Appendix G

Class I Cultural Resources Survey, Mouse River Enhanced Flood Protection Project, Burlington to Minot, Ward County, North Dakota

Trefoil

THIS REPORT CONTAINS SENSITIVE INFORMATION AND IS NOT FOR PUBLIC DISTRIBUTION.

Class I Cultural Resources Survey, Mouse River Enhanced Flood Protection Project, Burlington to Minot, Ward County, North Dakota

Report Prepared for Houston Engineering, Inc. and Souris River Joint Water Resources Board

by Richard Rothaus, PhD

24 September 2015

Historic and Archaeological artifacts or sites and associated locational data are protected under North Dakota Century Code 55-02-07. Access to, or release of, information from files that contain sensitive information, such as information included in this report, may be provided upon request from the director of the North Dakota state historical society.

2646 Lexington Dr.
Bismarck, ND 58503
Phone: 320-761-9090
Email: rothaus@trefoilcultural.com

Appendix H

Class III Archaeological Survey, Mouse River Enhanced Flood Protection Project, Forest Road Levee, 4th Avenue NE Floodwall, Napa Valley Levee, Minot Ward County, North Dakota

Trefoil

THIS REPORT CONTAINS SENSITIVE INFORMATION AND IS NOT FOR PUBLIC DISTRIBUTION.

Class III Archaeological Survey, Mouse River Enhanced Flood Protection Project, Forest Road Levee, 4th Avenue NE Floodwall, Napa Valley Levee, Minot, Ward County, North Dakota

Report Prepared for Houston Engineering, Inc. and Souris River Joint Water Resources Board

by Richard Rothaus, PhD and Joseph McFarlane

24 September 2015

Historic and Archaeological artifacts or sites and associated locational data are protected under North Dakota Century Code 55-02-07. Access to, or release of, information from files that contain sensitive information, such as information included in this report, may be provided upon request from the director of the North Dakota state historical society.

2646 Lexington Dr.
Bismarck, ND 58503
Phone: 320-761-9090
Email: rothaus@trefoilcultural.com

Appendix I

Class III Standing Structures Survey, Mouse River Enhanced Flood Protection Project, Forest Road Levee, 4th Avenue NE Floodwall, Napa Valley Levee, 2nd Avenue SW Stormwater Pool, Minot, Ward County, North Dakota

Trefoil

Class III Standing Structures Survey, Mouse River Enhanced Flood Protection Project, Forest Road Levee, 4th Avenue NE Floodwall, Napa Valley Levee, 2nd Ave SW Stormwater Pool, Minot, Ward County, North Dakota

Report Prepared for Houston Engineering, Inc. and Souris River Joint Water Resources Board

by Richard Rothaus, Ph.D. and Aaron Barth, M.A.

24 September 2015

Historic and Archaeological artifacts or sites and associated locational data are protected under North Dakota Century Code 55-02-07. Access to, or release of, information from files that contain sensitive information, such as information included in this report, may be provided upon request from the director of the North Dakota state historical society.

2646 Lexington Dr.
Bismarck, ND 58503
Phone: 320-761-9090
Email: rothaus@trefoilcultural.com

Appendix J

Programmatic Agreement between the U.S. Army Corps of Engineers, St. Paul District, the North Dakota State Historic Preservation Officer, and the Souris River Joint Water Resource Board Regarding the Mouse River Enhanced Flood Protection Project, Renville, Ward, McHenry, and Bottineau Counties, North Dakota

PROGRAMMATIC AGREEMENT AMONG THE U.S. ARMY CORPS OF ENGINEERS, ST. PAUL DISTRICT, THE NORTH DAKOTA STATE HISTORIC PRESERVATION OFFICER, AND THE SOURIS RIVER JOINT WATER REOURCE BOARD REGARDING THE MOUSE RIVER ENHANCED FLOOD PROTECTION PROJECT, RENVILLE, WARD, MCHENRY, AND BOTTINEAU COUNTIES, NORTH DAKOTA

Final October 2016

WHEREAS, the Mouse River Enhanced Flood Protection Project (MREFPP or Project) constitutes a Federal "undertaking" under the National Historic Preservation Act (NHPA), 54 United States Code (USC) § 300101 et seq., because the MREFPP includes proposed modifications to existing federal flood risk management projects and therefore requires the approval of the United States Army Corps of Engineers (Corps) under the authority of 33 USC § 408 (Section 408); and

WHEREAS, the MREFPP is also a Federal "undertaking" because the Corps' Regulatory Office must issue a permit under Section 404 Clean Water Act (Section 404), 33 USC § 1344, for the MREFPP to proceed; and

WHEREAS, issuance of approvals under Section 408 and permits under Section 404 are Federal actions requiring compliance with the National Environmental Policy Act (NEPA), 42 USC § 4321 et seq., and preparation of an environmental document; and

WHEREAS, the North Dakota State Water Commission had the Mouse River Enhanced Flood Protection Plan (MREFPP) Preliminary Engineering Report (PER) developed in February 2012; and

WHEREAS, the Souris River Joint Water Resource Board (SRJB) has proposed to move forward with the design and construction of the MREFPP and has responsibilities under the Programmatic Agreement and is an invited concurring party to this agreement; and

WHEREAS, the necessary cultural resources investigations, evaluations, and coordination for compliance with Section 106 of the NHPA, 54 USC § 306108, cannot be completed prior to starting the design stage of the Project; and

WHEREAS, the city of Minot has been involved in flood recovery efforts since 2011 and has been actively engaged in the acquisition and redevelopment of housing infrastructure through the U.S. Department of Housing and Urban Development (HUD) Community Development Block Grant Disaster Recovery (CDBG-DR) Program which is subject to NEPA review; and

WHEREAS, both NEPA compliance and Section 106 consultation is being conducted separately by the two responsible federal agencies, as both projects have separate purposes and are proceeding under separate authorities; and

WHEREAS, the HUD CDBG-DR program in the city of Minot has proceeded under a Memorandum of Agreement between the city of Minot and the North Dakota State Historic Preservation Officer (SHPO); and

WHEREAS, the Corps has established the Project's Area of Potential Effects (APE), as required by 36 CFR § 800.4(a)(1) and defined in 36 CFR § 800.16(d), as consisting of the areas where both direct and indirect effects would occur; and

WHEREAS, the APE was established based on the effects of the activities within the footprint of the selected plan which have direct effects and the area indirectly affected, which consists primarily of areas which may experience visual impacts related to the MREFPP; and

WHEREAS, the Corps has determined that the Project may have effects on historic properties within the APE and has consulted with the Advisory Council on Historic Preservation (Advisory Council) pursuant to section 36 CFR § 800.2(b) and the Advisory Council has declined to participate in the consultation process; and

WHEREAS, the Corps' Omaha District, in connection with the Section 404 permit process, initiated consultation with the Tribal Historic Preservation Officers of the Cheyenne River Sioux, Chippewa Cree, Crow Creek Sioux, Crow Nation, Fort Peck, Northern Cheyenne Nation, Oglala Sioux, Rosebud Sioux, Santee Sioux Nation, Sisseton-Wahpeton Oyate, Spirit Lake Sioux Nation, Standing Rock Sioux, Three Affiliated Tribes, Turtle Mountain Band of Chippewa, and Yankton Sioux. These Tribes have been invited as signatories (Invited Signatories) to this Agreement; and

WHEREAS, opinions and comments on the Project and its alternatives have been and will be solicited through comment periods on the Environmental Impact Statement and during public meetings, including those held to comply with the National Environmental Policy Act (NEPA).

NOW THEREFORE, the Corps and the ND SHPO (the Signatory Parties) agree that upon filing this Programmatic Agreement (PA) with the Advisory Council, the Signatory Parties will implement the following Stipulations in order to comply with Section 106 of the NHPA, with respect to the Project.

STIPULATIONS

I. GENERAL RESPONSIBILITIES

A. The Souris River Joint Water Resources Board (SRJB) shall provide plans and specifications for the Project to the Corps for all project construction planned within the limits of the APE, including construction limits, staging areas, stockpile areas, and disposal locations.

B. The SRJB will ensure that archaeologists, historians, and architectural historians meeting the

professional qualifications standards given in the Secretary of the Interior's *Standards and Guidelines for Archaeology and Historic Preservation* will conduct or directly supervise all cultural resources identification, evaluation, and mitigation related to this Project, to include archaeological surveys and evaluative testing, historic structure inventories and evaluation, and data recovery and documentation mitigation, and be permitted in North Dakota pursuant to North Dakota Century Code Section 55-03-01.

II. IDENTIFICATION OF CULTURAL PROPERTIES

A. The Corps shall coordinate the scope of identification efforts with the SRJB and the SRJB or its contractors shall at a minimum consult the site files, previous survey reports, and other documents at the Historic Preservation Division of the State Historical Society of North Dakota at Bismarck for information on previously recorded cultural resources sites, site leads, and previously surveyed areas in the MREFPP APE.

B. The SRJB or its contractors shall conduct a Phase I survey of all previously uninventoried Project areas in order to locate any cultural properties (precontact, historic, and architectural) within the MREFPP APE that may be eligible for inclusion on the National Register of Historic Places (NRHP).

   a. The cultural resources component of the survey will be an intensive, on-the-ground study of the area sufficient to determine the number and extent of the resources present and their relationships to MREFPP features. The archaeological investigations will take into account the unique geomorphology of the Souris River Valley, and the potential for deeply buried soils.
   b. The historic structure component of the survey will consider and address visual effect impacts of proposed above-ground components of the Project on cultural resources and landscapes within the project APE. It will also consider the potential indirect effects to structures associated with the phased construction of the project.

C. Upon completion of the Phase I survey, the SRJB shall provide the Corps with a draft Phase I Survey Report. The Phase I Survey Report shall provide a description of all cultural properties identified, a discussion that addresses the properties' potential eligibility for listing on the NRHP, and recommended actions for further investigations of these properties. The Corps shall advise the SRJB in writing whether the draft report is acceptable or of any deficiencies in the draft report which must be addressed. If deficiencies are identified by the Corps, the SRJB will address the deficiencies and submit a revised draft report within 30 days of receiving notice of the deficiencies. The draft Phase I Survey Report will become the final Phase I Survey Report if the Corps does not identify any deficiencies within the draft report or upon SRJB's submission of a revised draft that the Corps determines satisfactorily addresses the deficiencies identified by the Corps in consultation with the SHPO.

D. SRJB or its contractors may not proceed with MREFPP construction until notified in writing by the Corps. If the Corps deems that certain portions of the MREFPP require additional data

collections or investigation, or if there are unresolved concerns regarding the scope of the recommended investigations in a given area, the Corps notification shall specify the areas where construction may proceed and any remaining areas where additional data collection, investigation or resolution of concerns is required.

III. PHASE II EVALUATION OF NHRP ELIGIBILITY OF IDENTIFIED HISTORIC PROPERTIES

A. SRJB or its contractors will conduct a Phase II evaluation to evaluate the National Register of Historic Places (NRHP) eligibility of all cultural resources sites and structures over 45 years old located within the APE.

B. Evaluation of precontact sites shall include subsurface testing using one-meter-by-one-meter excavation units to determine the information potential of precontact sites and archival research for historic archaeological and architectural sites.

C. SRJB shall provide the Corps with a draft Phase II Evaluation Report that includes the results of testing and its evaluation of all cultural resources and structures evaluated for eligibility for the NRHP. The draft Phase II Evaluation Report shall apply the Criteria for Evaluation contained in the Department of Interior's regulations, 36 CFR Part 60: "National Register of Historic Places". Where the Phase II evaluation concludes that a cultural resources and structures is eligible for the NRHP, the draft Phase II Evaluation Report shall include a preliminary evaluation of the Project's effects on the cultural resources and structures and an evaluation of possible measures to avoid or reduce any identified adverse effects. The Corps shall advise the SRJB whether the draft report is acceptable or of any deficiencies in the draft report which must be addressed. If deficiencies are identified by the Corps, the SRJB will address the deficiencies and submit a revised draft Phase II Evaluation Report within 30 days of receiving notice of the deficiencies. The draft evaluation report will become the final report if the Corps does not identify any deficiencies within the draft report or upon SRJB's submission of a revised draft Phase II Evaluation Report that the Corps determines satisfactorily addresses the deficiencies identified by the Corps in consultation with the SHPO. The Corps will provide its determination regarding eligibility of all evaluated cultural resources and structures for the NRHP to the SRJB for inclusion in the final Phase II Evaluation Report.

D. The SRJB shall provide a copy of the final Phase II Evaluation Report to the Corps to provide to the SHPO and to any requesting Invited Signatory along with the Corps' determination regarding eligibility of all evaluated cultural resources and structures for the NRHP.

E. If the Corps determines that a cultural resource or structure is not eligible for the NRHP and does not receive comment from the SHPO or Invited Signatories within 30 days of the SHPO's or Invited Signatories' receipt of the final Phase II Evaluation Report, the Corps shall assume concurrence with the determination, and the SRJB may construct that portion of the project which affects the cultural resource or structure without further consultation.

F. If the Corps determines that a cultural resource or structure is eligible for the NRHP and does not receive comment from the SHPO within 30 days of the SHPO's receipt of the final Phase II Evaluation Report, the Corps shall assume concurrence with the determination, and will follow the procedures described in 36 CFR Sections 800.5 through 800.7 to assess the MREFPP's effects on the cultural resource or structure. SRJB or its contractors shall not construct that portion of the MREFPP affecting the cultural resource or structure that has been determined eligible for the NRHP without further consultation as described below.

G. SRJB or its contractors may not proceed with construction until notified in writing by the Corps that there are no unresolved concerns pertaining to the Corps' determination of eligibility for any properties identified. Corps notification shall specify the areas where construction may proceed. The Corps may require SRJB or its contractors to conduct additional evaluation or assessment of effects to resolve any concerns as necessary.

H. If any human burials are encountered during the cultural resources field work or Project construction, SRJB or its contractors will comply with the Native American Graves Protection and Repatriation Act (NAGPRA) for federal or tribal lands, or with North Dakota Century Code Section 23-06-27, "Protection of Human Burial Sites, Human Remains, and Burial Goods," and North Dakota Administrative Code Chapter 40-02-03, "Protection of Prehistoric and Historic Human Burial Sites, Human Remains, and Burial Goods," for all other lands in North Dakota.

I. The SRJB or its contractors shall ensure that all materials and records resulting from the survey, evaluation, and data recovery or mitigation conducted for the Project, or recovered during the Project construction, will be curated in accordance with 36 CFR Part 79, "Curation of Federally-Owned and Administered Archaeological Collections", at a facility within the state of North Dakota, unless the private landowner wishes to retain ownership of artifacts recovered from his/her land.

J. Should a previously unidentified site or property that may be eligible for inclusion in the National Register be discovered during the MREFPP construction, all work will cease in the vicinity of the discovered property until it can be evaluated pursuant to guidelines in Stipulation II.A of this Programmatic Agreement. If the property is determined to be eligible for the NRHP, the Corps shall comply with the provisions of Stipulation II.B of this Agreement. Construction of portions of the MREFPP that are not in the area of discovery may proceed while the consultation and any necessary evaluation and mitigation work is conducted.

IV. DISPUTE RESOLUTION

A. Should the North Dakota SHPO or an Invited Signatory to this PA object in writing to the contents of reports prepared under the terms of this PA within 30 days after receipt of the

report, the Corps shall consult with the party to resolve the objection. If the Corps determines that the objection cannot be resolved, the Corps shall forward all documentation relevant to the dispute to the Advisory Council. Any recommendation or comment provided to the Advisory Council will be understood to pertain only to the subject of the dispute. The Corps' responsibility to carry out all actions under this PA that are not the subject of the dispute will remain unchanged.

V. AMENDMENTS

A. The Signatory Parties to this PA may request that it be amended, whereupon the Signatory Parties will consult to consider such an amendment. The PA may only be amended with the written concurrence of all Signatory Parties.

VI. TERMINATION

1. Proof of compliance with the Stipulations to the satisfaction of the Corps, the North Dakota SHPO will constitute termination of this Programmatic Agreement.

2. If the terms of this PA have not been implemented twenty-five years (25) after execution, this agreement will be null and void. In such an event, the Corps shall notify the North Dakota SHPO of its expiration and, if appropriate, shall re-initiate review of the undertaking in accordance with 36 CFR Part 800.

3. Any Signatory Party to this PA may withdraw from it by providing sixty (60) days' notice to the other Signatory Parties, provided that the Signatory Parties will consult during the period prior to withdrawal to seek agreement on amendments or other actions that would avoid withdrawal. In the event of termination or withdrawal, the Corps will comply with federal regulation 36 CFR part 800, Protection of Historic Properties.

Execution of this Programmatic Agreement, its subsequent filing with the Advisory Council, and implementation of its Stipulations evidences that the Corps has taken into account the effects of the Project on National Register listed or eligible historic properties, and has satisfied its Section 106 responsibilities for all aspects of this undertaking.

SIGNATORIES

U.S. ARMY CORPS OF ENGINEERS, ST. PAUL DISTRICT

BY: _____ Date: 20 October 2014
Col. Samuel L. Calkins, District Commander

NORTH DAKOTA STATE HISTORIC PRESERVATION OFFICER

BY: _____ Date: _____
Claudia J. Berg, State Historic Preservation Officer

INVITED SIGNATORIES

SOURIS RIVER JOINT WATER RESOURCE BOARD

BY: _____ Date: _____
David Ashley, Chairman

CONCURRING PARTIES

CHEYENNE RIVER SIOUX

BY: _____ Date: _____
Harold C. Frazier, Tribal Chairman

CHIPPEWA CREE

BY: _____ Date: _____
Ken St. Marks, Tribal Chairman

CROW CREEK SIOUX

BY: _____ Date: _____
Roxanne Sazue, Tribal Chairperson

CROW NATION

BY: _____ Date: _____
Darrin Old Coyote, Tribal Chairman

FORT PECK

BY: _____ Date: _____
Floyd Azure, Tribal Chairman

Concur:

NORTHERN CHEYENNE NATION

BY: _____ Date: _____
Llevando Fisher, Tribal President

OGLALA SIOUX

BY: _____ Date: _____
John Yellow Bird Steele, Tribal President

ROSEBUD SIOUX

BY: _____ Date: _____
William Kindle, Tribal President

SANTEE SIOUX NATION

BY: _____ Date: _____
Roger Trudell, Tribal Chairman

SISSETON-WAHPETON OYATE

BY: _____ Date: _____
Dave Flute, Tribal Chairman

SPIRIT LAKE SIOUX NATION

BY: _____ Date: _____
Myra Pearson, Tribal Chairperson

Concur:

STANDING ROCK SIOUX

BY: _____ Date: _____
Dave Archambault II, Tribal Chairman

THREE AFFILIATED TRIBES

BY: _____ Date: _____
Mark Fox, Tribal Chairman

TURTLE MOUNTAIN BAND OF CHIPPEWA

BY: _____ Date: _____
Richard McCloud, Tribal Chairman

YANKTON SIOUX

BY: _____ Date: _____
Robert Flying Hawk, Tribal Chairman

Appendix K

Interim Project Inundation Area and Depth Impacts Maps

5,000 cfs - No Action Alternative
10,000 cfs - No Action Alternative
27,400 cfs - No Action Alternative

Appendix K description of contents:

The maps in Appendix K summarize the interim Project inundation and depth impacts and approximate the number and severity of impacted structures. All shaded areas indicating a change in depth of inundation are in reference to the no action alternative.

Maps are provided for the 5,000 cfs, 10,000 cfs, and 27,400 cfs events. Affected areas are shaded in one of four different colors.

- Green areas show locations that would no longer be inundated after a given construction stage.
- Light blue areas show locations that would be inundated, but the change in inundation depth would be less than 0.1 feet compared to existing conditions. This includes areas where the depth of inundation is reduced, but not made dry.
- The medium blue areas show locations where the inundation depth would increase between 0.1 and 0.5 feet.
- The dark blue areas show locations where the inundation depth would increase by more than 0.5 feet.

Tables in the top right corner of each map provide the approximate number of structures that would fall within each of the four categories. The tables use the same color coding as described above.

The intent of the inundation mapping, flood depth changes, and number of affected structures is to provide a general understanding of the location and magnitude of Project impacts and benefits. This understanding will be used to plan for ways to avoid, minimize, and mitigate impacts during the design and permitting of Project segments.

5,000 cfs - No Action Alternative

CITY OF BURLINGTON

CITY OF MINOT

83

B83

2

B2

B52

52

Number of Structures in Shaded Areas
20 to 40
0
0
0

The number of structures identified in the inundation area using the available LiDAR data provide an approximation of the number of structures that might experience a change in flood depth following the implementation of the respective construction stage relative to the no action alternative for a flood of similar magnitude. Ranges are used to reflect the uncertainty associated with the data sources and calculation methods. The ranges exclude structures that would be removed to construct the full project.

- Flood Elevation Change Less Than +0.1 Feet
- Flood Elevation Increase Between 0.1 Feet and 0.5 Feet
- Flood Elevation Increase Greater Than 0.5 Feet
- Area No Longer Flooded
- Project Floodwalls and Levees
- Municipality

This map shows areas that could experience a change in flood depths. Flood elevation changes were calculated by subtracting the proposed flood elevation after a given construction stage from the associated no action alternative flood elevation. In newly inundated areas, the flood elevation changes are based on the depth of flooding above existing ground.

N

0 2,000 4,000 8,000

Feet

Imagery Source: Ward County, 2015

Map 5k-Stage1

INTERIM IMPACTS OF PREFERRED ACTION COMPARED TO NO ACTION ALTERNATIVE: INUNDATION AREA AND DEPTH

FLOOD EVENT

5,000 CFS

NO ACTION ALTERNATIVE

CONSTRUCTION STAGE

1

Mouse River Enhanced Flood Protection Project
Minot, North Dakota

Barr Footer: ArcGIS 10.4, 2016-06-17 11:28 File: I:\Client\Mouse_River\Work_Orders\Part_3\Tasks\Hyd_Modeling\Maps\Vol2_409Submittal\20160526_Interim_Impacts\Baseline 2\Map_5k_Alt2_Stage1_Interim Impacts 5k cfs P2_CS 1.mxd User: KAC2

CITY OF BURLINGTON

CITY OF MINOT

83

B83

2

B2

B52

52

Number of Structures in Shaded Areas
0 to 20
0
0 to 10
10 to 30

The number of structures identified in the inundation area using the available LiDAR data provide an approximation of the number of structures that might experience a change in flood depth following the implementation of the respective construction stage relative to the no action alternative for a flood of similar magnitude. Ranges are used to reflect the uncertainty associated with the data sources and calculation methods. The ranges exclude structures that would be removed to construct the full project.

- Flood Elevation Change Less Than +0.1 Feet
- Flood Elevation Increase Between 0.1 Feet and 0.5 Feet
- Flood Elevation Increase Greater Than 0.5 Feet
- Area No Longer Flooded
- Project Floodwalls and Levees
- Municipality

This map shows areas that could experience a change in flood depths. Flood elevation changes were calculated by subtracting the proposed flood elevation after a given construction stage from the associated no action alternative flood elevation. In newly inundated areas, the flood elevation changes are based on the depth of flooding above existing ground.

N

0 2,000 4,000 8,000

Feet

Imagery Source: Ward County, 2015

Map 5k-Stage1.5

INTERIM IMPACTS OF PREFERRED ACTION COMPARED TO NO ACTION ALTERNATIVE: INUNDATION AREA AND DEPTH

FLOOD EVENT

5,000 CFS

NO ACTION ALTERNATIVE

CONSTRUCTION STAGE

1.5

Mouse River Enhanced Flood Protection Project
Minot, North Dakota

CITY OF BURLINGTON

CITY OF MINOT

2

83

B83

B2

B52

52

Number of Structures in Shaded Areas
20 to 40
0
0
0

The number of structures identified in the inundation area using the available LiDAR data provide an approximation of the number of structures that might experience a change in flood depth following the implementation of the respective construction stage relative to the no action alternative for a flood of similar magnitude. Ranges are used to reflect the uncertainty associated with the data sources and calculation methods. The ranges exclude structures that would be removed to construct the full project.

- Flood Elevation Change Less Than +0.1 Feet
- Flood Elevation Increase Between 0.1 Feet and 0.5 Feet
- Flood Elevation Increase Greater Than 0.5 Feet
- Area No Longer Flooded
- Project Floodwalls and Levees
- Municipality

This map shows areas that could experience a change in flood depths. Flood elevation changes were calculated by subtracting the proposed flood elevation after a given construction stage from the associated no action alternative flood elevation. In newly inundated areas, the flood elevation changes are based on the depth of flooding above existing ground.

N

0 2,000 4,000 8,000

Feet

Imagery Source: Ward County, 2015

Map 5k-Stage2

INTERIM IMPACTS OF PREFERRED ACTION COMPARED TO NO ACTION ALTERNATIVE: INUNDATION AREA AND DEPTH

FLOOD EVENT

5,000 CFS

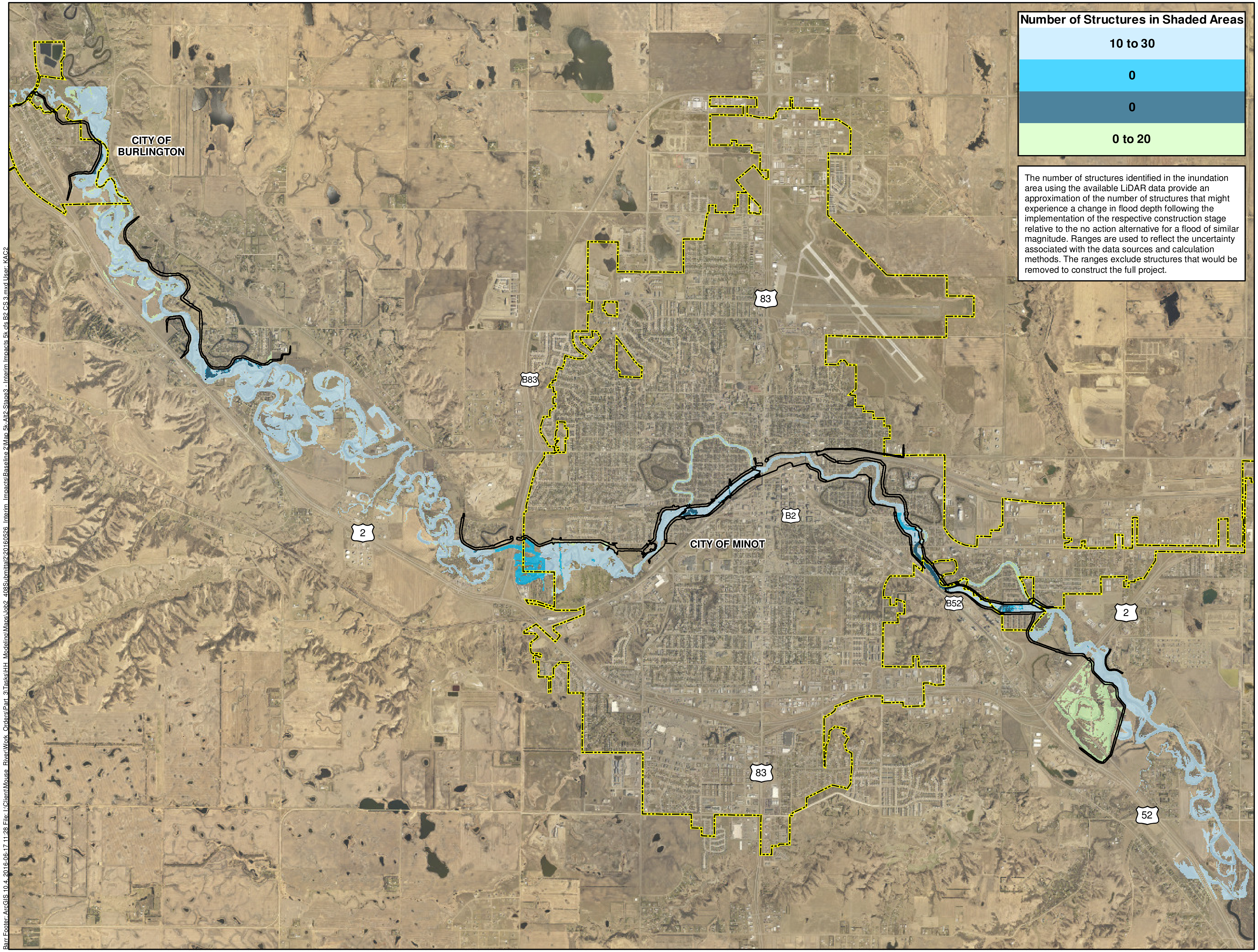
NO ACTION ALTERNATIVE

CONSTRUCTION STAGE

2

Mouse River Enhanced Flood Protection Project
Minot, North Dakota

Barr Footer ArcGIS 10.4, 2016-06-17 11:28 File: I:\Client\Mouse_River\Work_Orders\Part_3\Tasks\HH_Modeling\Maps\Vol2_4.09\Submittal\2016\0526_Interim_Impacts\Baseline 2\Map_5k_Alt2_Stage2_ Interim Impacts 5k cfs P2-CS 2.mxd User: KAC2



Number of Structures in Shaded Areas
10 to 30
0
0
0 to 20

The number of structures identified in the inundation area using the available LiDAR data provide an approximation of the number of structures that might experience a change in flood depth following the implementation of the respective construction stage relative to the no action alternative for a flood of similar magnitude. Ranges are used to reflect the uncertainty associated with the data sources and calculation methods. The ranges exclude structures that would be removed to construct the full project.

Flood Elevation Change Less Than +0.1 Feet

Flood Elevation Increase Between 0.1 Feet and 0.5 Feet

Flood Elevation Increase Greater Than 0.5 Feet

Area No Longer Flooded

Project Floodwalls and Levees

Municipality

This map shows areas that could experience a change in flood depths. Flood elevation changes were calculated by subtracting the proposed flood elevation after a given construction stage from the associated no action alternative flood elevation. In newly inundated areas, the flood elevation changes are based on the depth of flooding above existing ground.

N

0 2,000 4,000 8,000

Feet

Imagery Source: Ward County, 2015

Map 5k-Stage3

INTERIM IMPACTS OF PREFERRED ACTION COMPARED TO NO ACTION ALTERNATIVE: INUNDATION AREA AND DEPTH

FLOOD EVENT

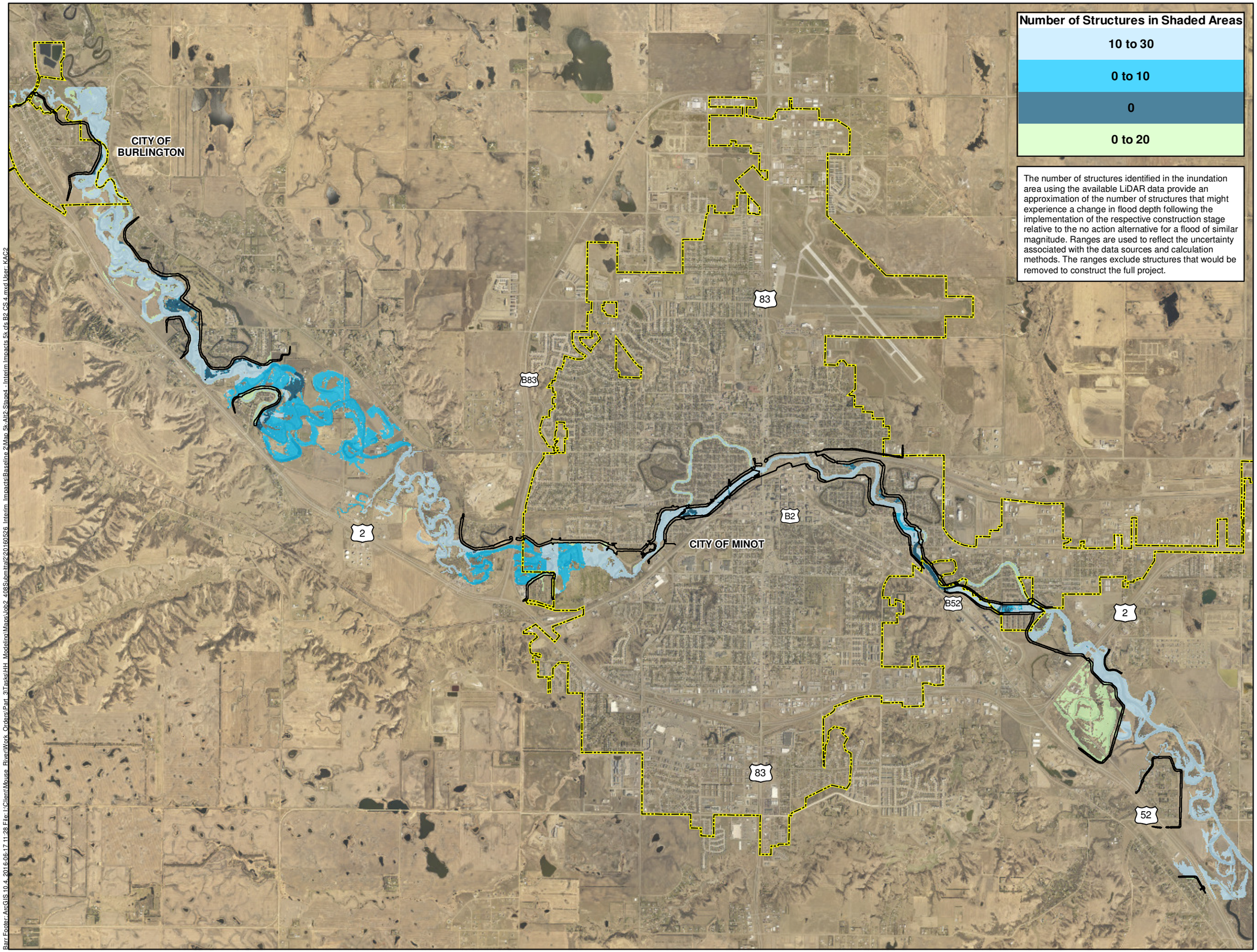
5,000 CFS

NO ACTION ALTERNATIVE

CONSTRUCTION STAGE

3

Mouse River Enhanced Flood Protection Project
Minot, North Dakota



Number of Structures in Shaded Areas
10 to 30
0 to 10
0
0 to 20

The number of structures identified in the inundation area using the available LiDAR data provide an approximation of the number of structures that might experience a change in flood depth following the implementation of the respective construction stage relative to the no action alternative for a flood of similar magnitude. Ranges are used to reflect the uncertainty associated with the data sources and calculation methods. The ranges exclude structures that would be removed to construct the full project.

- Flood Elevation Change Less Than +0.1 Feet
- Flood Elevation Increase Between 0.1 Feet and 0.5 Feet
- Flood Elevation Increase Greater Than 0.5 Feet
- Area No Longer Flooded
- Project Floodwalls and Levees
- Municipality

This map shows areas that could experience a change in flood depths. Flood elevation changes were calculated by subtracting the proposed flood elevation after a given construction stage from the associated no action alternative flood elevation. In newly inundated areas, the flood elevation changes are based on the depth of flooding above existing ground.

N

0 2,000 4,000 8,000
Feet

Imagery Source: Ward County, 2015

Map 5k-Stage4

INTERIM IMPACTS OF PREFERRED ACTION COMPARED TO NO ACTION ALTERNATIVE: INUNDATION AREA AND DEPTH

FLOOD EVENT

5,000 CFS

NO ACTION ALTERNATIVE

CONSTRUCTION STAGE

4

Mouse River Enhanced Flood Protection Project
Minot, North Dakota

10,000 cfs - No Action Alternative

CITY OF BURLINGTON

CITY OF MINOT

83

B83

2

B2

B52

52

Number of Structures in Shaded Areas
140 to 160
0 to 10
0 to 10
0 to 10

The number of structures identified in the inundation area using the available LiDAR data provide an approximation of the number of structures that might experience a change in flood depth following the implementation of the respective construction stage relative to the no action alternative for a flood of similar magnitude. Ranges are used to reflect the uncertainty associated with the data sources and calculation methods. The ranges exclude structures that would be removed to construct the full project.

- Flood Elevation Change Less Than +0.1 Feet
- Flood Elevation Increase Between 0.1 Feet and 0.5 Feet
- Flood Elevation Increase Greater Than 0.5 Feet
- Area No Longer Flooded
- Project Floodwalls and Levees
- Municipality

This map shows areas that could experience a change in flood depths. Flood elevation changes were calculated by subtracting the proposed flood elevation after a given construction stage from the associated no action alternative flood elevation. In newly inundated areas, the flood elevation changes are based on the depth of flooding above existing ground.

N

0 2,000 4,000 8,000

Feet

Imagery Source: Ward County, 2015

Map 10k-Stage1

INTERIM IMPACTS OF PREFERRED ACTION COMPARED TO NO ACTION ALTERNATIVE: INUNDATION AREA AND DEPTH

FLOOD EVENT

10,000 CFS

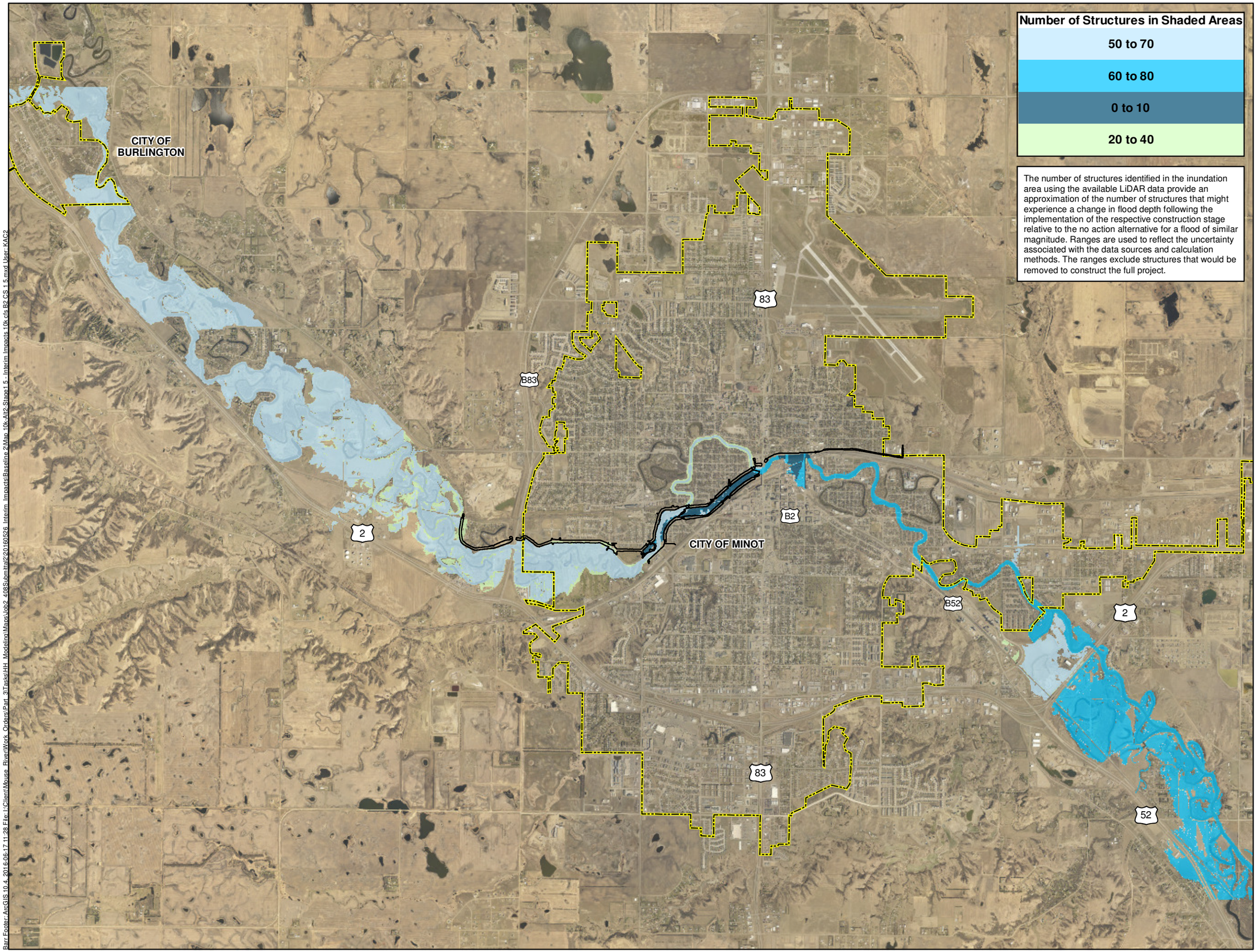
NO ACTION ALTERNATIVE

CONSTRUCTION STAGE

1

Mouse River Enhanced Flood Protection Project
Minot, North Dakota

Barr Footer: ArcGIS 10.4, 2016-06-17 11:28 File: I:\Client\Mouse_River\Work_Orders\Part_3\Tasks\Hyd_Modeling\Maps\Vol2_408\Submittal\20160926_Interim_Impacts\Baseline 2\Map_10k-Alt2-Stage1 - Interim Impacts 10k cfs B2-GS-1.mxd User: KAC2



Number of Structures in Shaded Areas
50 to 70
60 to 80
0 to 10
20 to 40

The number of structures identified in the inundation area using the available LiDAR data provide an approximation of the number of structures that might experience a change in flood depth following the implementation of the respective construction stage relative to the no action alternative for a flood of similar magnitude. Ranges are used to reflect the uncertainty associated with the data sources and calculation methods. The ranges exclude structures that would be removed to construct the full project.

- Flood Elevation Change Less Than +0.1 Feet
- Flood Elevation Increase Between 0.1 Feet and 0.5 Feet
- Flood Elevation Increase Greater Than 0.5 Feet
- Area No Longer Flooded
- Project Floodwalls and Levees
- Municipality

This map shows areas that could experience a change in flood depths. Flood elevation changes were calculated by subtracting the proposed flood elevation after a given construction stage from the associated no action alternative flood elevation. In newly inundated areas, the flood elevation changes are based on the depth of flooding above existing ground.

0 2,000 4,000 8,000
Feet

Imagery Source: Ward County, 2015

Map 10k-Stage1.5

INTERIM IMPACTS OF PREFERRED ACTION COMPARED TO NO ACTION ALTERNATIVE: INUNDATION AREA AND DEPTH

FLOOD EVENT
10,000 CFS

NO ACTION ALTERNATIVE

CONSTRUCTION STAGE
1.5

Mouse River Enhanced Flood Protection Project
Minot, North Dakota

CITY OF BURLINGTON

CITY OF MINOT

B83

83

B2

B52

2

52

Number of Structures in Shaded Areas
40 to 60
70 to 90
0 to 10
20 to 40

The number of structures identified in the inundation area using the available LiDAR data provide an approximation of the number of structures that might experience a change in flood depth following the implementation of the respective construction stage relative to the no action alternative for a flood of similar magnitude. Ranges are used to reflect the uncertainty associated with the data sources and calculation methods. The ranges exclude structures that would be removed to construct the full project.

- Flood Elevation Change Less Than +0.1 Feet
- Flood Elevation Increase Between 0.1 Feet and 0.5 Feet
- Flood Elevation Increase Greater Than 0.5 Feet
- Area No Longer Flooded
- Project Floodwalls and Levees
- Municipality

This map shows areas that could experience a change in flood depths. Flood elevation changes were calculated by subtracting the proposed flood elevation after a given construction stage from the associated no action alternative flood elevation. In newly inundated areas, the flood elevation changes are based on the depth of flooding above existing ground.

N

0 2,000 4,000 8,000

Feet

Imagery Source: Ward County, 2015

Map 10k-Stage2

INTERIM IMPACTS OF PREFERRED ACTION COMPARED TO NO ACTION ALTERNATIVE: INUNDATION AREA AND DEPTH

FLOOD EVENT

10,000 CFS

NO ACTION ALTERNATIVE

CONSTRUCTION STAGE

2

Mouse River Enhanced Flood Protection Project
Minot, North Dakota

CITY OF BURLINGTON

CITY OF MINOT

2

83

B83

B2

B52

52

Number of Structures in Shaded Areas
50 to 70
20 to 40
20 to 40
40 to 60

The number of structures identified in the inundation area using the available LiDAR data provide an approximation of the number of structures that might experience a change in flood depth following the implementation of the respective construction stage relative to the no action alternative for a flood of similar magnitude. Ranges are used to reflect the uncertainty associated with the data sources and calculation methods. The ranges exclude structures that would be removed to construct the full project.

- Flood Elevation Change Less Than +0.1 Feet
- Flood Elevation Increase Between 0.1 Feet and 0.5 Feet
- Flood Elevation Increase Greater Than 0.5 Feet
- Area No Longer Flooded
- Project Floodwalls and Levees
- Municipality

This map shows areas that could experience a change in flood depths. Flood elevation changes were calculated by subtracting the proposed flood elevation after a given construction stage from the associated no action alternative flood elevation. In newly inundated areas, the flood elevation changes are based on the depth of flooding above existing ground.

N

0 2,000 4,000 8,000

Feet

Imagery Source: Ward County, 2015

Map 10k-Stage3

INTERIM IMPACTS OF PREFERRED ACTION COMPARED TO NO ACTION ALTERNATIVE: INUNDATION AREA AND DEPTH

FLOOD EVENT

10,000 CFS

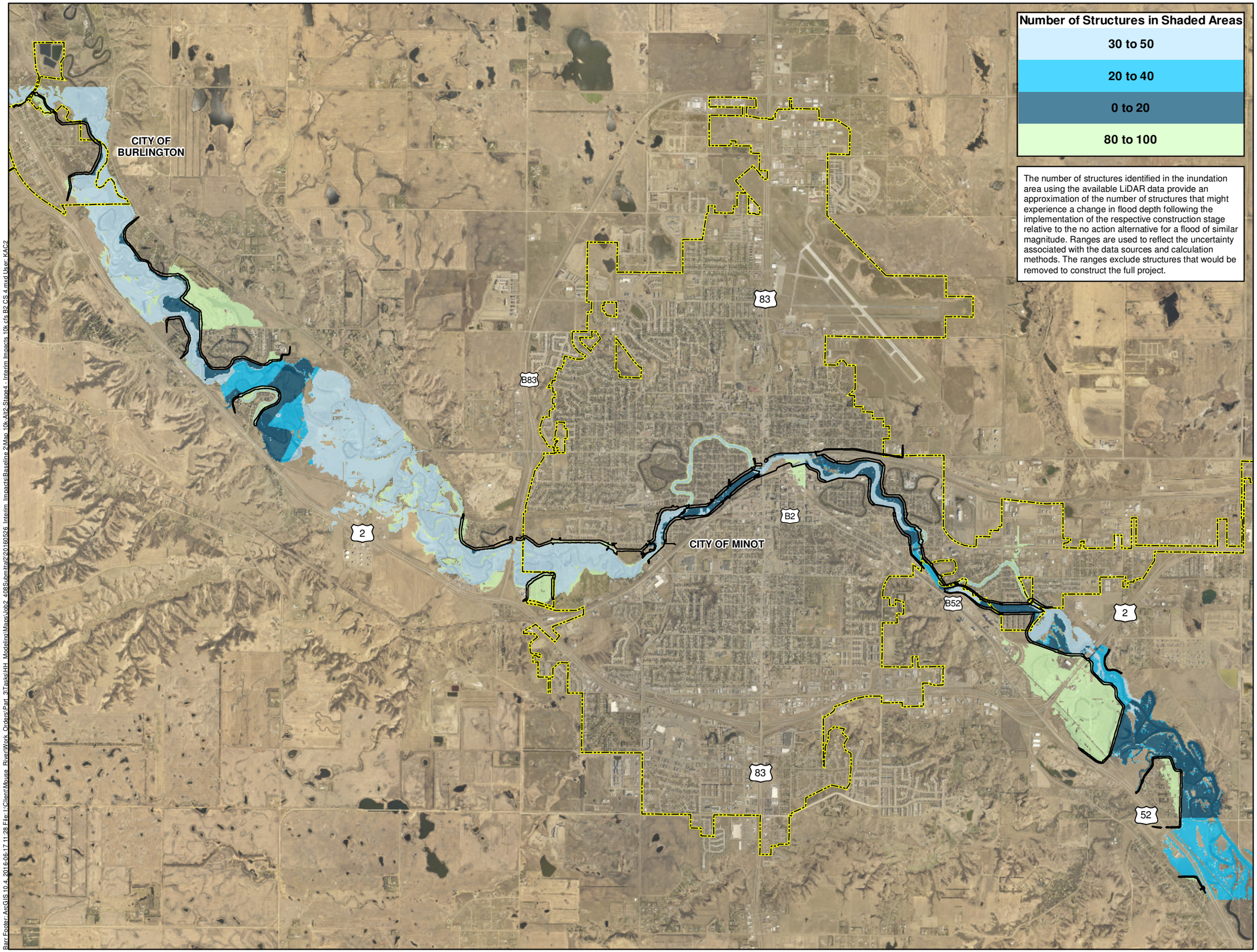
NO ACTION ALTERNATIVE

CONSTRUCTION STAGE

3

Mouse River Enhanced Flood Protection Project
Minot, North Dakota

Barr Footer: ArcGIS 10.4, 2016-06-17 11:28 File: I:\Client\Mouse_River\Work_Orders\Part_3\Tasks\HH_Modeling\Maps\Vol2_408Submittal\2016\0926_Interim_Impacts\Baseline 2\Map_10k-Alt2-Stage3_Interim Impacts 10k cfs B2-QS-3.mxd User: KAC2



Number of Structures in Shaded Areas
30 to 50
20 to 40
0 to 20
80 to 100

The number of structures identified in the inundation area using the available LiDAR data provide an approximation of the number of structures that might experience a change in flood depth following the implementation of the respective construction stage relative to the no action alternative for a flood of similar magnitude. Ranges are used to reflect the uncertainty associated with the data sources and calculation methods. The ranges exclude structures that would be removed to construct the full project.

- Flood Elevation Change Less Than +0.1 Feet
- Flood Elevation Increase Between 0.1 Feet and 0.5 Feet
- Flood Elevation Increase Greater Than 0.5 Feet
- Area No Longer Flooded
- Project Floodwalls and Levees
- Municipality

This map shows areas that could experience a change in flood depths. Flood elevation changes were calculated by subtracting the proposed flood elevation after a given construction stage from the associated no action alternative flood elevation. In newly inundated areas, the flood elevation changes are based on the depth of flooding above existing ground.

N

0 2,000 4,000 8,000

Feet

Imagery Source: Ward County, 2015

Map 10k-Stage4

INTERIM IMPACTS OF PREFERRED ACTION COMPARED TO NO ACTION ALTERNATIVE: INUNDATION AREA AND DEPTH

FLOOD EVENT

10,000 CFS

NO ACTION ALTERNATIVE

CONSTRUCTION STAGE

4

Mouse River Enhanced Flood Protection Project
Minot, North Dakota

27,400 cfs - No Action Alternative

CITY OF BURLINGTON

CITY OF MINOT

83

B83

2

B2

B52

52

Number of Structures in Shaded Areas
4440 to 4540
920 to 940
120 to 140
110 to 130

The number of structures identified in the inundation area using the available LiDAR data provide an approximation of the number of structures that might experience a change in flood depth following the implementation of the respective construction stage relative to the no action alternative for a flood of similar magnitude. Ranges are used to reflect the uncertainty associated with the data sources and calculation methods. The ranges exclude structures that would be removed to construct the full project.

- Flood Elevation Change Less Than +0.1 Feet
- Flood Elevation Increase Between 0.1 Feet and 0.5 Feet
- Flood Elevation Increase Greater Than 0.5 Feet
- Area No Longer Flooded
- Project Floodwalls and Levees
- Municipality

This map shows areas that could experience a change in flood depths. Flood elevation changes were calculated by subtracting the proposed flood elevation after a given construction stage from the associated no action alternative flood elevation. In newly inundated areas, the flood elevation changes are based on the depth of flooding above existing ground.

N

0 2,000 4,000 8,000

Feet

Imagery Source: Ward County, 2015

Map 27k-Stage1

INTERIM IMPACTS OF PREFERRED ACTION COMPARED TO NO ACTION ALTERNATIVE: INUNDATION AREA AND DEPTH

FLOOD EVENT

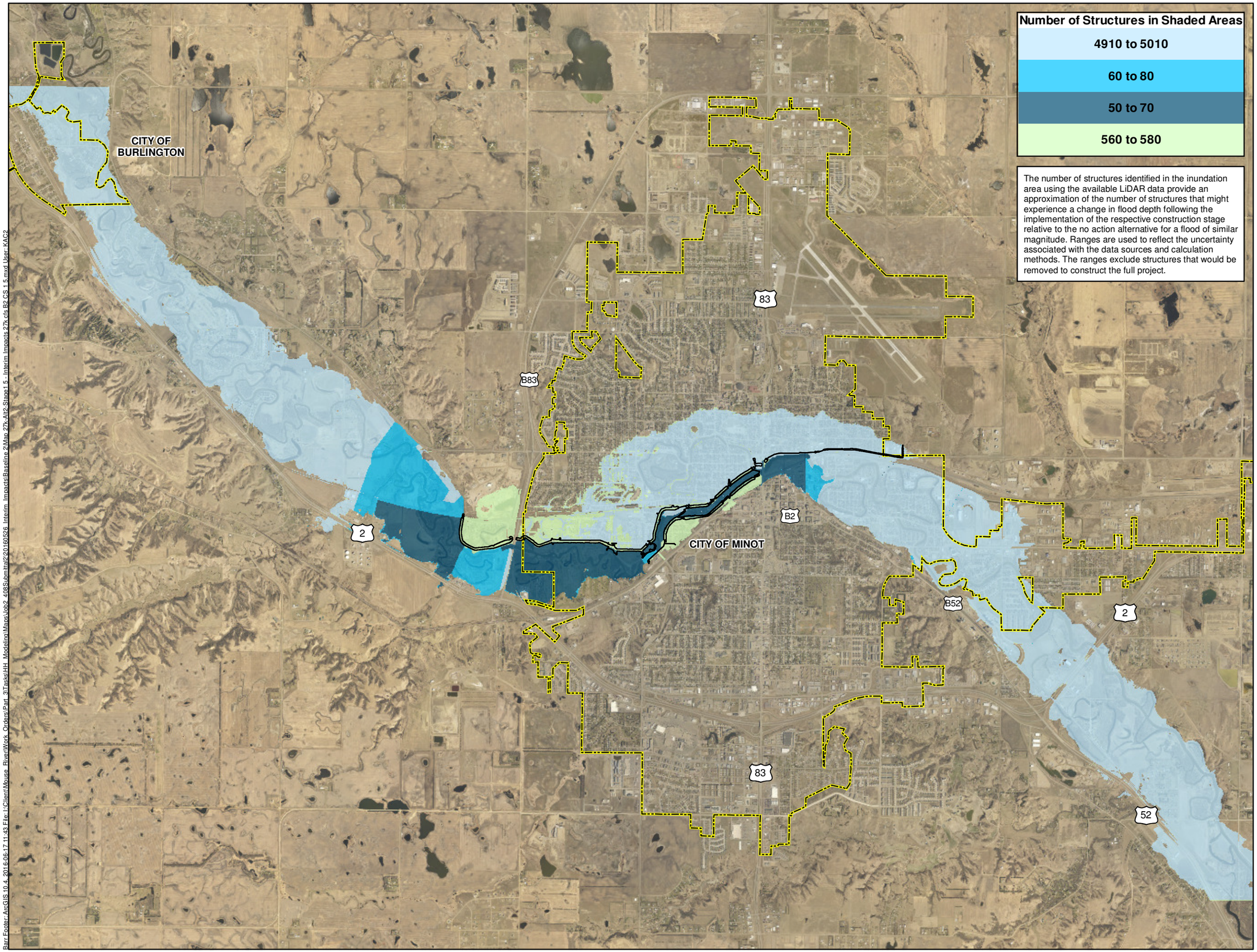
27,400 CFS

NO ACTION ALTERNATIVE

CONSTRUCTION STAGE

1

Mouse River Enhanced Flood Protection Project
Minot, North Dakota



Number of Structures in Shaded Areas
4910 to 5010
60 to 80
50 to 70
560 to 580

The number of structures identified in the inundation area using the available LiDAR data provide an approximation of the number of structures that might experience a change in flood depth following the implementation of the respective construction stage relative to the no action alternative for a flood of similar magnitude. Ranges are used to reflect the uncertainty associated with the data sources and calculation methods. The ranges exclude structures that would be removed to construct the full project.

- Flood Elevation Change Less Than +0.1 Feet
- Flood Elevation Increase Between 0.1 Feet and 0.5 Feet
- Flood Elevation Increase Greater Than 0.5 Feet
- Area No Longer Flooded
- Project Floodwalls and Levees
- Municipality

This map shows areas that could experience a change in flood depths. Flood elevation changes were calculated by subtracting the proposed flood elevation after a given construction stage from the associated no action alternative flood elevation. In newly inundated areas, the flood elevation changes are based on the depth of flooding above existing ground.

N

0 2,000 4,000 8,000
Feet

Imagery Source: Ward County, 2015

Map 27k-Stage1.5

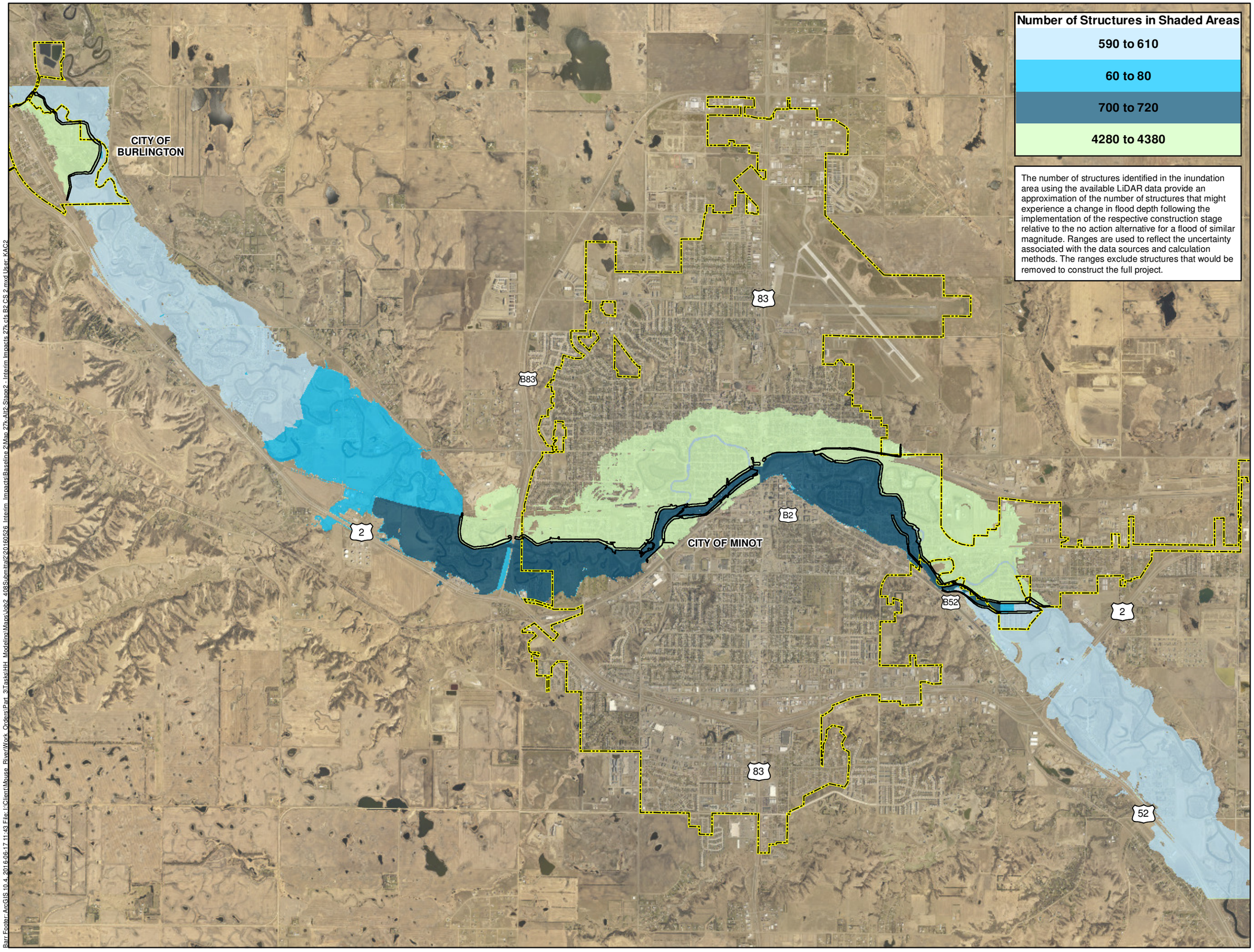
INTERIM IMPACTS OF PREFERRED ACTION COMPARED TO NO ACTION ALTERNATIVE: INUNDATION AREA AND DEPTH

FLOOD EVENT
27,400 CFS

NO ACTION ALTERNATIVE

CONSTRUCTION STAGE
1.5

Mouse River Enhanced Flood Protection Project
Minot, North Dakota



Number of Structures in Shaded Areas
590 to 610
60 to 80
700 to 720
4280 to 4380

The number of structures identified in the inundation area using the available LiDAR data provide an approximation of the number of structures that might experience a change in flood depth following the implementation of the respective construction stage relative to the no action alternative for a flood of similar magnitude. Ranges are used to reflect the uncertainty associated with the data sources and calculation methods. The ranges exclude structures that would be removed to construct the full project.

- Flood Elevation Change Less Than +0.1 Feet
- Flood Elevation Increase Between 0.1 Feet and 0.5 Feet
- Flood Elevation Increase Greater Than 0.5 Feet
- Area No Longer Flooded
- Project Floodwalls and Levees
- Municipality

This map shows areas that could experience a change in flood depths. Flood elevation changes were calculated by subtracting the proposed flood elevation after a given construction stage from the associated no action alternative flood elevation. In newly inundated areas, the flood elevation changes are based on the depth of flooding above existing ground.

N

0 2,000 4,000 8,000

Feet

Imagery Source: Ward County, 2015

Map 27k-Stage2

INTERIM IMPACTS OF PREFERRED ACTION COMPARED TO NO ACTION ALTERNATIVE: INUNDATION AREA AND DEPTH

FLOOD EVENT

27,400 CFS

NO ACTION ALTERNATIVE

CONSTRUCTION STAGE

2

Mouse River Enhanced Flood Protection Project
Minot, North Dakota

CITY OF BURLINGTON

CITY OF MINOT

83

B83

2

B2

B52

52

Number of Structures in Shaded Areas
220 to 240
70 to 90
50 to 70
5240 to 5340

The number of structures identified in the inundation area using the available LiDAR data provide an approximation of the number of structures that might experience a change in flood depth following the implementation of the respective construction stage relative to the no action alternative for a flood of similar magnitude. Ranges are used to reflect the uncertainty associated with the data sources and calculation methods. The ranges exclude structures that would be removed to construct the full project.

- Flood Elevation Change Less Than +0.1 Feet
- Flood Elevation Increase Between 0.1 Feet and 0.5 Feet
- Flood Elevation Increase Greater Than 0.5 Feet
- Area No Longer Flooded
- Project Floodwalls and Levees
- Municipality

This map shows areas that could experience a change in flood depths. Flood elevation changes were calculated by subtracting the proposed flood elevation after a given construction stage from the associated no action alternative flood elevation. In newly inundated areas, the flood elevation changes are based on the depth of flooding above existing ground.

N

0 2,000 4,000 8,000

Feet

Imagery Source: Ward County, 2015

Map 27k-Stage3

INTERIM IMPACTS OF PREFERRED ACTION COMPARED TO NO ACTION ALTERNATIVE: INUNDATION AREA AND DEPTH

FLOOD EVENT

27,400 CFS

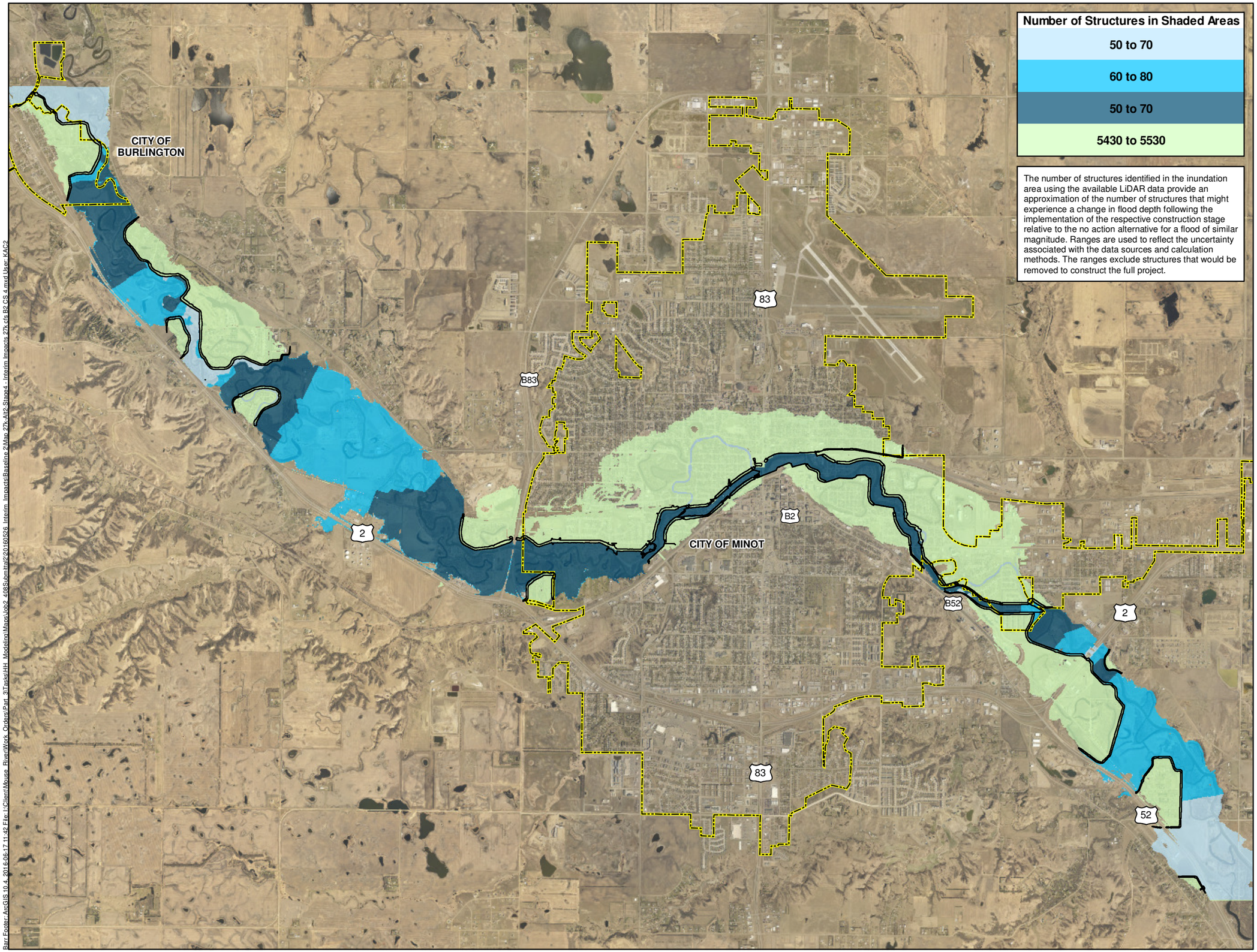
NO ACTION ALTERNATIVE

CONSTRUCTION STAGE

3

Mouse River Enhanced Flood Protection Project
Minot, North Dakota

Barr Footer: ArcGIS 10.4 2016-06-17 11:43 File: I:\Minot\Maps\e_RiverWork_Orders\Part_3\Tasks\HH_Modeling\Maps\Job2_408Submittal\20160526_Interim_Impacts\Baseline 2\Map 27k-AltA-Stage3_Interim Impacts 27k cfs B2-QS-3.mxd User: KAC2



Number of Structures in Shaded Areas

50 to 70
60 to 80
50 to 70
5430 to 5530

The number of structures identified in the inundation area using the available LiDAR data provide an approximation of the number of structures that might experience a change in flood depth following the implementation of the respective construction stage relative to the no action alternative for a flood of similar magnitude. Ranges are used to reflect the uncertainty associated with the data sources and calculation methods. The ranges exclude structures that would be removed to construct the full project.

- Flood Elevation Change Less Than +0.1 Feet
- Flood Elevation Increase Between 0.1 Feet and 0.5 Feet
- Flood Elevation Increase Greater Than 0.5 Feet
- Area No Longer Flooded
- Project Floodwalls and Levees
- Municipality

This map shows areas that could experience a change in flood depths. Flood elevation changes were calculated by subtracting the proposed flood elevation after a given construction stage from the associated no action alternative flood elevation. In newly inundated areas, the flood elevation changes are based on the depth of flooding above existing ground.

N

0 2,000 4,000 8,000

Feet

Imagery Source: Ward County, 2015

Map 27k-Stage4

INTERIM IMPACTS OF PREFERRED ACTION COMPARED TO NO ACTION ALTERNATIVE: INUNDATION AREA AND DEPTH

FLOOD EVENT

27,400 CFS

NO ACTION ALTERNATIVE

CONSTRUCTION STAGE

4

Mouse River Enhanced Flood Protection Project
Minot, North Dakota