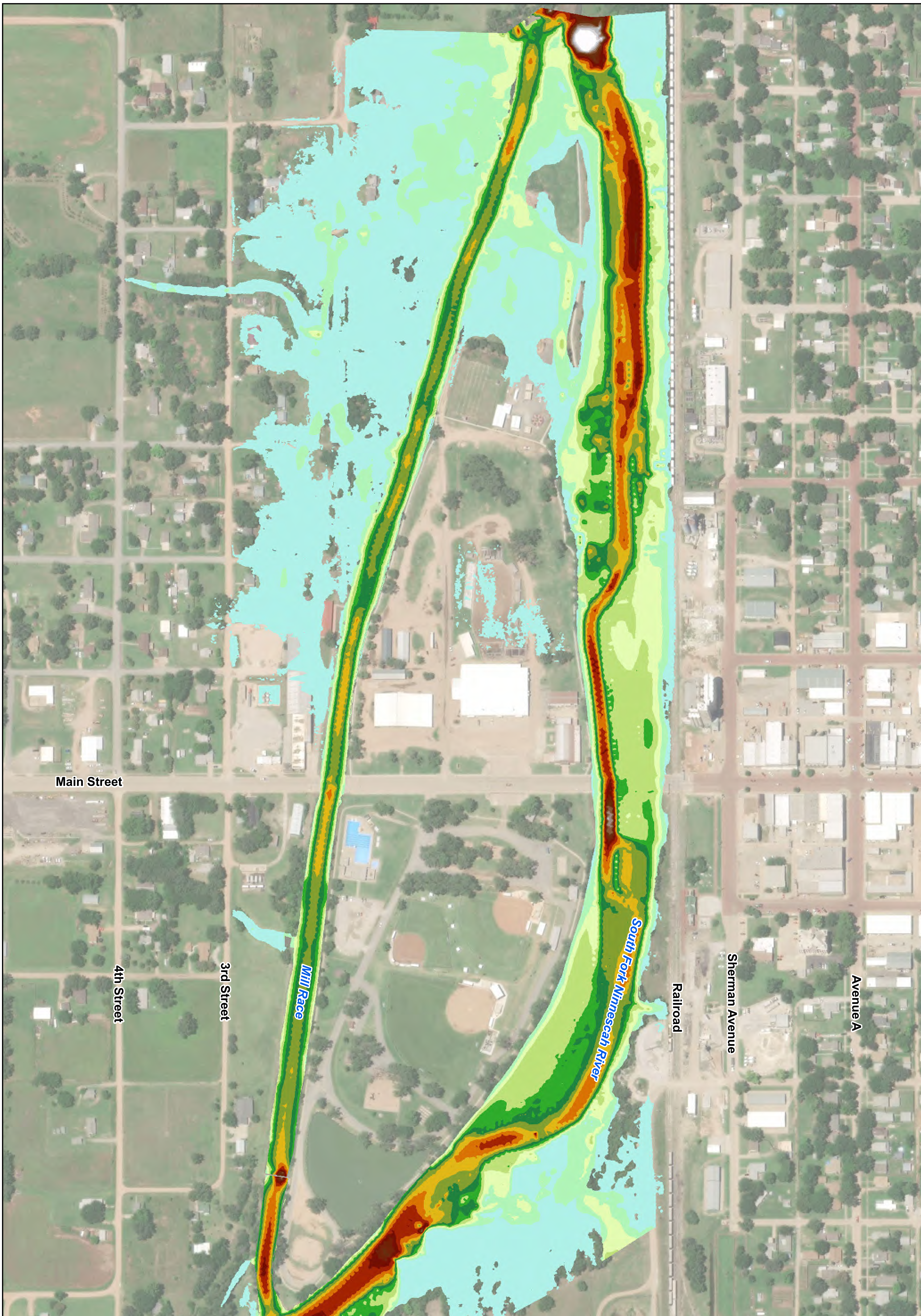
EXHIBIT
SITE LAYOUT

SHEET NO:

EX01

Appendix D

Existing Conditions HEC-RAS 2D Results



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	2 - 3		8 - 9		14 - 15
	3 - 4		9 - 10		15 - 16
	4 - 5		10 - 11		16 - 17
	5 - 6		11 - 12		17 - 18

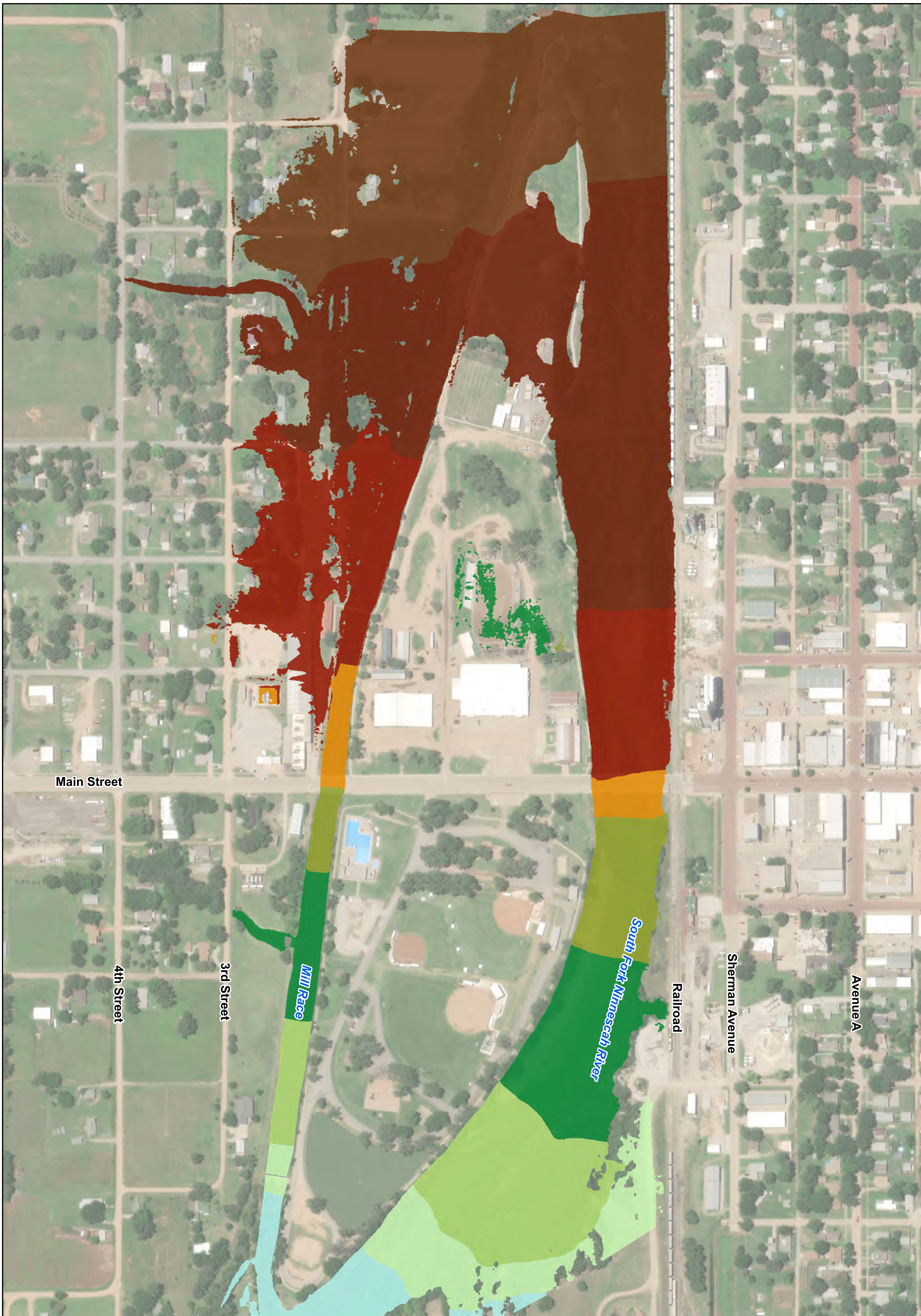
0 145 290 580 Feet

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

City of Kingman, KS
Ninnescah River FEMA Mitigation Study
10-year Existing Velocity

March 2022

Vertical Datum: NAVD 88
Coordinate System: NAD 83 State Plane KS South FIPS 1501 Feet



1,498 - 1,499	1,504 - 1,505
1,499 - 1,500	1,505 - 1,506
1,500 - 1,501	1,506 - 1,507
1,501 - 1,502	1,507 - 1,508
1,502 - 1,503	1,508 - 1,509
1,503 - 1,504	1,509 - 1,510

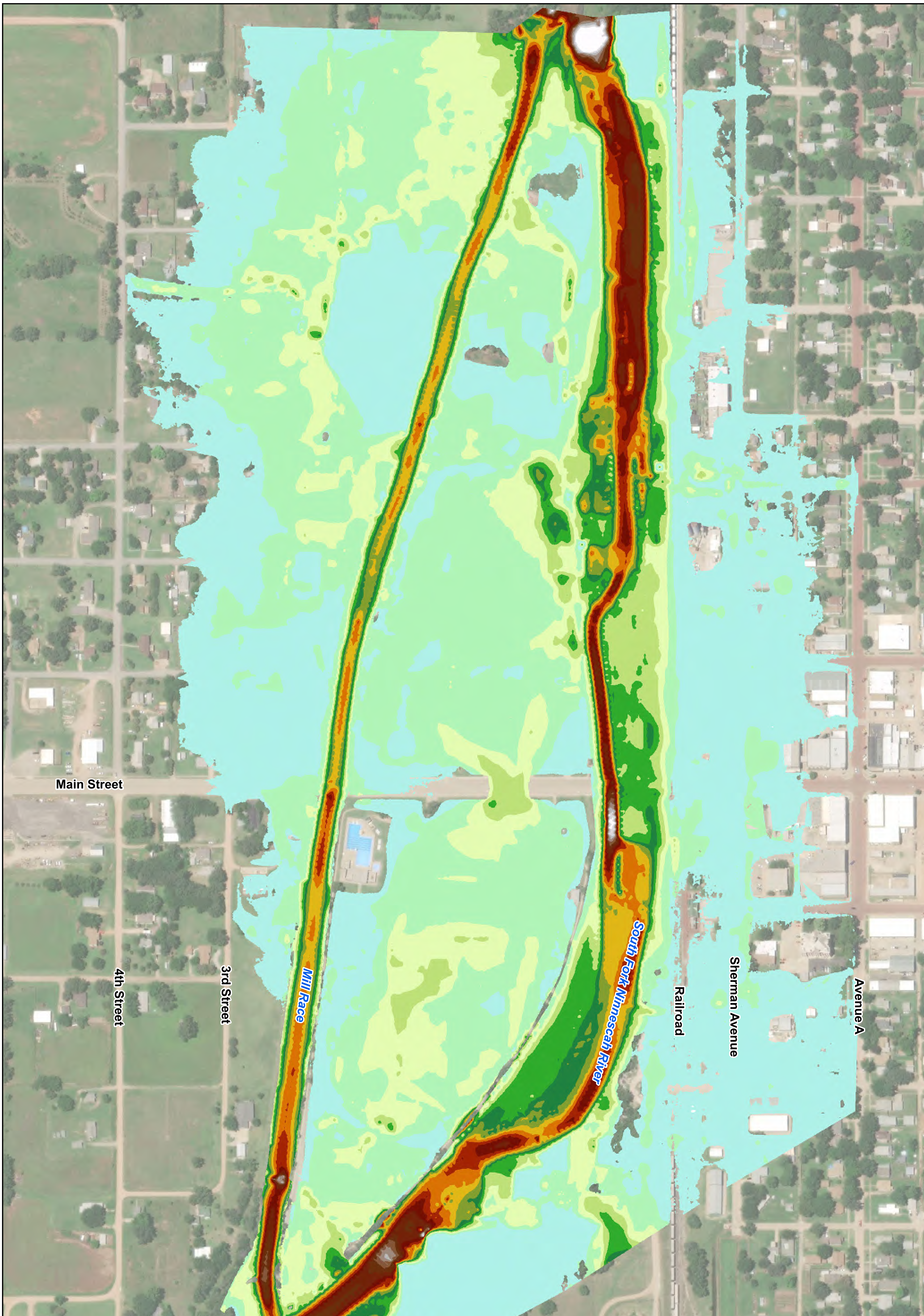
0 145 290 580
Feet

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

City of Kingman, KS
Ninnescah River FEMA Mitigation Study
10-year Existing Water Surface Elevation

March 2022

Vertical Datum: NAVD 88
Coordinate System: NAD 83 State Plane KS South FIPS 1501 Feet



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1 - 2	7 - 8	13 - 14
2 - 3	8 - 9	14 - 15
3 - 4	9 - 10	15 - 16
4 - 5	10 - 11	16 - 17
5 - 6	11 - 12	17 - 18

0 145 290 580 Feet

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

City of Kingman, KS
Ninnescah River FEMA Mitigation Study
50-year Existing Velocity

March 2022

Vertical Datum: NAVD 88
Coordinate System: NAD 83 State Plane KS South FIPS 1501 Feet

1,498 - 1,499	1,504 - 1,505
1,499 - 1,500	1,505 - 1,506
1,500 - 1,501	1,506 - 1,507
1,501 - 1,502	1,507 - 1,508
1,502 - 1,503	1,508 - 1,509
1,503 - 1,504	1,509 - 1,510

N

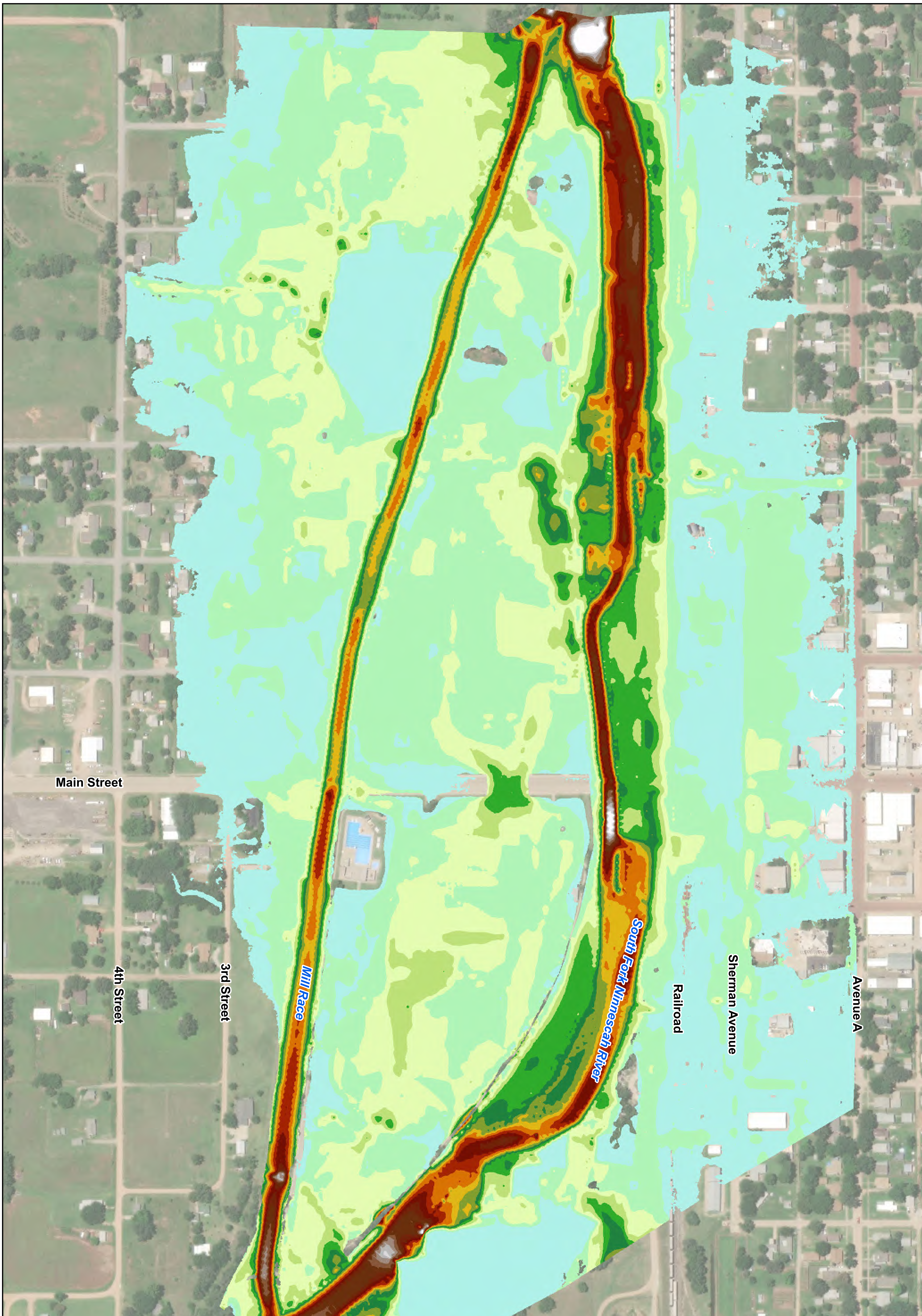
0 145 290 580 Feet

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

City of Kingman, KS
Ninnescah River FEMA Mitigation Study
50-year Existing Water Surface Elevation

March 2022

Vertical Datum: NAVD 88
Coordinate System: NAD 83 State Plane KS South FIPS 1501 Feet



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	3 - 4		9 - 10		15 - 16
	4 - 5		10 - 11		16 - 17
	5 - 6		11 - 12		17 - 18

0 145 290 580 Feet

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

City of Kingman, KS
Ninnescah River FEMA Mitigation Study
100-year Existing Velocity

March 2022

Vertical Datum: NAVD 88
Coordinate System: NAD 83 State Plane KS South FIPS 1501 Feet

1,498 - 1,499	1,504 - 1,505
1,499 - 1,500	1,505 - 1,506
1,500 - 1,501	1,506 - 1,507
1,501 - 1,502	1,507 - 1,508
1,502 - 1,503	1,508 - 1,509
1,503 - 1,504	1,509 - 1,510

0 145 290 580 Feet

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

City of Kingman, KS
Ninnescah River FEMA Mitigation Study
100-year Existing Water Surface Elevation

March 2022

Vertical Datum: NAVD 88
Coordinate System: NAD 83 State Plane KS South FIPS 1501 Feet

Appendix E

Proposed Improvement Plan

2022 FEMA PROJECT

NINNESCAH RIVER BANK STABILIZATION

CITY OF KINGMAN, KANSAS

N

PROJECT MAP

ENGINEER & AGENCY CONTACTS

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Charles.Loughman@wilsonco.com

CITY OF KINGMAN, KANSAS
GREG GRAFFMAN, INTERIM CITY MANAGER
(620) 532-3111
graffman@cityofkingman.com

SHEET INDEX

ENGINEER APPROVAL

PREPARED UNDER MY DIRECT SUPERVISION FOR AND ON THE BEHALF OF WILSON & COMPANY, INC., ENGINEERS AND ARCHITECTS

CHARLES D. LOUGHMAN, P.E. DATE

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KANSAS CITY, MO 64131
PHONE: 816-701-3100
FAX: 816-942-3013
www.wilsonco.com

PROJECT NAME
CITY OF KINGMAN, KS
NINNESCAH RIVER
MITIGATION STUDY
PRELIMINARY STUDY

REV.	DATE	DESCRIPTION	BY

PROJECT NO:	19-600-505-02
DESIGNED BY:	CLP
DRAWN BY:	CLP
CHECKED BY:	CDL
DATE:	1/6/2020

SHEET TITLE
COVER

SHEET NO:

3/21/2022 M:\MSD\19-600-505-02\2_Disciplines_SHEETS\2_Sheets - civil\SITE LAYOUT EXHIBIT.DWG

GENERAL NOTES & SPECIFICATIONS

SCOPE OF WORK: THE WORK TO BE COMPLETED UNDER THESE REPAIRS SHALL INCLUDE THE PROJECT AS DEPICTED ON THESE CONSTRUCTION DRAWINGS AND SPECIFICATIONS AND SHALL INCLUDE ALL EQUIPMENT, LABOR, AND MATERIALS NECESSARY FOR CONSTRUCTION AS WELL AS EROSION AND SEDIMENT CONTROL, CONTROL OF WATER DURING CONSTRUCTION, PROTECTION OF ADJACENT IMPROVEMENTS, IMPORT OR EXPORT OF EARTHEN MATERIALS, REMOVAL OF ALL WASTE MATERIALS FROM THE SITE, AND RECLAMATIONS OF THE AREAS OF THE SITES DISTURBED BY CONSTRUCTION ACTIVITIES.

ALL MATERIALS AND INSTALLATION PROCEDURES WILL BE IN COMPLIANCE WITH ALL APPLICABLE STATE AND FEDERAL REGULATIONS UNLESS OTHERWISE SPECIFIED IN SPECIAL PROVISIONS, SUPPLEMENTAL TECHNICAL SPECIFICATIONS, THE PLANS, OR AS DIRECTED BY THE OWNER.

THE CONTRACTOR'S SHALL NOTIFY THE OWNER FOR TESTING AND OBSERVATION AS ESTABLISHED AT THE PRECONSTRUCTION CONFERENCE AND AS REQUIRED BY THE PLANS AND SPECIFICATIONS.

THE CONTRACTOR SHALL PROVIDE A COPY OF ALL SUBMITTALS AND CERTIFICATIONS TO THE OWNER FOR APPROVAL A MINIMUM OF ONE (1) WEEKS PRIOR TO THE ORDERING OF MATERIALS. THE SUBMITTALS SHALL BE MADE AS ELECTRONIC PDF FILES.

ALL MATERIALS AND WORKMANSHIP SHALL BE SUBJECT TO INSPECTION BY THE OWNER. THE OWNER RESERVES THE RIGHT TO ACCEPT OR REJECT MATERIALS AND WORKMANSHIP THAT DO NOT CONFORM TO THE PLANS AND SPECIFICATIONS.

THE CONTRACTOR SHALL NOTIFY THE OWNER A MINIMUM OF 48 HOURS PRIOR TO STARTING CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR NOTIFYING ANY OTHER AFFECTED UTILITY AGENCIES (OR THE LOCATING AGENCY) 72 HOURS IN ADVANCE OF CONSTRUCTION FOR UTILITY LOCATING.

THE CONTRACTOR SHALL HAVE ONE (1) SIGNED COPY OF THE PLANS AND SPECIFICATIONS AT THE JOB SITE AT ALL TIMES.

THE CONTRACTOR IS REQUIRED TO OBTAIN THE NECESSARY CONSTRUCTION PERMITS PRIOR TO THE START OF WORK INCLUDING PREPARATION OF A STORMWATER MANAGEMENT PLAN, WHICH SHALL BE KEPT ON SITE.

THE CONTRACTOR SHALL CONDUCT THE WORK IN A SAFE AND WORKMANLIKE MANNER, AND SHALL COMPLY WITH ALL APPLICABLE GOVERNMENTAL REGULATIONS REGARDING HEALTH AND SAFETY, PARTICULARLY INCLUDING THOSE PERTAINING TO EXCAVATION AND TRENCHING.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR RESETTING ANY LAND MONUMENTS AND/OR PROPERTY CORNERS DAMAGED DURING CONSTRUCTION. ANY MONUMENTS TO BE RESET WILL BE DONE UNDER THE DIRECT SUPERVISION OF A KANSAS REGISTERED LAND SURVEYOR AT THE CONTRACTORS EXPENSE.

THE CONTRACTOR SHALL OBTAIN AND BE FAMILIAR WITH ALL REGULATIONS GOVERNING THE CONSTRUCTION OF THIS PROJECT. THE CONTRACTOR SHALL OBTAIN COPIES OF ALL LATEST EDITIONS OF ALL DESIGN STANDARDS CRITERIA AND SPECIFICATIONS PRIOR TO CONSTRUCTION. A COPY OF THESE DOCUMENTS SHALL REMAIN ONSITE DURING CONSTRUCTION. COMPLIANCE WITH ALL LOCAL, COUNTY, STATE AND FEDERAL REQUIREMENTS IS THE ULTIMATE RESPONSIBILITY OF THE CONTRACTOR.

THE CONTRACTOR SHALL VERIFY LOCATION OF EXISTING FACILITIES INCLUDING UNDERGROUND UTILITIES PRIOR TO ACTUAL CONSTRUCTION. FOR INFORMATION CONTACT UNDERGROUND LOCATORS AT 1-316-687-2470. THE UTILITY INFORMATION SHOWN ON THESE PLANS REPRESENTS THE BEST AVAILABLE INFORMATION COMPILED TO THIS DATE. NO UNDERGROUND INVESTIGATIONS OR SURFACE LOCATIONS OF UNDERGROUND UTILITIES HAVE BEEN PERFORMED.

DIMENSIONS, ELEVATIONS, AND LOCATION OF EXISTING STRUCTURES, PIPELINES, AND UTILITIES ARE APPROXIMATE. THERE MAY BE OTHER STRUCTURES, PIPELINES, UTILITIES, ETC., NOT SHOWN ON THE DRAWINGS WHICH PRESENTLY EXIST IN THE AREA OF CONSTRUCTION. THE ENGINEER AND/OR OWNER ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OR COMPLETENESS OF THE INFORMATION SHOWN. THE CONTRACTOR WILL BE RESPONSIBLE FOR LOCATING AND PROTECTION OF ALL EXISTING STRUCTURES, PIPELINES, UTILITIES, ETC., WITHIN THE PROJECT SITE. THE CONTRACTOR SHALL, AT HIS EXPENSE, REPAIR ANY UTILITIES DISTURBED OR DISRUPTED BY THE CONSTRUCTION ACTIVITIES.

THE QUANTITY OF MATERIALS STORED ON THE PROJECT SITE SHALL BE LIMITED, AS MUCH AS PRACTICAL, TO THAT QUANTITY REQUIRED TO PERFORM THE WORK IN AN ORDERLY SEQUENCE. ALL MATERIAL STORED ON-SITE SHALL BE STORED IN A NEAT, ORDERLY MANNER, IN THEIR ORIGINAL CONTAINERS, WITH ORIGINAL MANUFACTURE'S LABELS. MATERIAL SHALL NOT BE STORED IN A LOCATION WHERE THEY MAY BE CARRIED BY STORMWATER RUNOFF INTO A STATE WATER AT ANY TIME.

SPILL PREVENTION AND CONTAINMENT MEASURES SHALL BE USED AT STORAGE, AND EQUIPMENT FUELING AND SERVICING AREAS TO PREVENT THE POLLUTION OF ANY STATE WATERS OR WETLANDS. ALL SPILLS SHALL BE CLEANED UP IMMEDIATELY AFTER DISCOVERY, OR CONTAINED UNTIL APPROPRIATE CLEANUP METHODS CAN BE EMPLOYED. MANUFACTURERS RECOMMENDED METHODS OF SPILL CLEANUP SHALL BE FOLLOWED, ALONG WITH PROPER DISPOSAL METHODS.

THE CONTRACTOR SHALL PREPARE A STORMWATER MANAGEMENT PLAN FOR THE SITE THAT IS COMPATIBLE WITH THE CONTRACTOR'S PLAN FOR PERFORMING THE WORK. THE PLAN SHALL MEET THE REQUIREMENTS OF THE CITY OF KINGMAN. THIS PLAN SHALL BE FOLLOWED IN THE EXECUTION OF THE WORK, AND A COPY SHALL BE MAINTAINED ON SITE.

IN NO CASE SHALL CONCRETE/GROUT OR CONCRETE/GROUT WASHWATER BE POURED IN FLOWING WATER.

THE CONTRACTOR IS RESPONSIBLE FOR ALL DEWATERING AND WATER CONTROL REQUIRED FOR CONSTRUCTION OF THE PROJECT IMPROVEMENTS.

THE CONTRACTOR SHALL CONSTRUCT THE PROJECT IN A MANNER THAT DOES NOT INCREASE THE RISK OF FLOODING OR EROSION DAMAGE TO ADJACENT FACILITIES.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTION OF ALL PARTIALLY COMPLETED AND COMPLETED WORK UNTIL ACCEPTANCE BY THE OWNER.

THE CONTRACTOR SHALL PROVIDE A FENCING CLOSURE ACROSS THE EXISTING TRAIL AT THE NORTH AND SOUTH ENDS OF THE PROJECT AREA TO HARDEN THE TRAIL CLOSURE. IN ADDITION, THE CONTRACTOR SHALL PROVIDE A FENCING CLOSURE AROUND ACTIVE WORK ZONES. THE CITY PARKS STAFF WILL PROVIDE "TRAIL CLOSED" SIGNS FOR EACH END.

THE CONTRACTOR SHALL REPAIR ALL DAMAGE TO THE EXISTING TRAILS CAUSED BY THE CONTRACTORS USE OF THE TRAILS. SUCH REPAIRS WILL NOT BE PAID FOR SEPARATELY BUT WILL BE CONSIDERED INCIDENTAL TO BID ITEMS.

THE CONTRACTOR SHALL BE AWARE THAT THE WORK ZONES OF THIS PROJECT ARE WITHIN THE 100-YEAR FLOOD HAZARD ZONE.

EROSION AND SEDIMENT CONTROL NOTES

EROSION AND SEDIMENT CONTROL AND PERMITTING SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. ALL WORK SHALL BE PLANNED AND IMPLEMENTED TO MINIMIZE THE POTENTIAL FOR EROSION AND SEDIMENTATION, AND TO MINIMIZE THE TIME OF WORK IN THE CREEK IN ACCORDANCE WITH THE KANSAS CITY METRO APWA DESIGN MANUAL.

TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL BE IMPLEMENTED PRIOR TO THE EARTHWORK OPERATIONS THEY PROVIDE CONTROL FOR. EROSION CONTROL MEASURES SHALL BE IMPLEMENTED IN A MANNER THAT WILL PROTECT PROPERTIES, WETLANDS, WILDLIFE HABITAT, DOWN STREAM WATER COURSE AND PUBLIC FACILITIES FROM THE ADVERSE EFFECTS OF EROSION AND SEDIMENTATION AS A RESULT OF CONSTRUCTION AND EARTHWORKS ACTIVITIES WITHIN THE PROJECT SITE.

ALL AREAS DISTURBED BY CONSTRUCTION ACTIVITIES THAT ARE NOT PAVED SHALL BE REVEGETATED IN CONFORMANCE WITH THE PLANS AND SPECIFICATIONS OR DIRECTION BY THE OWNER.

ALL EARTH DISTURBANCES SHALL BE DESIGNED, CONSTRUCTED AND COMPLETED IN SUCH A MANNER SO THAT THE EXPOSED AREA OF ANY DISTURBED LAND SHALL BE LIMITED TO THE SHORTEST PRACTICAL PERIOD OF TIME.

ANY TEMPORARY OR PERMANENT FACILITY DESIGNED AND CONSTRUCTED FOR THE CONVEYANCE OF STORMWATER AROUND, THROUGH, OR FROM THE EARTH DISTURBANCE AREA SHALL BE DESIGNED AND PROTECTED TO MINIMIZE EROSION IN ACCORDANCE WITH KANSAS CITY METRO APWA DESIGN MANUAL.

NO PERSON SHALL CAUSE, PERMIT, OR CONTRIBUTE TO THE DISCHARGE THAT COULD CAUSE THE CITY OF KINGMAN TO BE IN VIOLATION OF ANY LOCAL, STATE, OR FEDERAL STORMWATER DISCHARGE PERMITS.

THE CONTRACTOR, AND/OR THEIR AUTHORIZED AGENTS SHALL BE RESPONSIBLE FOR THE REMOVAL AND DISPOSAL OF ALL CONSTRUCTION DEBRIS, DIRT, TRASH, ROCK, SEDIMENT, AND SAND THAT MAY ACCUMULATE IN THE STORM SEWER OR OTHER DRAINAGE CONVEYANCE SYSTEM AND STORMWATER APPURTENANCES AS A RESULT OF SITE CONSTRUCTION.

ALL TEMPORARY EROSION CONTROL FACILITIES INCLUDING BMP'S AND ALL PERMANENT FACILITIES INTENDED TO CONTROL EROSION OF ANY EARTH DISTURBANCE OPERATIONS, SHALL BE INSTALLED AS DEFINED IN THE APPROVED PLANS AND SPECIFICATIONS AND MAINTAINED THROUGHOUT THE DURATION OF THE EARTH DISTURBANCE OPERATION.

PERMANENT SOIL EROSION CONTROL MEASURES FOR ALL SLOPES, CHANNELS, DITCHES OR ANY DISTURBED LAND AREA SHALL BE COMPLETED WITHIN FOURTEEN (14) CALENDAR DAYS AFTER FINAL GRADING, OR FINAL EARTH DISTURBANCE, HAS BEEN COMPLETED. DISTURBED AREAS AND STOCKPILES WHICH ARE NOT AT FINAL GRADE BUT WILL REMAIN DORMANT FOR LONGER THAN 30 DAYS SHALL ALSO BE MULCHED WITHIN 21 DAYS AFTER INTERIM GRADING. AN AREA THAT IS GOING TO REMAIN IN AN INTERIM STATE FOR MORE THAN 60 DAYS SHALL ALSO BE SEEDED AND BLANKETED AS REQUIRED. ALL TEMPORARY SOIL EROSION CONTROL MEASURES AND BMP'S SHALL BE MAINTAINED UNTIL PERMANENT SOIL EROSION CONTROL MEASURES ARE IMPLEMENTED.

THE CONTRACTOR SHALL PROVIDE AND MAINTAIN ADEQUATE SEDIMENT AND EROSION CONTROL MEASURES FOR ALL AREAS DISTURBED BY THE CONTRACTOR IN THE PERFORMANCE OF THE PROJECT WORK.

EROSION AND SEDIMENT CONTROL STRUCTURES SHALL BE INSPECTED REGULARLY BY THE CONTRACTOR AND AFTER EVERY STORMWATER RUNOFF EVENT. EROSION AND SEDIMENT CONTROL STRUCTURES SHALL BE MAINTAINED CONTINUOUSLY AS REQUIRED TO MAINTAIN FUNCTION UNTIL FINAL STABILIZATION IS ACHIEVED.

DEWATERING AND TEMPORARY EROSION CONTROL FOR CONSTRUCTION WITHIN THE STREAM BED SHALL BE IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS AND ALL APPLICABLE STATE, COUNTY, CITY, AND FEDERAL REGULATIONS.

THE CONTRACTOR IS REQUIRED TO INSTALL VEHICLE TRACKING CONTROL (VTC) AT ACCEPTABLE LOCATIONS OF THE PROJECT INGRESS AND EGRESS IN ORDER TO MINIMIZE THE TRACKING OF SEDIMENT FROM THE SITE. CONTRACTOR SHALL BE RESPONSIBLE TO MAINTAIN SEDIMENT FREE SURFACES ON ALL SURROUNDING ROADWAYS AND PAVED PARKING LOTS. THE CONTRACTOR IS RESPONSIBLE FOR PROMPT CLEANUP OF ANY SEDIMENT TRACKED ONTO ADJACENT STREETS AND PARKING LOTS FROM THE PROJECT AREA.

TO THE EXTENT PRACTICAL FLOW SHALL BE DIVERTED AROUND EARTH DISTURBING WORK PERFORMED IN THE ACTIVE STREAM BED.

GRADING ACTIVITIES ADJACENT TO THE ACTIVE STREAM BED SHALL BE PERFORMED IN A MANNER THAT MINIMIZES SPILLAGE OF SOIL INTO THE ACTIVE STREAM.

GRAVEL FILTRATION PACKS OR OTHER APPROPRIATE FILTRATION OR SETTLING METHODS SHALL BE UTILIZED TO MINIMIZE SEDIMENT CONTENT IN PUMPAGE FROM DEWATERING OR DIVERSION ACTIVITIES.

FERTILIZER SHALL BE APPLIED IN ACCORDANCE WITH THE KANSAS CITY METRO APWA DESIGN CRITERIA.

A STORMWATER MANAGEMENT PLAN (SWMP) SHALL BE SUBMITTED TO THE CITY PRIOR TO CONSTRUCTION AND SHALL BE MAINTAINED TO REFLECT CURRENT CONDITIONS THROUGHOUT CONSTRUCTION.

SEE SPECIFICATIONS FOR SEEDING MIX AND SEEDING RATE.

EARTHWORK

TEMPORARY EXCAVATION SLOPES SHALL BE IN ACCORDANCE WITH O.S.H.A REQUIREMENTS.

WATER FOR COMPACTION WILL NOT BE MEASURED AND PAID SEPARATELY, BUT WILL BE INCLUDED IN ALL EARTHWORK.

WATER WILL BE USED AS A DUST PALLIATIVE WHERE REQUIRED. LOCATIONS WILL BE AS ORDERED BY THE OWNER. WATER WILL NOT BE PAID FOR SEPARATELY, BUT WILL BE SUBSIDIARY TO EARTHWORK.

VEGETATED SLOPE PLANTING

ROOT PRODUCTION METHOD (RPM) VEGETATION SHALL BE UTILIZED FOR ALL PLANTINGS ASSOCIATED WITH THE VEGETATED GEOGRID SLOPE. RPM STOCK MUST BE GROWN FROM LOCALLY ADAPTED SEED OR CUTTING OF KNOWN ORGIN AND HEIGHT AND CALIPER STANDARDS LISTED IN THE NRCS KANSAS FORESTRY TECHNICAL NOTES KS-9.

QUANTITIES

ITEM NO.	DESCRIPTION	QUANTITY	UNIT
1	Mobilization	1	LS
2	Construction Staking	1	LS
3	Clearing and Grubbing	1	LS
4	Demolition (Concrete Sidewalk)	1370	SF
5	Excavation	7660	CY
6	Embankment (Contractor Furnished)	2910	CY
7	6" Concrete Sidewalk	8155	SF
8	Bank Protection (Stone Riprap)	830	SY
9	Granular Filter	830	SY
10	Filter Fabric	830	SY
11	Geogrid Reinforcement	2343	SY
12	Erosion Control Fabric	8412	SY
13	Grade Control Rock (D50=24")	580	CY
14	LPSTP Rock (D50=24")	1020	CY
15	Vegetated Slope Planting	1175	SY
16	Lightpole	5	EACH
17	Lighting Conduit	500	LF
18	Erosion Control	6	AC
19	Seeding and Restoration	6	AC

ABBREVIATIONS

BOW = BOTTOM OF WALL
CL = CENTERLINE
CLR = CLEAR
CP = CONTROL POINT
CY = CUBIC YARD
DIA = DIAMETER
DS = DOWNSTREAM
ELEV = ELEVATION
FG = FINISHED GRADE
FL = FLOW LINE
GB = GRADE BREAK
INV = INVERT
L = LENGTH
LT = LEFT
LF = LINEAR FOOT
MAINT= MAINTENANCE
MAX = MAXIMUM
MH = MANHOLE
MIN = MINIMUM
OC = ON CENTER
OS = OFFSET
PC = POINT OF CURVATURE
PRC = POINT OF REVERSE CURVATURE
PT = POINT OF TANGENCY
PVC = POLYVINYL CHLORIDE PIPE
R = RADIUS
RCP = REINFORCED CONCRETE PIPE
RT = RIGHT
SF = SQUARE FOOT
STA = STATION
SY = SQUARE YARD
TBC = TOP BACK OF CURB
TOB = TOP OF BOULDER/TOP OF BOX
TOS = TOP OF SLOPE
TOW = TOP OF WALL
TYP = TYPICAL
US = UPSTREAM
WSE = WATER SURFACE ELEVATION
YR = YEAR

WILSON & COMPANY
800 EAST 101ST TERRACE, SUITE 200
KANSAS CITY, MO 64131
PHONE: 816-701-3100
FAX: 816-942-3013
www.wilsonco.com

PROJECT NAME
CITY OF KINGMAN, KS
NINNESCAH RIVER
MITIGATION STUDY
PRELIMINARY STUDY

REV.	DATE	DESCRIPTION	BY

PROJECT NO: 19-600-505-02
DESIGNED BY: CLP
DRAWN BY: CLP
CHECKED BY: CDL
DATE: 1/6/2020

SHEET TITLE
COVER

SHEET NO:

3/21/2022 M:\MSD\19-600-505-02\2_Disciplines_SHEETS\2_Sheets - civil\SITE LAYOUT EXHIBIT.DWG

A1 SITE LAYOUT

SCALE: 1:50_XREF

0 25' 50'

WILSON & COMPANY
800 EAST 101ST TERRACE, SUITE 200
KANSAS CITY, MO 64131
PHONE: 816-701-3100
FAX: 816-942-3013
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PROJECT NAME

CITY OF KINGMAN, KS
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MITIGATION STUDY
PRELIMINARY STUDY

REV.	DATE	DESCRIPTION	BY

PROJECT NO:	19-600-505-02
DESIGNED BY:	CLP
DRAWN BY:	CLP
CHECKED BY:	CDL
DATE:	1/6/2020

SHEET TITLE

WEST SITE PLAN

SHEET NO:

M:\MSD\19-600-505-02\2_Disciplines_SHEETS\2_Sheets - civil\SITE LAYOUT EXHIBIT.DWG

4/4/2022

A1 SITE LAYOUT

SCALE: 1:50_XREF

0 25' 50'

WILSON & COMPANY
800 EAST 101ST TERRACE, SUITE 200
KANSAS CITY, MO 64131
PHONE: 816-701-3100
FAX: 816-942-3013
www.wilsonco.com

PROJECT NAME

CITY OF KINGMAN, KS
NINNESCAH RIVER
MITIGATION STUDY
PRELIMINARY STUDY

REV.	DATE	DESCRIPTION	BY

PROJECT NO:	19-600-505-02
DESIGNED BY:	CLP
DRAWN BY:	CLP
CHECKED BY:	CDL
DATE:	1/6/2020

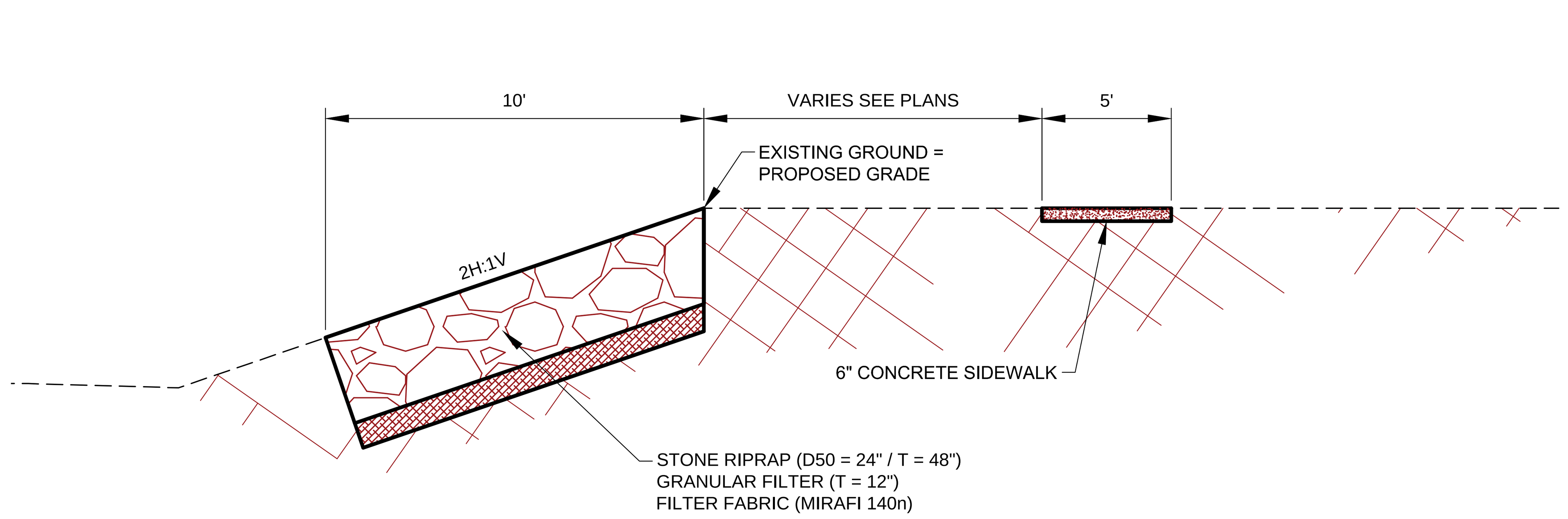
SHEET TITLE

EAST SITE PLAN

SHEET NO:

M:\MSD\19-600-505-02\2_Disciplines_SHEETS\2_Sheets - civil\SITE LAYOUT EXHIBIT.DWG

4/4/2022



F1 NINNESCAH RIVER RIPRAP TYPICAL SECTION

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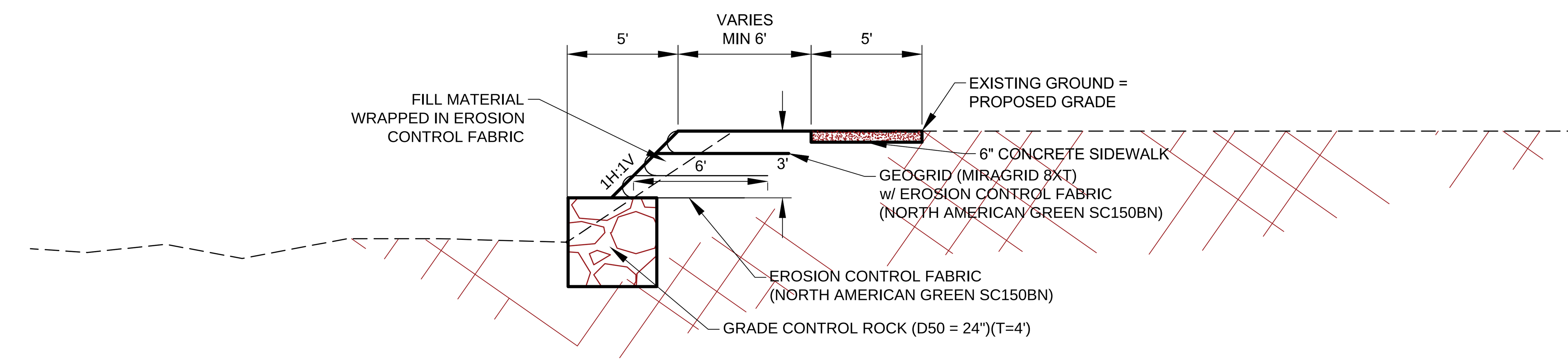
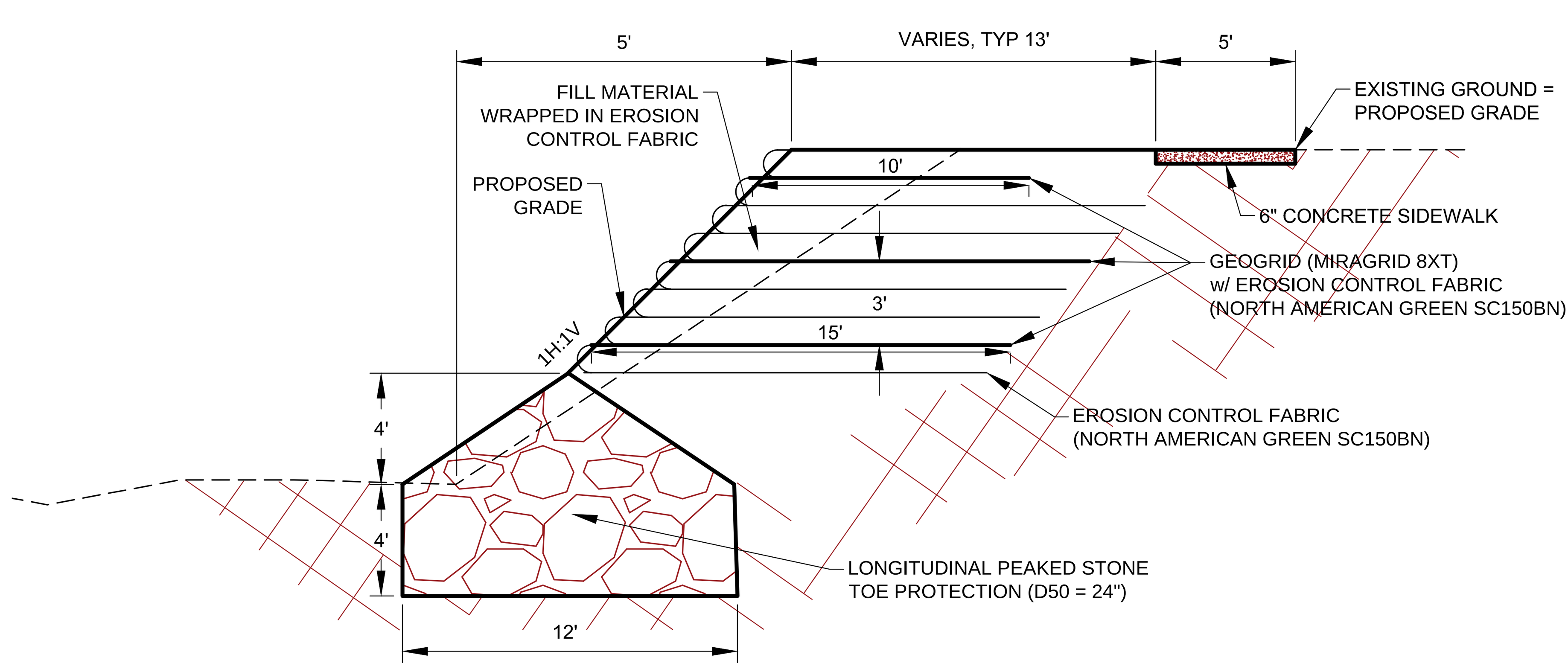


F6 MILL RACE VEGETATED GEOGRID TYPICAL SECTION

SCALE: 1:5_XREF



C1 NINNESCAH RIVER VEGETATED GEOGRID TYPICAL SECTION

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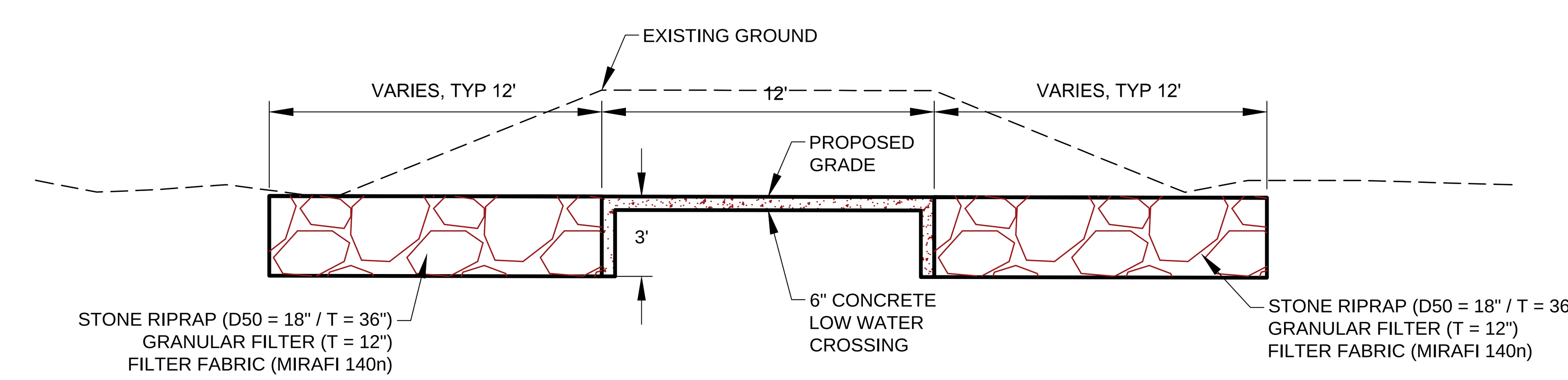

C6 LOW WATER CROSSING TYPICAL SECTION

SCALE: 1:5_XREF

0 25' 50'

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800 EAST 101ST TERRACE, SUITE 200
KANSAS CITY, MO 64131
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PROJECT NAME
CITY OF KINGMAN, KS
NINNESCAH RIVER
MITIGATION STUDY
PRELIMINARY STUDY

REV.	DATE	DESCRIPTION	BY

PROJECT NO:	19-600-505-02
DESIGNED BY:	CLP
DRAWN BY:	CLP
CHECKED BY:	CDL
DATE:	1/6/2020

SHEET TITLE
CONSTRUCTION DETAILS

SHEET NO:

M:\MSD\19-600-505-02\2_Disciplines_SHEETS\2_Sheets - civil\SITE LAYOUT EXHIBIT.DWG
4/4/2022

ENGINEERS ESTIMATE OF PROBABLE CONSTRUCTION COST
NINNESCAH RIVER BANK STABLIZATION MITIGATION
CITY OF KINGMAN, KANSAS

Estimators: CDLoughman Date: 4/5/2022
Stage: Preliminary

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
1	Mobilization	1	LS	$10,000.00	$10,000
2	Construction Staking	1	LS	$2,500.00	$2,500
3	Clearing and Grubbing	1	LS	$15,000.00	$15,000
4	Demolition (Concrete Sidewalk)	1370	SF	$3.00	$4,110
5	Excavation	7660	CY	$5.00	$38,300
6	Embankment (Contractor Furnished)	2910	CY	$10.00	$29,100
7	6" Concrete Sidewalk	8155	SF	$10.00	$81,550
8	Bank Protection (Stone Riprap)	830	SY	$100.00	$83,000
9	Granular Filter	830	SY	$15.00	$12,450
10	Filter Fabric	830	SY	$5.00	$4,150
11	Geogrid Reinforcement	2343	SY	$10.00	$23,430
12	Erosion Control Fabric	8412	SY	$5.00	$42,060
13	Grade Control Rock (D50=24")	580	CY	$125.00	$72,500
14	LPSTP Rock (D50=24")	1020	CY	$150.00	$153,000
15	Vegetated Slope Planting	1175	SY	$20.00	$23,500
16	Lightpole	5	EACH	$4,000.00	$20,000
17	Lighting Conduit	500	LF	$25.00	$12,500
18	Erosion Control	6	AC	$2,000.00	$12,000
19	Seeding and Restoration	6	AC	$1,500.00	$9,000

WILSON & COMPANY

Total Probable Construction Cost	***$648,150***
Construction Contingency (20%)	*$129,630*
Environmental Assessment	*$100,000*
Engineering & Administration	*$80,000*
TOTAL PROJECT COST	***$957,780***

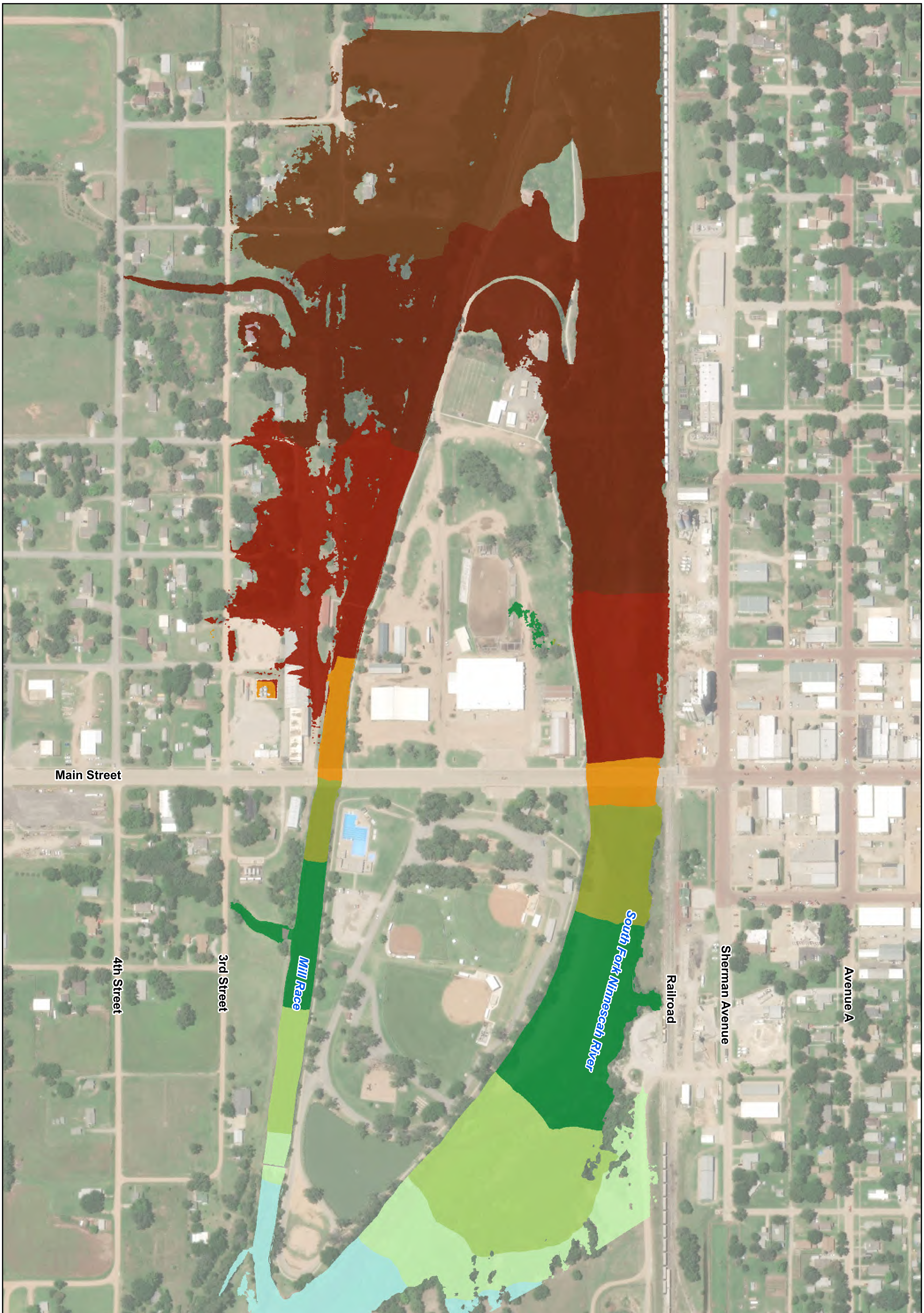
Appendix F

Proposed Conditions HEC-RAS 2D Results

City of Kingman, KS
Ninnescah River FEMA Mitigation Study
10-year Proposed Velocity

March 2022

Vertical Datum: NAVD 88
Coordinate System: NAD 83 State Plane KS South FIPS 1501 Feet



1,498 - 1,499	1,504 - 1,505
1,499 - 1,500	1,505 - 1,506
1,500 - 1,501	1,506 - 1,507
1,501 - 1,502	1,507 - 1,508
1,502 - 1,503	1,508 - 1,509
1,503 - 1,504	1,509 - 1,510

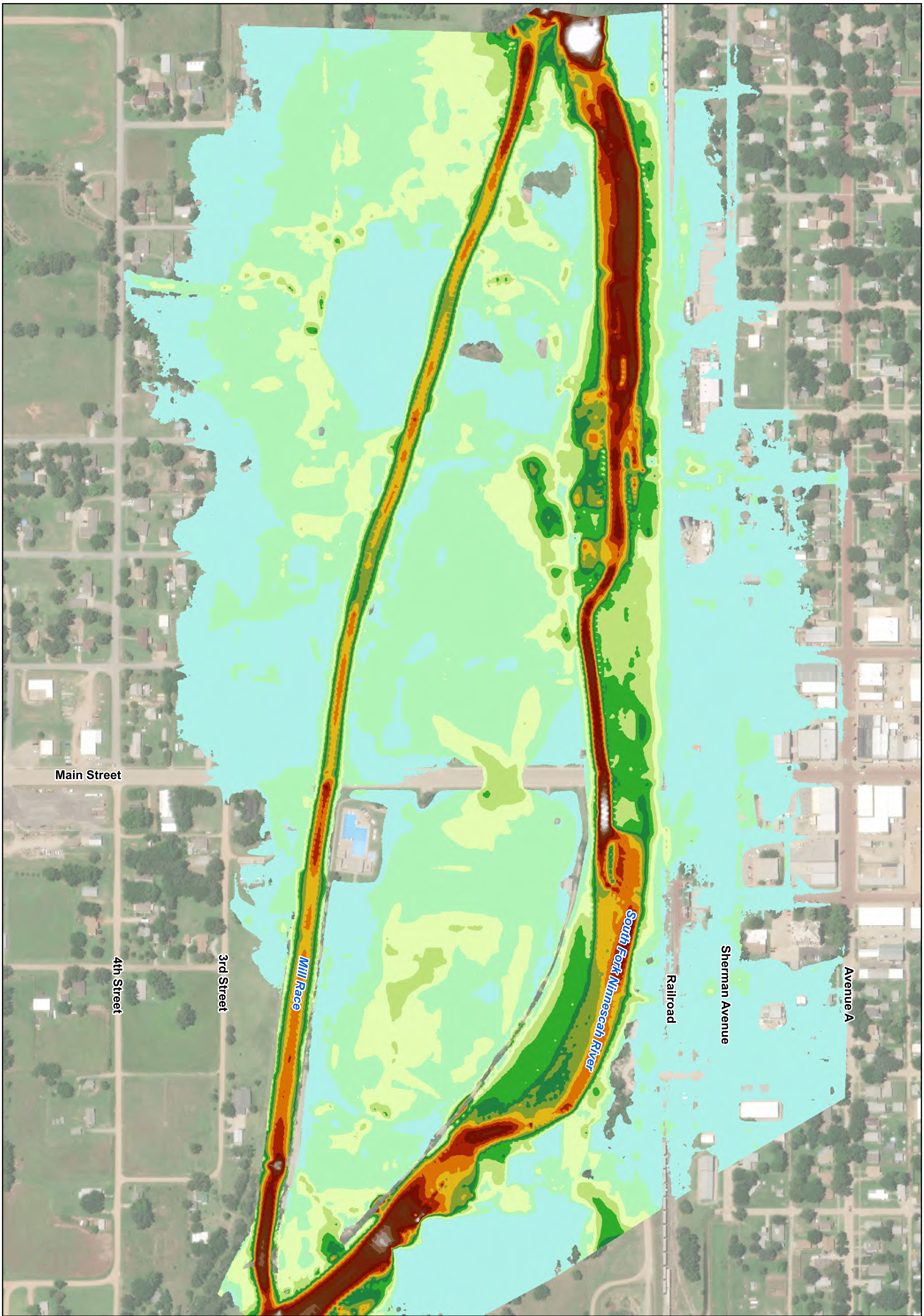
0 145 290 580 Feet

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

City of Kingman, KS
Ninnescah River FEMA Mitigation Study
10-year Proposed Water Surface Elevation

March 2022

Vertical Datum: NAVD 88
Coordinate System: NAD 83 State Plane KS South FIPS 1501 Feet



	0 - 1		6 - 7		12 - 13
	1 - 2		7 - 8		13 - 14
	2 - 3		8 - 9		14 - 15
	3 - 4		9 - 10		15 - 16
	4 - 5		10 - 11		16 - 17
	5 - 6		11 - 12		17 - 18

N

0 145 290 580 Feet

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

City of Kingman, KS
Ninnescah River FEMA Mitigation Study
50-year Proposed Velocity

March 2022

Vertical Datum: NAVD 88
Coordinate System: NAD 83 State Plane KS South FIPS 1501 Feet

	1,498 - 1,499		1,504 - 1,505
	1,499 - 1,500		1,505 - 1,506
	1,500 - 1,501		1,506 - 1,507
	1,501 - 1,502		1,507 - 1,508
	1,502 - 1,503		1,508 - 1,509
	1,503 - 1,504		1,509 - 1,510

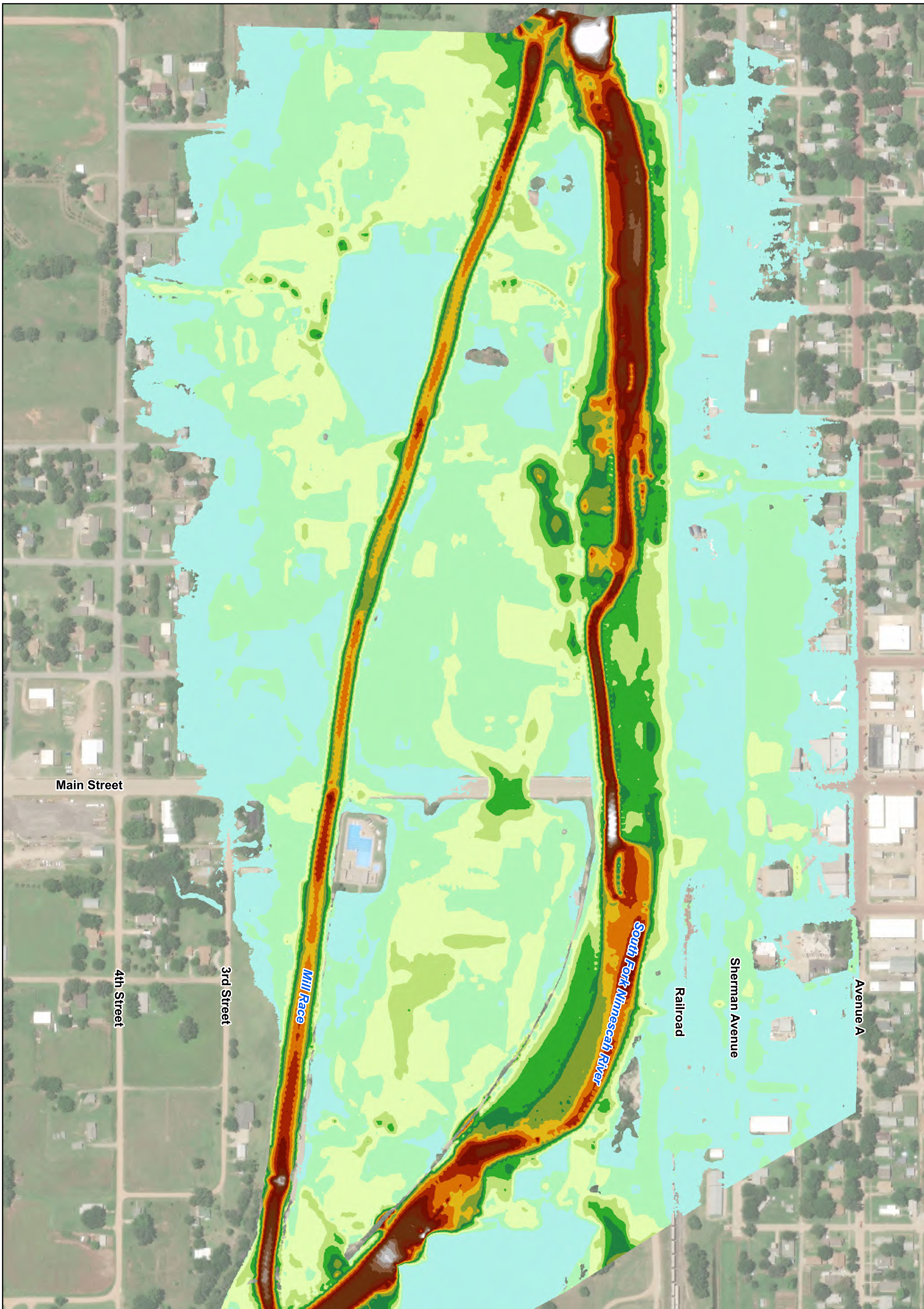
0 145 290 580 Feet

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

City of Kingman, KS
Ninnescah River FEMA Mitigation Study
50-year Proposed Water Surface Elevation

March 2022

Vertical Datum: NAVD 88
Coordinate System: NAD 83 State Plane KS South FIPS 1501 Feet



0 - 1	6 - 7	12 - 13
1 - 2	7 - 8	13 - 14
2 - 3	8 - 9	14 - 15
3 - 4	9 - 10	15 - 16
4 - 5	10 - 11	16 - 17
5 - 6	11 - 12	17 - 18

0 145 290 580 Feet

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

City of Kingman, KS
Ninnescah River FEMA Mitigation Study
100-year Proposed Velocity

March 2022

Vertical Datum: NAVD 88
Coordinate System: NAD 83 State Plane KS South FIPS 1501 Feet

1,498 - 1,499	1,504 - 1,505
1,499 - 1,500	1,505 - 1,506
1,500 - 1,501	1,506 - 1,507
1,501 - 1,502	1,507 - 1,508
1,502 - 1,503	1,508 - 1,509
1,503 - 1,504	1,509 - 1,510

N

0 145 290 580 Feet

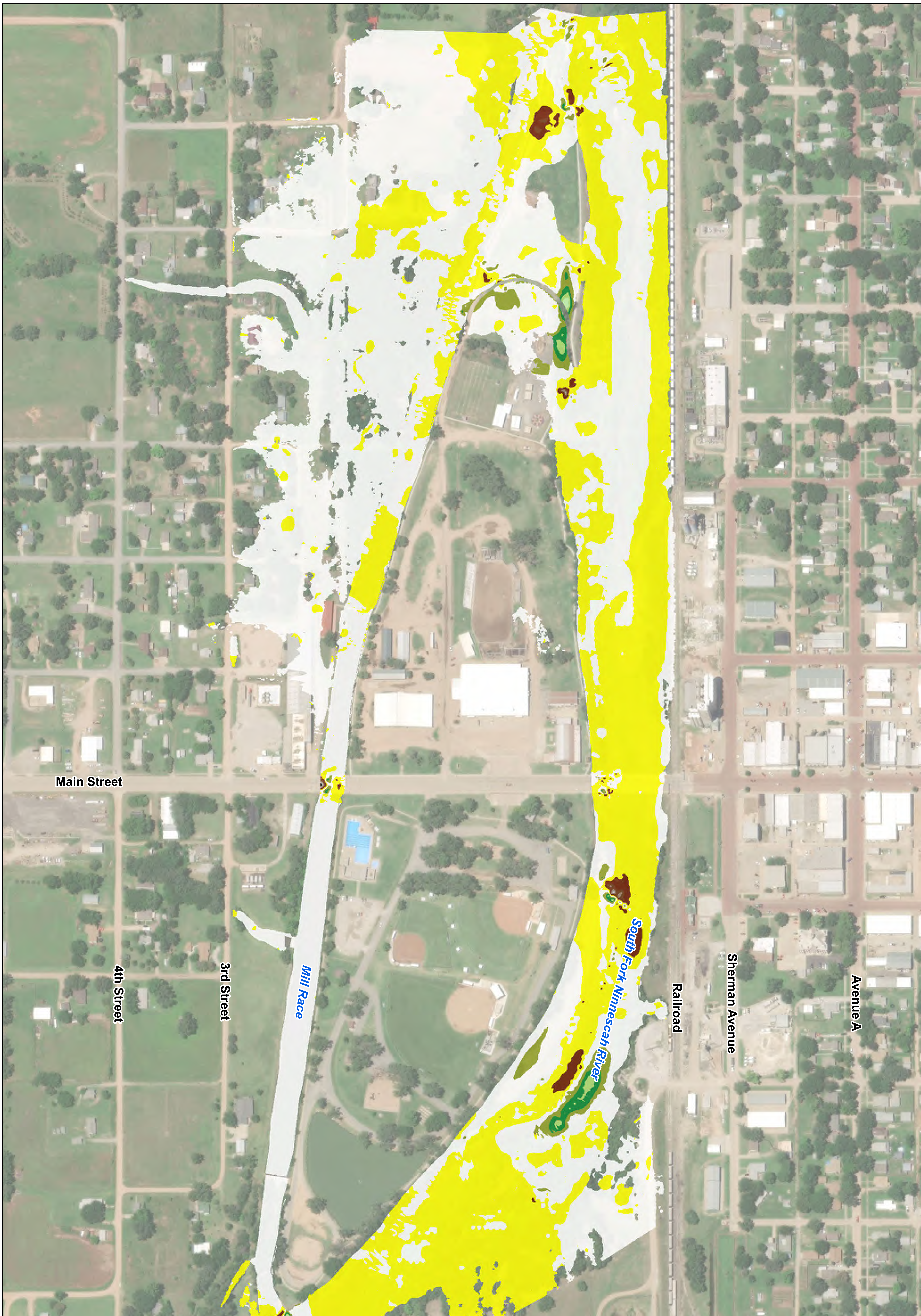
City of Kingman, KS
Ninnescah River FEMA Mitigation Study
100-year Proposed Water Surface Elevation

March 2022

Vertical Datum: NAVD 88
Coordinate System: NAD 83 State Plane KS South FIPS 1501 Feet

Appendix G

HEC-RAS 2D Results Comparison



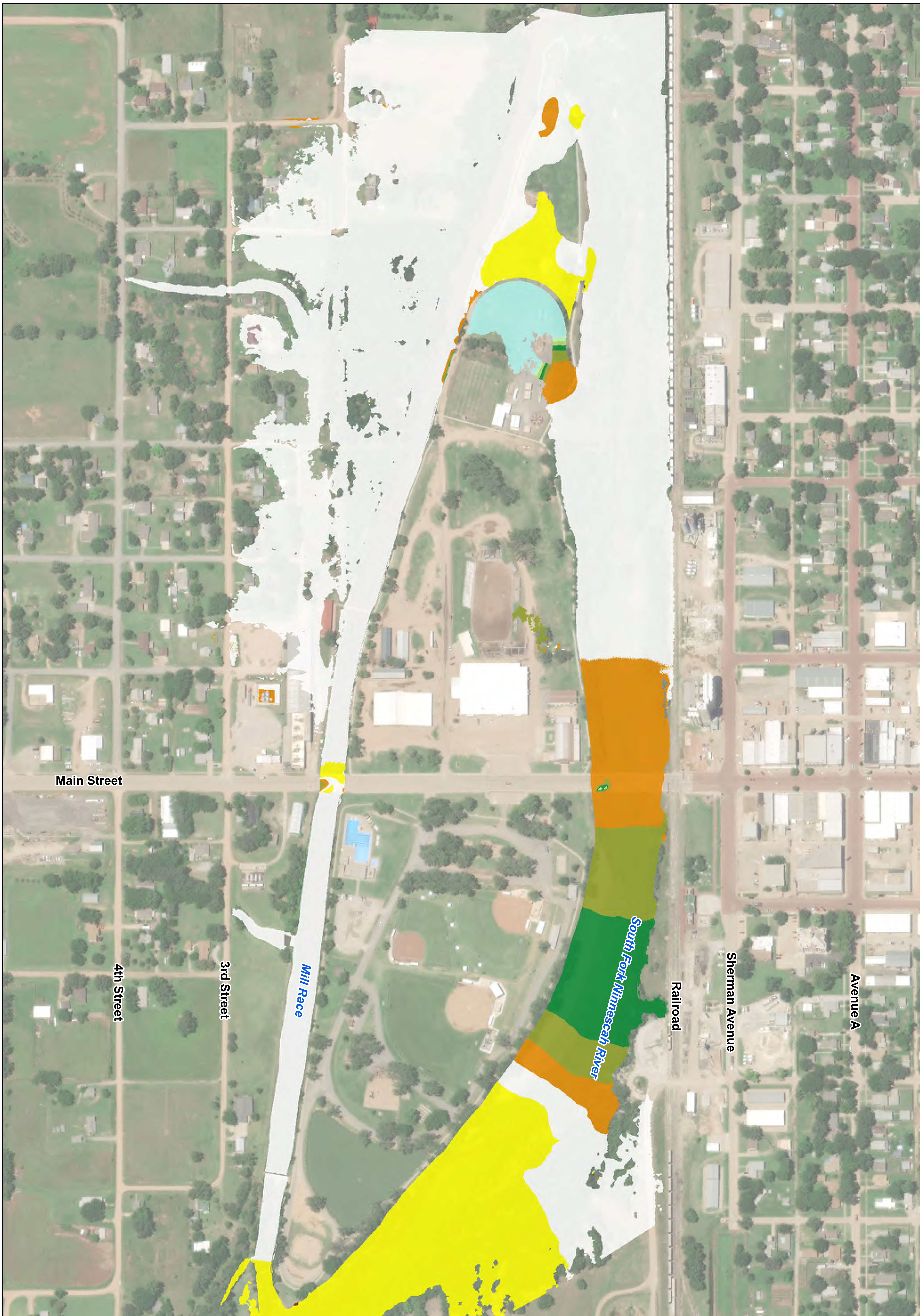
-3 - -2.5	0 - 0.5
-2.5 - -2	0.5 - 1
-2 - -1.5	1 - 1.5
-1.5 - -1	1.5 - 2
-1 - -0.5	2 - 2.5
-0.5 - 0	2.5 - 3

0 145 290 580 Feet

City of Kingman, KS
Ninnescah River FEMA Mitigation Study
10-year Velocity Comparison

March 2022

Vertical Datum: NAVD 88
Coordinate System: NAD 83 State Plane KS South FIPS 1501 Feet



-0.4 - -0.3	-0.05 - 0
-0.3 - -0.25	0 - 0.05
-0.25 - -0.2	0.05 - 0.1
-0.2 - -0.15	0.1 - 0.15
-0.15 - -0.1	0.15 - 0.2
-0.1 - -0.05	0.2 - 0.25

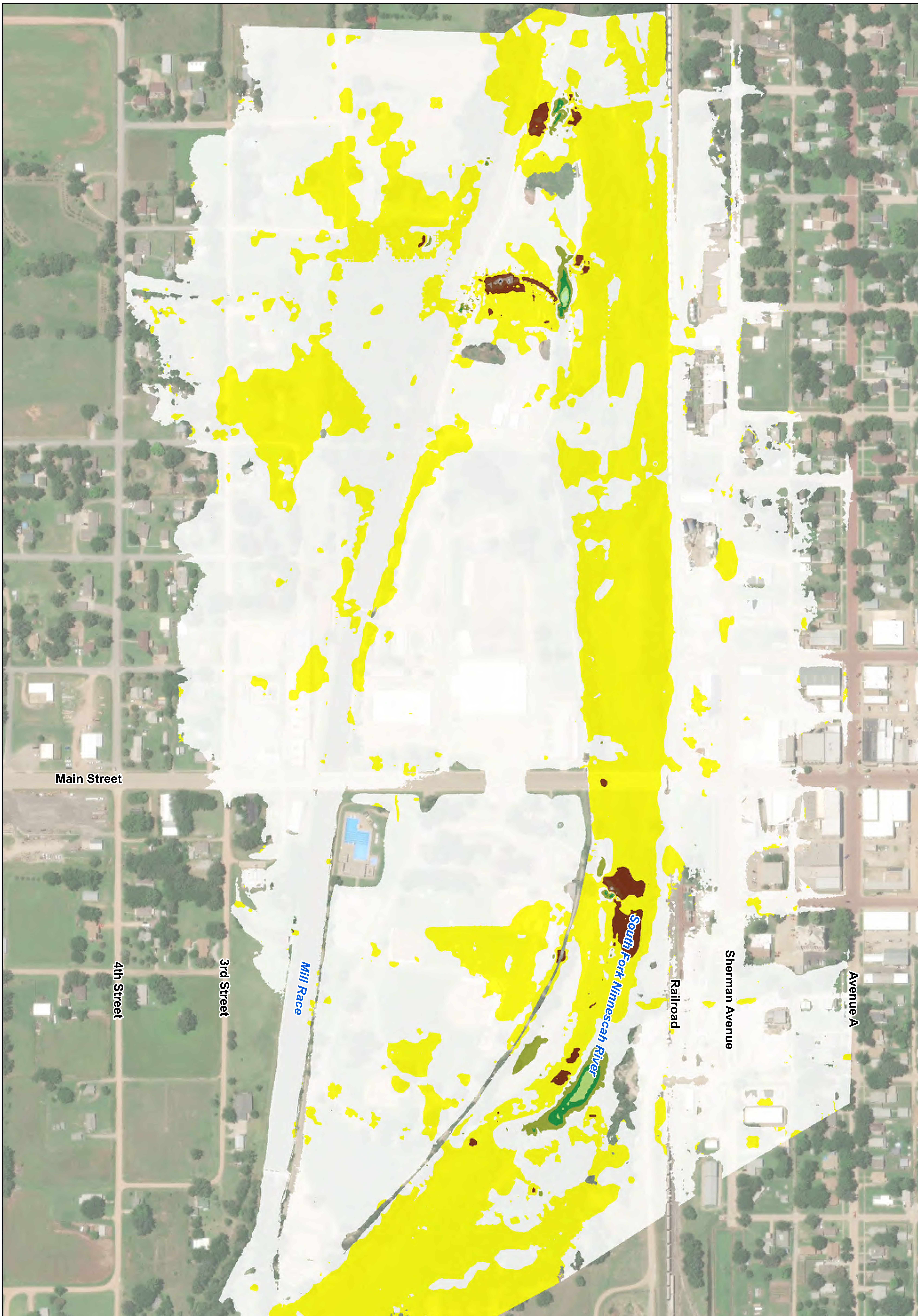
0 145 290 580 Feet

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

City of Kingman, KS
Ninnescah River FEMA Mitigation Study
10-year Water Surface Elevation Comparison

March 2022

Vertical Datum: NAVD 88
Coordinate System: NAD 83 State Plane KS South FIPS 1501 Feet



-3 - -2.5	0 - 0.5
-2.5 - -2	0.5 - 1
-2 - -1.5	1 - 1.5
-1.5 - -1	1.5 - 2
-1 - -0.5	2 - 2.5
-0.5 - 0	2.5 - 3

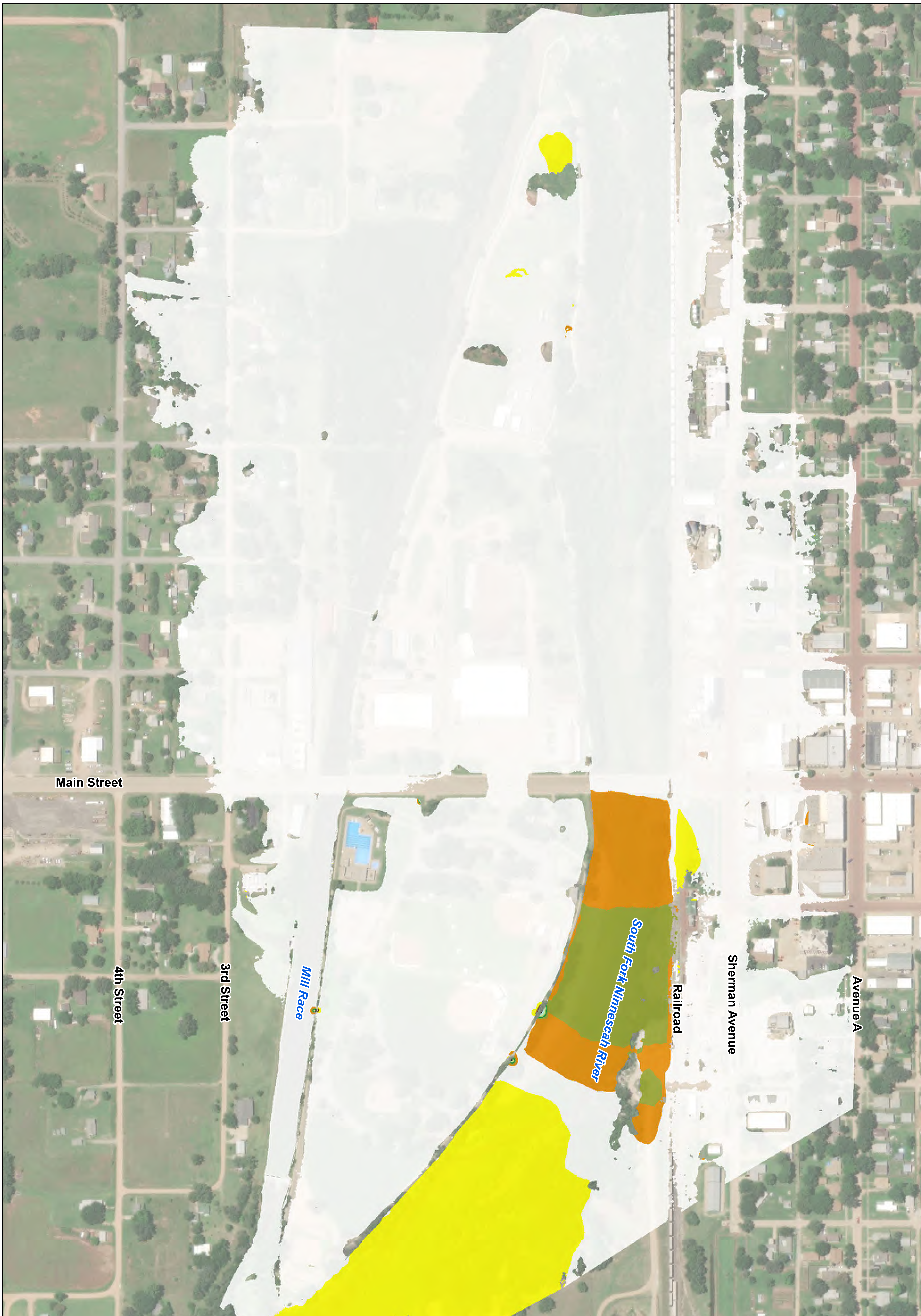
0 145 290 580 Feet

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

City of Kingman, KS
Ninnescah River FEMA Mitigation Study
50-year Velocity Comparison

March 2022

Vertical Datum: NAVD 88
Coordinate System: NAD 83 State Plane KS South FIPS 1501 Feet



	-0.4 - -0.3		-0.05 - 0
	-0.3 - -0.25		0 - 0.05
	-0.25 - -0.2		0.05 - 0.1
	-0.2 - -0.15		0.1 - 0.15
	-0.15 - -0.1		0.15 - 0.2
	-0.1 - -0.05		0.2 - 0.25

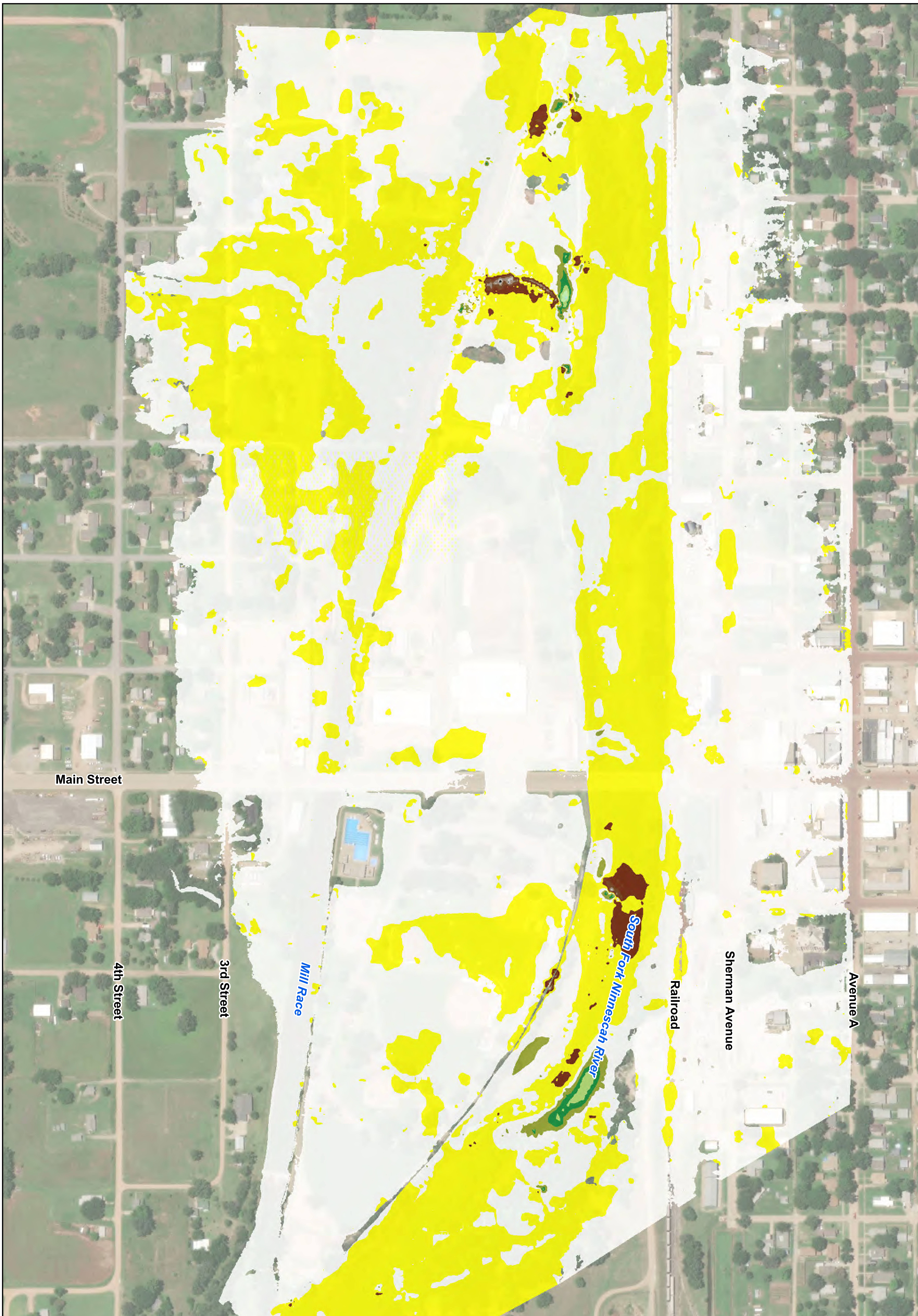
0 145 290 580 Feet

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

City of Kingman, KS
Ninnescah River FEMA Mitigation Study
50-year Water Surface Elevation Comparison

March 2022

Vertical Datum: NAVD 88
Coordinate System: NAD 83 State Plane KS South FIPS 1501 Feet



-3 - -2.5	0 - 0.5
-2.5 - -2	0.5 - 1
-2 - -1.5	1 - 1.5
-1.5 - -1	1.5 - 2
-1 - -0.5	2 - 2.5
-0.5 - 0	2.5 - 3

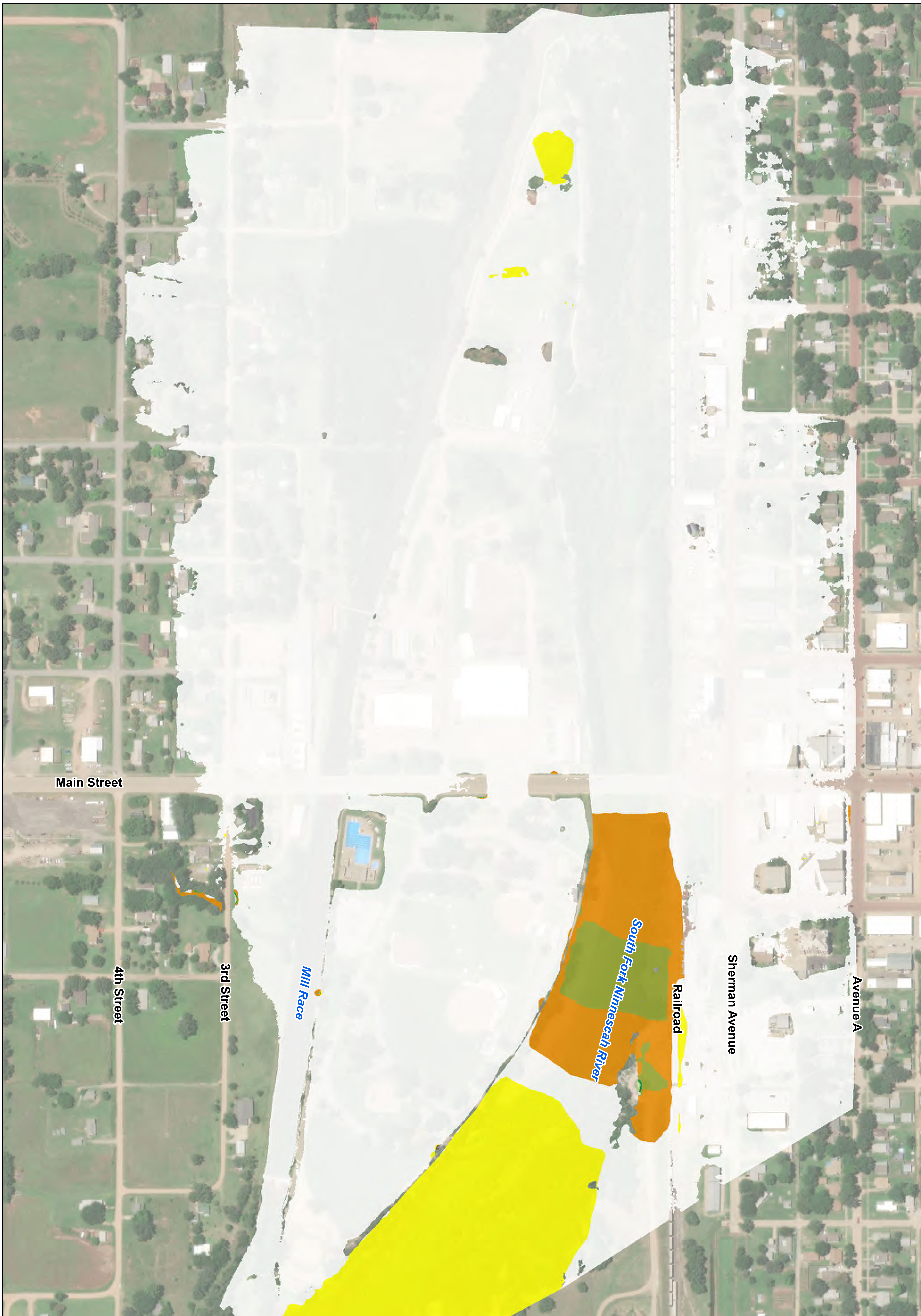
0 145 290 580 Feet

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

City of Kingman, KS
Ninnescah River FEMA Mitigation Study
100-year Velocity Comparison

March 2022

Vertical Datum: NAVD 88
Coordinate System: NAD 83 State Plane KS South FIPS 1501 Feet



	-0.4 - -0.3		-0.05 - 0
	-0.3 - -0.25		0 - 0.05
	-0.25 - -0.2		0.05 - 0.1
	-0.2 - -0.15		0.1 - 0.15
	-0.15 - -0.1		0.15 - 0.2
	-0.1 - -0.05		0.2 - 0.25

N

0 145 290 580 Feet

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

City of Kingman, KS
Ninnescah River FEMA Mitigation Study
100-year Water Surface Elevation Comparison

March 2022

Vertical Datum: NAVD 88
Coordinate System: NAD 83 State Plane KS South FIPS 1501 Feet