Wetland Mitigation Needs Assessment

Nebraska Department of Roads

Project No. 79413

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Wetland Mitigation Needs Assessment

prepared for

Nebraska Department of Roads
Lincoln, Nebraska

Project No. 79413

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EXECUTIVE SUMMARY

The Nebraska Department of Roads (NDOR) is constantly maintaining, upgrading, and constructing new roadways to meet the transportation needs of the State of Nebraska. Unavoidable impacts to wetlands resulting from these activities necessitate permitting through the US Army Corps of Engineers (USACE) or the Nebraska Department of Environmental Quality (NDEQ). The permitting process typically requires wetland mitigation to offset wetland impacts. NDOR has created a number of established wetland mitigation banks throughout the state with mitigation credits available to offset these impacts.

NDOR has determined that a strategic plan is needed for the development of future wetland mitigation banks to meet the needs of anticipated projects. In order to understand the future need for mitigation, NDOR contracted with Burns & McDonnell Engineering Company, Inc. (Burns & McDonnell) to provide an assessment of wetland mitigation banking needs for the 5, 10, 15, and 20-year road improvement program for NDOR. The following tasks were completed to conduct this assessment:

- Predict NDOR's anticipated wetland impacts within the next 5, 10, 15, and 20 years
- Review NDOR's available mitigation bank credits
- Identify locations where anticipated wetland impacts exceed the currently available credits at existing NDOR mitigation banks
- Research the scientific literature and USACE guidance regarding the watershed approach for mitigation banking
- Preparation of this Mitigation Banking Needs Assessment Report to summarize the findings

The results of the mitigation banking needs assessment resulted in the identification of four geographic service areas (GSAs) expected to experience deficiencies over the next 20 years. The four GSAs (with their respective Ecoregion IV) were identified with expected deficiencies: Axtell/Rainwater Basin (Loess Plains), Mormon Island (Platte River Valley and Kearny to Central City), Willow Island (Central Nebraska Loess Hills), and Ceresco/Rock Creek/Waterloo (Loess Drift Hills). Of these GSAs, the Willow Island bank is predicted to need additional credits first; this bank will become deficient in 2017. Additionally, three areas exist that do not currently fall within any of the GSAs. These areas should be analyzed in the near future to determine the best locations for potential mitigation banks based on the latest USACE guidance on GSAs.

Each project was assigned to an existing mitigation bank, where available. New bank locations were identified based on concentrations of credits needed, the prospective reach of the GSA for that bank, and the ability of a single bank to serve the largest GSA or satisfy the largest number of needed credits possible. Three different potential mitigation bank locations were identified and recommended for future evaluation as areas of priority need due to project schedules.

Recommendations for the next stage of this study will be to conduct a more in-depth analysis to identify HUC-8 watersheds that provide the best locations to build mitigation banks and to evaluate these areas in order, based on anticipated need. Although an initial attempt was conducted to assign each project to a mitigation bank, and thus identify HUC-8 watersheds most in need of credits, there was not a project-by-project evaluation to determine which bank could provide credits when multiple GSAs were crossed. Every effort should be made to assign projects to existing banks with excess credits wherever possible. Once that is accomplished, then the timing of credit usage should be further evaluated to utilize existing bank credits first and assign projects impacts that will occur later to the new banks.

The three proposed locations for mitigation banks should be evaluated first. These areas have enough credit needs to support a bank and will require bank creation soon to support the project schedules. A strategic approach to placement of the new banks should be implemented to maximize the GSA for the bank and satisfy the greatest number of anticipated wetland credits required.

Additionally, as these new projects are delineated using a field survey and actual impacts are calculated, this predictive model for estimating wetland impacts should be revisited to gauge the accuracy with which impacts were estimated. If impact estimates are not as accurate as needed, revisions to the formulas used for predicting wetland presence or impact to wetlands by project type should be evaluated.

1.0 WATERSHED APPROACH FOR MITIGATION BANKING

The Nebraska Department of Roads (NDOR) is constantly maintaining, upgrading, and constructing new roadways to meet the transportation needs of the State of Nebraska. Unavoidable impacts to wetlands resulting from these activities necessitate permitting through the US Army Corps of Engineers (USACE) or the Nebraska Department of Environmental Quality (NDEQ). The permitting process typically requires wetland mitigation to offset wetland impacts. NDOR has created a number of established wetland mitigation banks throughout the state with mitigation credits available to offset these impacts.

NDOR has determined that a strategic plan is needed to guide the development of future wetland mitigation banks to meet the needs of anticipated projects. In order to understand the future need for mitigation, NDOR contracted with Burns & McDonnell Engineering Company, Inc. (Burns & McDonnell) to provide an assessment of wetland mitigation banking needs for the 5, 10, 15, and 20-year road improvement program for NDOR.

Mitigation requirements typically state that mitigation should be provided in the same watershed as where impacts occur. However, for long linear projects, such as road projects, this is not always practical. Nor is it practical to create and maintain a mitigation bank in each watershed. To determine appropriate locations for future mitigation banks, it is important to understand the intent of the compensatory mitigation program as well as the process to define service areas for existing and future banks in the region.

1.1 Wetland Mitigation Banking History

The concept of wetland mitigation banking began in the 1970s as an incentive system for the restoration or creation of wetlands to compensate for the loss of such ecosystems due to development. Mitigation banking can potentially increase ecological benefits by restoring and preserving valuable sites and streamlining the permitting process for development in sensitive ecosystems. Mitigation banking also serves as a less expensive alternative to other mitigation strategies by allowing permittees to purchase mitigation credits instead of developing a site-specific wetland mitigation site to compensate for acres impacted or degraded during development. Mitigation banking allows for small amounts of purchased credits to be combined and used for the restoration and preservation of much larger, more ecologically viable and sustainable wetland sites (Whitsitt 1997). A great deal of discussion has taken place over how to decide where banks are located, the types and locations of developments they should serve, and the geographic service area (GSA) in which they can provide credits.

Title 33 of the Code of Federal Regulations Part 332 (Compensatory Mitigation for Losses of Aquatic Resources) states that compensatory mitigation should generally occur within the same watershed as the impact site, in an area where it will be most likely to replace lost functions and services locally. Additionally, USACE district engineers may utilize a watershed approach to establish compensatory mitigation requirements. The USACE defines this approach as using landscape position and resource type of project sites to maintain or improve aquatic resource functions within the watershed. The regulations also discuss a watershed plan, which is defined as:

> *"A plan developed by federal, tribal, state, and/or local government agencies or appropriate non-government organizations in consultation with relevant stakeholders, for the specific goal of aquatic resource restoration, establishment, enhancement, and preservation. A watershed plan addresses aquatic resource conditions in the watershed, multiple stakeholder interests, and land uses. Watershed plans may also identify priority sites for aquatic resource restoration and protection."*

This section also supplies examples of watershed plans that include special area management plans, advance identification programs, and wetland management plans. The district engineer may use a watershed plan to help determine mitigation bank areas, but if no such plan is available, other information provided by project sponsors may be used. Wetland maps, soil surveys, endangered or threatened species habitat ranges, topologic and hydrologic maps, and aerial photographs are all acceptable sources to use when utilizing the watershed approach (33 CFR Section 332).

1.2 Defining a Watershed

The premise of providing mitigation for wetland impacts on a watershed basis is scientifically sound; however, defining what constitutes a watershed can be extremely complex. A watershed, in its simplest context, is simply a region of land where water flows to a specific body such as a river, lake, ocean, etc. In general, vegetation communities, land use, and soil types are often similar within a watershed; therefore, it can be inferred that the functions and values of wetlands within the same watershed will also be similar. This is not always the case, however, and is largely dependent on the breadth and location of the watershed. To complicate further the watershed definition, the size of a watershed depends on the mechanism used to define it. Major Land Resource Areas (MLRAs), Hydrologic Unit Code (HUC), and Ecoregions can be used in watershed analysis. Each is described in more detail below.

1.2.1 Major Land Resource Area

MLRAs are US Department of Agriculture (USDA)-identified, geographically isolated land resource units that are based upon a similarity of physiography, geology, climate, water, soils, biological resources, and land use. The state of Nebraska is comprised of 14 different MLRAs (Figure A-1). MLRAs are commonly utilized in defining landscape types and are used, in part, in defining regulatory division boundaries for USACE regions as well as GSAs previously used in the state of Nebraska.

1.2.2 Hydrologic Unit Code

The US Geological Survey (USGS) has divided the US into successively smaller hydrological units, which are classified into four levels:

- Regions (2-digit number) - a total of 21 regions have been identified
- Sub-regions (4-digit number) – a total of 221 sub-regions have been identified
- Accounting units (6-digit number) – a total of 378 accounting units have been identified
- Cataloging units (8-digit number) – a total of 2,264 accounting units have been identified. This 8-digit number, or HUC-8, is most commonly referred to as a watershed.

The HUC-6 and, to a greater extent, the HUC-8 watersheds are often used for ecological studies or mitigation needs (Figure A-2 and A-3). A total of 16 HUC-6 and 71 HUC-8 watersheds have been identified in Nebraska.

1.2.3 Ecoregion

The US Environmental Protection Agency (US EPA) Ecoregions denote areas of general similarity in biotic and abiotic phenomena and reflect differences in the type, quality, and quantity of environmental resources. These phenomena include geology, physiography, vegetation, climate, soils, land use, wildlife, and hydrology. The relative importance of each characteristic varies from one ecological region to another regardless of the hierarchical level. North America has been divided into four levels of Ecoregion:

- Level I - 15 ecoregions
- Level II - 50 ecoregions
- Level III - 105 ecoregions
- Level IV - 968 ecoregions

The Level III and IV ecoregions for the state of Nebraska have been included as Figures A-4 and A-5 in Appendix A.

1.3 Benefits of a Watershed Approach to Mitigation Banking

An article published by the US Department of Transportation, Federal Highway Administration, in 2011 documents the shift in thinking about mitigation bank policy from an approach that considered MLRAs as the main component in selecting bank sites to one that utilizes HUC-8 watersheds (USDOT 2011). HUC-8 watersheds typically cover much smaller areas of land than a MLRA. However, the HUC-8 watershed unit creates additional challenges when attempting to provide mitigation for long, linear projects. This HUC-8 approach is less cost effective in general due to the inability to find a bank located in the correct GSA for each project, and using this system may cause permittees to revert to onsite mitigation. This approach would also require the creation of many more mitigation banks to provide complete coverage for the state. HUC-8 watersheds are relatively small in size compared to MLRAs, and while it is recommended to utilize a bank that is close to the development site, it limits the banks to a smaller GSA and leaves many development projects with no mitigation bank from which to purchase credits.

Many studies have shown that onsite mitigation is much less ecologically successful than utilizing mitigation banks. Wetland banks offer large, contiguous, sustainable tracts of wetland habitat as opposed to the isolated, smaller fragments that often result from onsite mitigation (Whitsitt 1997; Bendor 2009). These larger tracts are generally more ecologically viable than many small, individual sites, as they provide habitat for more species and have a longer and more sustainable food chain (Whitsitt 1997). Banks are also generally located in areas that contain carefully chosen characteristics that make them ideal wetland sites, which onsite mitigation areas may not possess. For example, many wetland banks are located in previously degraded wetlands that may provide hydric soil characteristics that otherwise would take decades to develop or contain remnant wetland hydrology that would otherwise require costly manipulation to replicate. This means that mitigation banks are often able to develop ecological functions and values critical for wetlands like hydric soil characteristics and hydrology much quicker than onsite mitigation wetlands. Therefore, banks located in carefully chosen locations are likely to have higher ecological functions than onsite mitigation areas that simply utilize extra, undeveloped land.

As wetland mitigation is often held to ecological design and performance standards, utilizing a bank allows these requirements to be met in a timely and effective manner due to the opportune location of mitigation and consolidation of resource to achieve goals. Furthermore, mitigation banks streamline the process of wetland creation and restoration and minimize unforeseen costs. This makes mitigation banks preferable to regulators, who need not spend time on monitoring for compliance on many small, onsite mitigation efforts if purchasing credits from banks is utilized. This optimization of time can streamline the process of reviewing permits, further reducing costs and delays that are common in the permitting process.

1.4 Omaha District Approach to Mitigation Banking

In January 2015, the USACE provided written draft guidance to NDOR regarding the revised GSAs for mitigation banks and In-Lieu Fee programs in Nebraska (Appendix C). The new draft guidance is consistent with the watershed approach used in other states in that a larger landscape-level area is being considered. The draft guidance states that a Mitigation Bank GSA will include the local HUC-8 watershed in which the bank is located as well as adjacent HUC-8 watersheds (or portions of watersheds) located in the same Level IV Ecoregion without crossing HUC-6 boundaries. This new draft guidance will drive the site selection process for future mitigation banks in Nebraska.

1.5 Watershed Approach Summary

Moving toward a system that causes permittees to favor onsite mitigation could be disadvantageous and will not necessarily support the ecological viability of created and/or restored wetlands intended to replace impacted sites. Consistent with surrounding states, it would seem Nebraska's watershed approach should favor utilizing larger watershed areas like MLRAs or other large units to allow permittees to purchase from a variety of banks located throughout the state. Missouri and South Dakota utilize watershed approaches over delineated GSAs that take into consideration larger landscapes and allow for flexibility to make current banks more widely available for development projects across the state. This will make wetland mitigation accessible to a wide variety of projects and will likely result in the ecological viability of more restoration and/or creation efforts throughout Nebraska than if HUC-8 watersheds alone are utilized to establish GSAs.

2.0 REVIEW OF NDOR FUTURE PROJECTS

In order to predict wetland impacts at future NDOR projects and subsequently assess the existing mitigation banks, a review of the future projects was first conducted. Details of this analysis are described below.

2.1 Review of Future NDOR Projects

NDOR provided Burns & McDonnell with a master spreadsheet listing projects scheduled for construction over the next 20 years. NDOR also provided spatial data showing the proposed project locations in ArcGIS format (Figure A-6; Appendix A). Combined, these files included information for each project such as the roadway name, project mileage, a brief project description, proposed repair or construction type, and proposed year of construction. A total of 713 projects were included in the analysis to predict future mitigation needs.

2.2 Review of Historic NDOR Projects

In order to estimate accurately wetland impacts and mitigation needs on future projects, past projects with completed wetland delineations and permitting were evaluated. Because actual delineated wetland presence and impacts were known (in most cases), these projects were reviewed and analyzed to determine the most accurate methods to apply to the future projects. As with the future projects, the historical project files included information for each project such as the roadway name, project mileage, a brief project description, proposed repair or construction type, and proposed year of construction. A total of 87 projects were included in the analysis to refine the methods for predicting future impacts.

2.3 Analysis of NDOR Project Survey Areas

Using ArcGIS, Burns & McDonnell created a 150-foot-wide buffer (75 feet on either side of the center line) for each project (cumulatively referred to as the Survey Area). The 150-foot-wide buffer is based on the typical wetland delineation survey corridor for NDOR projects at areas containing potentially jurisdictional water crossings. The basis for the desktop wetland analysis at each project was based on this 150-foot-wide Survey Area. Various types of available background data covering the state of Nebraska were reviewed for each project.

NDOR projects include maintenance, rehabilitation, restoration, and new construction. Projects most likely to impact wetlands typically include work at culverts, bridges, intersections, interchanges, crossovers, or construction of new roadway or shoulder widening.

3.0 PREDICTING WETLAND OCCURRENCE

3.1 Background Data

Burns & McDonnell collected available background information in order to conduct a desktop wetland evaluation of the Survey Area for each proposed project using GIS. The USACE defines wetlands as areas that contain hydric soils, hydrophytic vegetation, and wetland hydrology. Therefore, GIS data available for Nebraska that could affect these criteria were evaluated for possible inclusion in the assessment. Existing available information reviewed included:

- USDA Natural Resources Conservation Service (NRCS) Soil Surveys for Nebraska
- US Fish & Wildlife Service (FWS) National Wetland Inventory (NWI) maps
- USGS 7.5-minute topographic maps
- USGS National Hydrography Dataset (NHD) digital stream and river data
- Federal Emergency Management Agency (FEMA) floodplain and floodway data
- NDOR Wetland Inventory (RWI) delineated wetland dataset (provided by NDOR)
- National Oceanic and Atmospheric Administration (NOAA) historic precipitation data
- Railroad data for Nebraska (ESRI)

Data from the sources mentioned above were used to predict probable locations of wetlands within the Survey Areas. This evaluation used existing available information to identify these areas. The methods used to interpret each type of background information are described below and figures depicting these data are included in Appendix A.

3.1.1 USDA NRCS Soil Survey

The soil surveys and digital soils data were used to locate areas with hydric soils typically found in wetlands. NRCS soil surveys group areas into soil map units, which consist of one or more soil types. Wetlands are more likely to be present in soil map units that contain a high percentage of hydric soil types.

Soils were grouped into three categories based on soil survey information: non-hydric soils, hydric soils, and soils with hydric inclusions (partially hydric). For this evaluation, soil map units that consisted of less than 33 percent hydric soil components were classified as non-hydric soils, soil map units that consisted of 33 to 65 percent hydric soil types were classified as hydric inclusion soils, and soil map units that consisted of greater than 65 percent hydric soil types were classified as hydric soils. Areas with hydric soils have a greater probability of supporting wetlands than areas with hydric inclusion soils and hydric inclusion soils have a greater probability of supporting wetlands than areas with non-hydric soils. Areas with hydric soils and partially hydric soils are shown in Figure A-7 in Appendix A.

3.1.2 USFWS National Wetland Inventory Maps

USFWS NWI maps also were used to identify probable locations of wetlands (Figure A-8; Appendix A). NWI maps show the location and shape of potential wetlands, and classify them into categories based on vegetation, water regime, salinity, and other wetland characteristics. NWI maps can accurately show the location and extent of conspicuous wetland types such as ponds and emergent wetlands, but are not as accurate in showing inconspicuous wetlands such as forested wetlands.

3.1.3 USGS Topographic Maps and USGS National Hydrography Dataset

USGS topographic maps were also used to locate areas where probable wetlands occur. Topographic maps indicate the topography of the land and thus show areas where wetlands are typically found. For example, wetlands commonly occur in river floodplains and are uncommon on steep slopes and ridges. Topographic maps also indicate the presence of streams, rivers, lakes, and other aquatic resources. The USGS NHD shows the locations of streams, rivers, and open water as determined by the USGS and the US EPA. Figure A-9 in Appendix A shows the NHD data for Nebraska overlain on a topographic background.

3.1.4 FEMA Floodplain and Floodway

FEMA floodplain and floodway boundaries were included in the analysis because these areas are often good predictors of wetland presence based on the landscape and hydrological regime. Additionally, wetlands found in these areas have a high likelihood of USACE jurisdiction based on their connection with the associated waterway. Figure A-10 in Appendix A shows the FEMA floodplain and floodway data for Nebraska.

3.1.5 NDOR Wetland Inventory Maps

NDOR has maintained a database of delineated wetlands from previous wetland delineations (Nebraska Department of Roads Wetland Inventory, RWI Maps). This GIS layer was initially used, where available, to add to the wetland analysis. Because the majority of future projects has not been formally delineated and, therefore, do not have a value in the RWI GIS layer, the RWI was eventually removed from the desktop analysis when attempting to predict wetland acreage in the Survey Area. The RWI GIS layer was, however, useful in the comparison of actual delineated and impacted wetlands compared to the predicted wetland acreages and impacts discussed later in the statistical analysis section of this report. Figure A-11 in Appendix A shows the NDOR RWI data for Nebraska.

3.1.6 NOAA Historic Precipitation Data

Historical annual average precipitation records across Nebraska were analyzed to determine natural precipitation gradients. Initially, the state was divided into 4 quadrants based on annual precipitation amounts generally progressing from wetter to drier from east to west (Figure A-12, Appendix A). Burns & McDonnell also compared annual precipitation amounts on a project-specific basis for the future projects to develop a modifier that could be used at that level of analysis. Table 3-1 below shows the modifiers that were used based on the average annual precipitation measured at each project Survey Area.

Table 3-1: Project Precipitation Modifiers

Precipitation Category	Precipitation Amount (inches)	Modifier
Very high	31-35	1.25
Medium high	26-30	1
Medium low	21-25	1
Very low	13-20	0.75

3.1.7 Railroads in Nebraska

The presence of railroads, particularly closely paralleling the roadways, tends to increase the likelihood of wetland formation. The berms created by the roadway and the railroad bed trap water flow and the swale or ditch between the two features often provides hydrology suitable for wetland formation. As part of the analysis, Burns & McDonnell looked at railroads within 150 and 300 feet of the road centerline and the length along which the railroads parallel or intersect the roadway. The modifiers in Table 3-2 below were used when determining the predicted wetland acreage present along each project. Figure A-13 in Appendix A shows the railroads mapped in Nebraska.

Table 3-2: Project Railroad Modifiers

Impact Type	Distance from Center Line (feet)	Modifier
No RR	0-300	1
No Intersection, partially parallel	0-150	1.5
No Intersection, partially parallel	151-300	1.25
Intersecting, partially parallel	0-150	1.5
Intersecting, partially parallel	151-300	1.25
No intersecting, mostly parallel	0-150	2
No intersecting, mostly parallel	151-300	1.75
No intersecting, no parallel	0-300	1
Intersecting, no parallel	0-300	1
Intersecting, majority parallel	0-150	2
Intersecting, majority parallel	151-300	1.75

3.2 Statistical Analysis

An analysis was conducted to predict wetland presence within the Survey Area. The available background information was compared to historical NDOR projects where wetland delineations had already been conducted. Using this methodology, a comparison of predicted wetland presence to actual wetland presence was possible.

Desktop data were generated by spatially combining or intersecting data layers in GIS. Combining layers entailed adding areas from multiple sources with the Survey Area and either subtracting the overlapping acreage or keeping only the areas with multiple layers present. For example, NWI acreages were added to hydric soil acreages, and the area of overlapping layers was counted only once. The resulting data layer was "clipped" in GIS to include a final acreage for both entire layers, without counting overlap. Alternatively, only the areas that contained both NWI and hydric soils were retained in certain analyses. For example, the NWI and hydric soil intersect layer is comprised solely of NWI wetlands that are located within hydric soil. Many different combinations of data layers were developed and tested through the statistical analysis process. These data layers included both qualitative information (e.g. railroad modifier, precipitation categories, and topographic maps) and quantitative information (e.g. NWI, RWI, NHD, floodplain, and soils). Combinations were identified based on professional knowledge and experience in the region, known dataset reliability, and the results of the statistical correlations in the historical project data set.

To determine which data were the best predictors of wetland presence, a multiple variable correlation test was conducted using the historical NDOR projects. The predicted wetland acreage based on the combinations of various data layers was compared to the actual wetland acreage as determined by NDOR wetland delineations. The data layers that had a statistically significant Pearson coefficient were considered potential predictor variables of wetlands.

The identified potential predictor variables were then analyzed using multivariate regression analyses in various combinations. Combinations of variables with a higher coefficient of multiple determination (R^2) were considered more accurate at predicting wetland acreages than combinations of variables with low coefficients of multiple determination. Regression coefficients from the combination with the highest coefficient of multiple determination were used to create a mathematical formula to predict the areas of wetlands in future NDOR projects. The developed regression formula included the following variables: hydric soil and floodplain intersect, hydric soil and NWI intersect, railroad modifier, precipitation value, NHD and hydric soil intersect, and NHD/NWI/hydric soil intersects.

3.3 Predicted Wetland Presence Results

As described above, the predicted wetland acreages for the Survey Area are based on a review of available desktop information and the statistical analysis to determine the best method for predicting wetland acreage within the Survey Area. During the analysis numerous data were evaluated including a combination of NWI, NHD, and RWI acres minus overlap (Version 1), NWI, hydric soils, partially hydric soils, and floodplain acres minus overlap (Version 2), NWI, hydric soils, and partially hydric soils acres minus overlap (Version 3), and NWI plus hydric soils acres minus overlap (Version 4). Ultimately, the best predictor of wetland presence was a combination of hydric soils, floodplain, NWI, NHD, railroad proximity, and precipitation (Version 5).

Five versions of the data layer combinations and the regression formula were used to analyze the prediction of wetland presence when compared to actual delineated wetlands. The predicted wetland presence from those analyses and the correlation coefficient (indicating how accurate a prediction each version provides) are included in Table 3-2. The closer the correlation coefficient is to a value of 1, the more strongly correlated that method is to the actual delineation results. A sample project is included as Figure A-14 to illustrate how the data layers were interpreted and quantified.

Table 3-3: Predicted Wetland Acreage Compared to Actual Delineated Acreage for Historical NDOR Projects

Desktop Wetland Evaluation Method	Predicted Wetland Acreage	Correlation Coefficient
Version 1: NWI + NHD + RWI	343	0.33
Version 2: NWI + Hydric Soil + Partially Hydric Soil + Floodplain	2,462	0.26
Version 3: NWI + Hydric Soil + Partially Hydric Soil	1,129	0.33
Version 4: NWI + Hydric Soil	1,042	0.34
Version 5: Regression model	599	0.63
*Actual delineated wetland acreage for the historical projects is 593 acres		

As a result of the review of the historical projects and the statistical analysis that was conducted, the most accurate prediction of wetland presence within the project Survey Areas was the use of the regression model. This regression model was applied to the NDOR project data set to predict the presence of wetlands for the future projects included in this study. The application of this model predicted that a total of 5,471 acres of wetland could be present within the 150-foot wide corridor along the 4,030 miles of projects. This provides an estimated 1.36 acres of wetland per mile of project.

4.0 QUANTIFYING NDOR IMPACT ESTIMATES

4.1 Identify Percent Impact based on Project Type

Once the predicted wetlands presence in each Survey Area had been identified, the impacts that may occur to those wetlands as a result of the proposed projects could be estimated. In order to calculate the predicted wetland impacts at each proposed project, it was necessary to identify the percent of the predicted wetland acreage expected to incur impacts based on project or construction type. Impact modifiers were determined by estimating the percentage of the Survey Area that would be impacted by a given project type. For instance, a new construction would be expected to impact a far greater percentage of the wetlands than a simple resurfacing of an existing road. The assigned percentages were determined based on Burns & McDonnell's experience, coordination with NDOR, and a visual comparison of predicted impacts to actual project impacts in the historical projects provided by NDOR. Table 4-1 below shows the four different scenarios that were evaluated to predict percent of impact used for each specific project or construction type.

Table 4-1: Evaluated Scenarios to Identify Percentage of the Project Impacted by Project Type

Project or Construction Type	Scenario A	Scenario B	Scenario C	Scenario D
Crackseal	0	0	0	0
Painting	0	0	0	0
Seal	0	0	0	0
Urban	0	0	0	0
Guardrail	5	10	20	5
Shoulder	5	10	20	5
Resurface/concrete surface	5	10	20	5
Bridge	5	20	40	15
Culvert	10	20	40	15
Intersection	10	20	40	10
Interchange	10	20	40	15
Capital Improvement (CI)	50	100	100	75
Crossover	50	100	100	50
New construction	50	100	100	75
Viaduct	50	100	100	75

To determine which scenario is the best predictor of wetland impacts, a multiple variable correlation test was again conducted using the historical NDOR projects. The predicted wetland impacts based on the four scenarios included in Table 4-1 were compared to the actual wetland impacts as determined by NDOR. Scenarios A through C produced inferior correlation coefficients compared to Scenario D, the preferred project impact modifiers (Table 4-2). Adding the precipitation and railroad modifiers to the impact calculations was also evaluated as part of this study, however, it seemed more appropriate to include those variables into the wetland acreage prediction formula as each proved to be statistically significant to predicting wetland presence.

Table 4-2: Correlation of Evaluated Impact Modifiers

Scenario	Correlation Coefficient
Scenario A	0.35
Scenario B	0.35
Scenario C	0.35
Scenario D	0.52

4.2 Predicted Project Impact Results

The anticipated impacts to wetlands for each future NDOR project were calculated based on applying the above described project-type modifier to the predicted wetland acreage within each Survey Area. The predicted wetland acreage, multiplied by the project modifier assigned for that project type, equals the predicted wetland impacts for that project. This calculation takes into account the known variables that affect the likelihood of wetland impacts for each individual project based on its general landscape position.

Figure A-15 illustrates the total predicted wetland impacts grouped by HUC-8. The application of this formula predicted that approximately 291 acres of wetland would be impacted out of the total 5,471 acres of wetlands predicted to be present in the Survey Areas. This provides an estimated 0.07 acre of wetland impact per mile of project. The five HUC-8s with the most predicted impacts are Middle Platte-Buffalo, West Fork Big Blue, Lewis and Clark Lake, Lower Elkhorn, and Salt.

5.0 REVIEW EXISTING NDOR MITIGATION BANK CAPACITY

In order to determine which existing NDOR mitigation banks are likely to face deficits as future project impacts are incurred, it was first necessary to analyze the existing banks, the approved GSA for the bank, and the available credits at each bank.

5.1 Review Mitigation Bank Ledgers

NDOR has detailed accounting ledgers to track the wetland acreage (by type) at each existing mitigation bank. These ledgers are used as a debit and credit tracker to update continually the available credits at each bank. Burns & McDonnell, with input from NDOR, compared the ledgers to the anticipated project impacts in the existing GSAs and used the data to determine banks with future excess and deficits of available banking credits (Table 5-1). Figure A-15 in Appendix A shows the locations of these service areas and their predicted credit balance based on the predicted wetland impacts within each GSA.

Table 5-1: Existing Mitigation Bank Credits Available, Predicted Wetland Impacts, and Credit Deficiencies

Existing Mitigation Bank Service Area	Mitigation Bank(s)	Credits Available	Predicted Wetland Impacts	Excess or (Deficit)
Platte River Valley, Kearney to Central City	Mormon Island	25.07	68.95	(43.88)
MLRA 102B- Loess Uplands And Till Plains	Tarnov/Tracy Creek/West Point	136.75	26.04	110.71
MLRA 106- Loess Drift Hills	Ceresco/Rock Creek/Waterloo	35.66	36.49	(0.83)
MLRA 107- Iowa And Missouri Deep Loess Hills	Lincoln Bend*	250	5.52	244.48
MLRA 65- Nebraska Sandhills	Rose*	250	9.39	240.61
MLRA 67- Central High Plains	Scottsbluff	31.10	22.02	9.09
MLRA 71- Central Nebraska Loess Hills	Willow Island	2.34	13.89	(11.54)
MLRA 72- Central High Tableland	Sutherland/Maxwell	23.76	18.60	5.16
MLRA 75- Loess Plains	Axtell/RWB	8.59	76.32	(67.73)
No Service Area	none	0.00	53.00	(53.00)
	Grand Total:	**763.28**	**330.21**	
*Anticipated Credits included				

5.2 Mitigation Bank Capacity Results

As indicated in Table 5-1 above, four of the existing service areas will have sufficient mitigation bank credits to compensate for the currently anticipated 20-year project forecast. These GSAs include the following mitigation banks: Tarnov, Tracy Creek, West Point, Lincoln Bend, Rose, Scottsbluff, Sutherland, and Maxwell. In addition to the existing, approved mitigation banks, NDOR has proposed banks, which are in various stages of development. This information was also included in the analysis to identify areas that may already have additional mitigation credits and compare these sites to the updated GSA based on the latest USACE draft guidance.

5.3 Future Mitigation Bank GSAs

The existing GSAs, for most of the current NDOR mitigation banks, are based on the NRCS MLRA designations within the state. As part of recent, on-going discussions with the USACE to approve a new Mitigation Banking Instrument, the USACE provided additional draft guidance. As previously discussed, the USACE's new draft guidance on GSAs for future banks, which includes HUC-8 and ECO-IV considerations, must be considered when identifying the most advantageous locations for future banks. Therefore, predicted project impacts based on HUC-8 watersheds (Figure A-15) will be considered to identify future mitigation bank locations.

6.0 FUTURE MITIGATION BANK NEEDS

6.1 Identification of Project Impacts by Year and by GSA

The written draft guidance provided by the USACE to NDOR provided direction on identifying the GSAs for new mitigation banks in Nebraska (Appendix C). This draft guidance uses the HUC-8 watershed as the basis for the GSA. A new mitigation bank will have a GSA that covers the HUC-8 watershed in which it is located and adjacent HUC-8 watersheds, provided they are within the same Ecoregion IV. As a result, project impacts have been separated by HUC-8 watershed and are illustrated in Figure A-17, in Appendix A. In addition, to better prioritize the need for new mitigation banks, impacts have also been separated based on anticipated year of construction. This will allow for prioritization of banks in watersheds that have projects that will be constructed sooner than others. Table B-1, in Appendix B, provides a breakdown of the anticipated project impacts based on year of construction.

Each future project was reviewed and assigned to an existing mitigation bank, if one is currently available. Due to the changing GSA boundaries between the existing banks and the new banks, several potential bank scenarios could exist for each project. Where adequate existing credits are available, assignment to the appropriate bank is straightforward. In areas where available credits are inadequate to meet predicted needs, a review of whether the existing bank or a new bank is a better use for that project should be conducted. In some cases, projects that are within an existing bank GSA could also be served by a new bank that it required in close proximity. Projects on the edges of the GSAs will be reviewed with this perspective in mind to maximize effective usage of existing bank credits while minimizing the need to create new mitigation banks.

6.2 Prioritized Future Mitigation Bank Locations

Three distinct geographic areas were identified with no current mitigation bank available to provide credits. Additionally, four existing GSAs have existing banks that will be depleted for the anticipated projects based on this analysis (Willow Island, Mormon Island, Axtell/Rainwater Basin, and Ceresco/Rock Creek/ Waterloo; Figure A-16 and A-17, Appendix A). Therefore, additional mitigation banks will be required to satisfy the anticipated mitigation obligation. A preliminary recommendation of possible bank locations has been included in Figure A-18. These possible bank locations have been prioritized as areas with the greatest immediate need for mitigation banking credits. Additional areas will likely experience mitigation credit deficiencies and will require future banking analysis.

To identify potential priority locations for mitigation banks, each project was first assigned to an existing mitigation bank, where available. Priority bank locations were identified based on concentrations of credits needed, the prospective reach of the GSA for that bank, and the ability of a single bank to serve the largest GSA or satisfy the largest number of needed credits possible. Two of the proposed bank locations have an identified bank location and GSA indicated in Figure A-18 in Appendix A. The bank could be placed anywhere within the hatched area and still served the indicated GSA. The third potential prioirity bank location has not been refined to reflect an applicable GSA due to the complexity of the watersheds in that area. Further analysis will be required to identify a specific bank location. The potential for these recommended new mitigation banks to satisfy future project needs, the specific bank locations, and project assignments to each bank should be evaluated in more detail as part of further studies.

6.3 Limitations of this Study

Due to the predictive nature of this study and the reliance on available background data to estimate and predict wetland impacts, an acknowledgment of the limitations of this study and the possible considerations that should be taken are included in this section. The primary limitations in this study are related to the accuracy and availability of the source data; the difficulty in identifying wetlands remotely; that projects are subject to change; and many future projects past 2020 are not known at this time.

FEMA data does not encompass the entirety of Nebraska and individual counties report floodplains and floodways differently. For instance, a large floodway may abruptly stop at a county line, indicating a discrepancy in reporting because natural features do not observe political lines. NWI mapped wetlands or NHD streams or waterbodies can be out-of-date without additional ground truthing. In an effort to mitigate the limitations, all geospatial data used was downloaded at the beginning of the project from source websites such as USGS and NRCS in June of 2014.

Additionally, for purposes of this study, all wetlands are considered equal without consideration of function, value, or type. Impacts to a higher quality wetland are equally comparable to impacts to a lesser wetland (e.g., impacts to a palustrine forested wetland are not comparable to a roadside ditch).Without an actual wetland delineation, determining the actual value is difficult. Similarly, in an effort to mitigate this limitation, the formula used to predict wetland presence was derived from actual historical delineated wetlands. Additionally, no consideration was given to wetland type as that is difficult to predict and can easily change over time. The amount of mitigation required for wetland impacts is determined, in part, based on wetland type. A large amount of forested wetland impacts, for example, may cause the predicted impacts to underestimate the mitigation required. Finally, large, off-alignment (Capital Improvement) projects may not use a bank, which could skew the results of this study.

In project-specific cases where increased potential for wetlands is possible or in areas with limited credit availability, further desktop review to evaluate aerial photography in detail to determine the likelihood that wetlands are present could also be conducted to further refine and estimated wetland presence and increase the accuracy of those estimates. While it would be cost-prohibitive to conduct aerial photo interpretation over the entire state, on a smaller project-by-project scale, aerial photography provides a more accurate indication of potential wetland presence.

6.4 Recommended Next Steps

The purpose of this study was to evaluate the potential need for additional mitigation banks to provide adequate wetland mitigation credits to satisfy the obligations of the future NDOR projects. While several large areas of the state have adequate coverage, other areas have no mitigation banks currently or will have insufficient credits to mitigate for the anticipated impacts. The proposed mitigation banks identified above are an initial attempt to identify suitable locations where the bank could provide the highest number of required credits in an effort to minimize the number of banks NDOR will need to create.

Although an initial attempt was conducted to assign each project to a mitigation bank, and thus identify HUC-8 watersheds most in need of credits, there was not a project-by-project evaluation to determine which bank could provide credits when multiple GSAs were crossed. Every effort should be made to assign projects to existing banks with excess credits wherever possible. Once that is accomplished, then the timing of credit usage should be further evaluated to utilize existing bank credits first and assign projects impacts that will occur later to the new banks.

The three areas with no existing mitigation banks should be evaluated first, along with a new bank to overlap the Willow Island bank; the remaining credits will be depleted by 2017. These areas either will require project-specific mitigation or will need a bank created as soon as possible.

The next most urgent need will be in the Axtell/Rainwater Basin GSA, where existing credits will be depleted in 2021. There are a large number of projects in this area that crossed multiple ecoregions and HUC-8 watersheds. A strategic approach to placement of this new bank or multiple banks should be implemented to maximize the GSA for the bank and satisfy the greatest number of anticipated wetland credits required.

Additionally, as these new projects are delineated using a field survey and actual impacts are calculated, this predictive model for estimating wetland impacts should be revisited to gauge the accuracy with which impacts were estimated. If impact estimates are not as accurate as needed, revisions to the formulas used for predicting wetland presence or impact to wetlands by project type should be reevaluated.

6.5 Conclusion

After conducting a comprehensive evaluation of NDOR's future projects, predicting resulting impacts to wetlands, and analyzing the predicted impacts within the existing mitigation bank GSAs, four GSAs (with their respective Ecoregion IV) were identified to have expected deficiencies: Axtell/Rainwater Basin (Loess Plains), Mormon Island (Platte River Valley and Kearny to Central City), Willow Island (Central Nebraska Loess Hills), and Ceresco/Rock Creek/Waterloo (Loess Drift Hills). Of these GSAs, the Willow Island bank is predicted to need additional credits first. Additionally, three areas exist that do not currently fall within any of the GSAs. These areas should be analyzed in the near future to determine the best locations for potential mitigation banks based on the latest USACE draft guidance on GSAs.

For each area, once the preferred bank location, from a HUC-8 and Ecoregion IV perspective, has been identified, a more detailed and formal site selection study is recommended. This study would identify several potential properties for the mitigation bank and determine the best location not only for wetland formation, but would maximize the GSA coverage of each bank to best serve NDOR's future mitigation needs.

7.0 REFERENCES

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APPENDIX A - FIGURES

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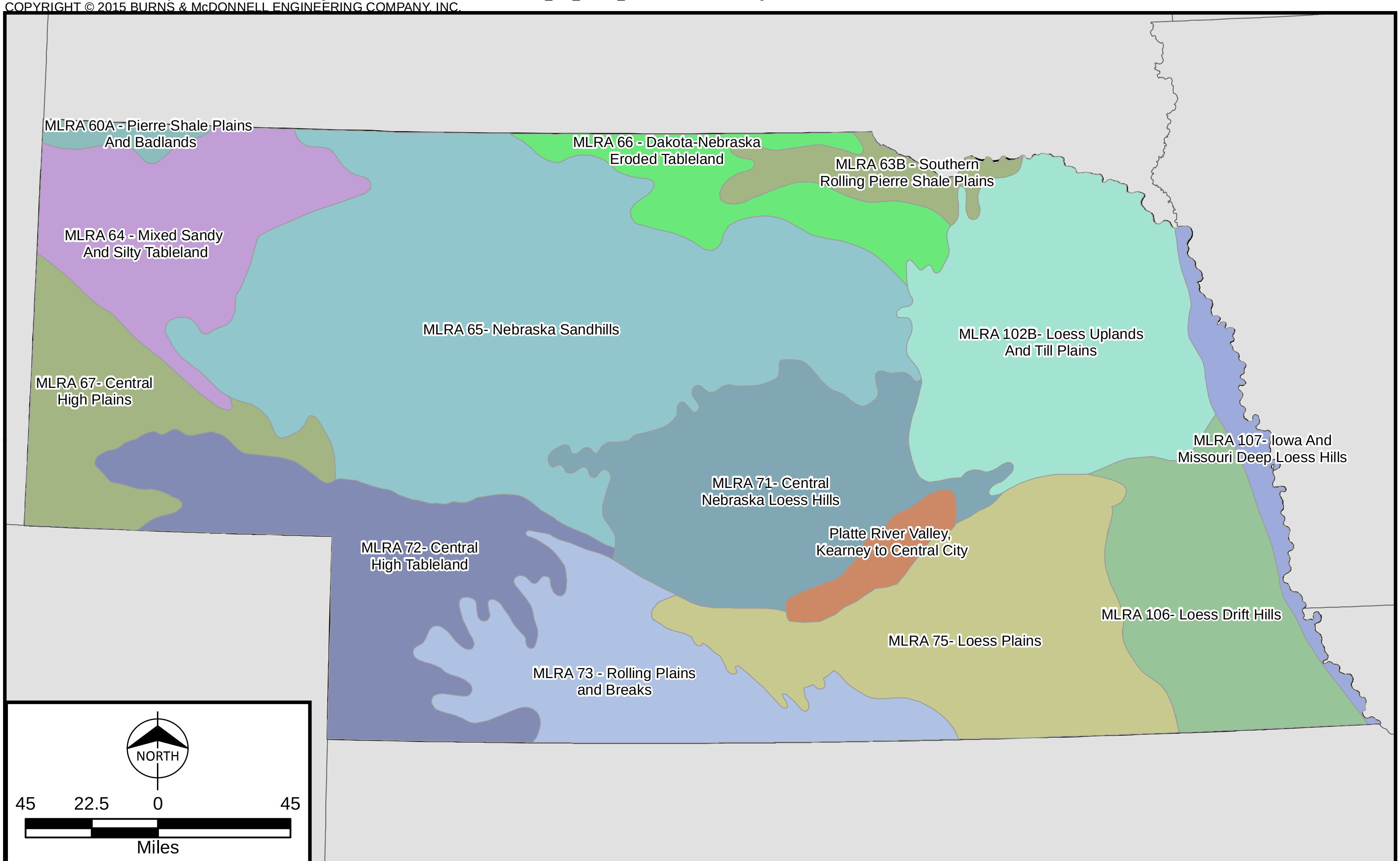

MLRA Service Area

- Platte River Valley, Kearney to Central City
- MLRA 102B- Loess Uplands & Till Plains
- MLRA 106- Loess Drift Hills
- MLRA 107- Iowa And Missouri Deep Loess Hills
- MLRA 60A - Pierre Shale Plains And
- MLRA 63B - Southern Rolling Pierre Shale Plains
- MLRA 64 - Mixed Sandy And Silty
- MLRA 65- Nebraska Sand Hills
- MLRA 66 - Dakota-Nebraska Eroded Tableland
- MLRA 67- Central High Plains
- MLRA 71- Central Nebraska Loess Hills
- MLRA 72- Central High Tableland
- MLRA 73 - Rolling Plains and Breaks
- MLRA 75- Loess Plains

NDOR
Nebraska Department of Roads

Figure A-1
Nebraska Major Land Resource Areas (MLRAs)
Nebraska Department of Roads

Source: Esri, NDOR, USGS, and Burns & McDonnell Engineering.

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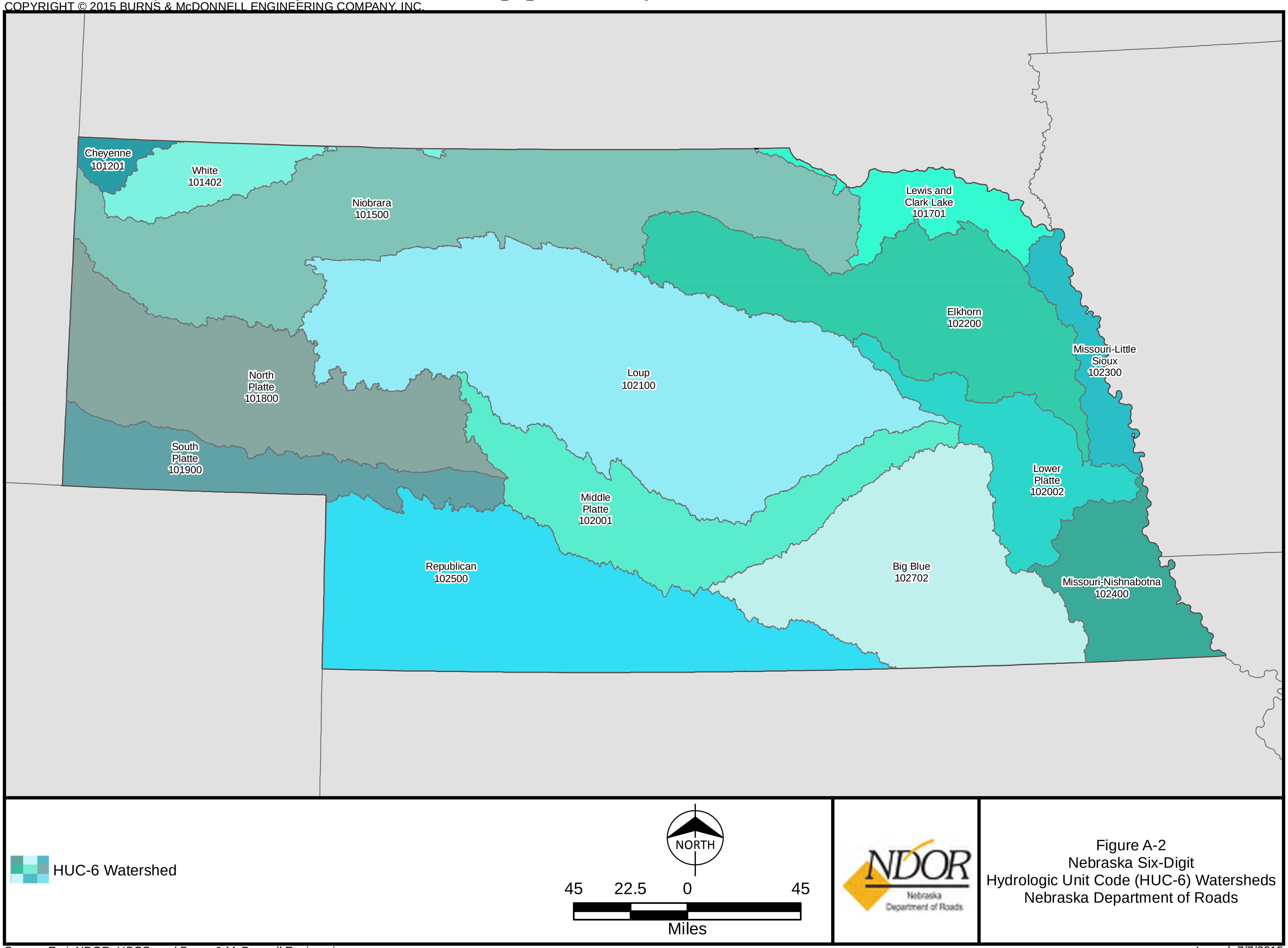

Figure A-2
Nebraska Six-Digit
Hydrologic Unit Code (HUC-6) Watersheds
Nebraska Department of Roads

Source: Esri, NDOR, USGS, and Burns & McDonnell Engineering.

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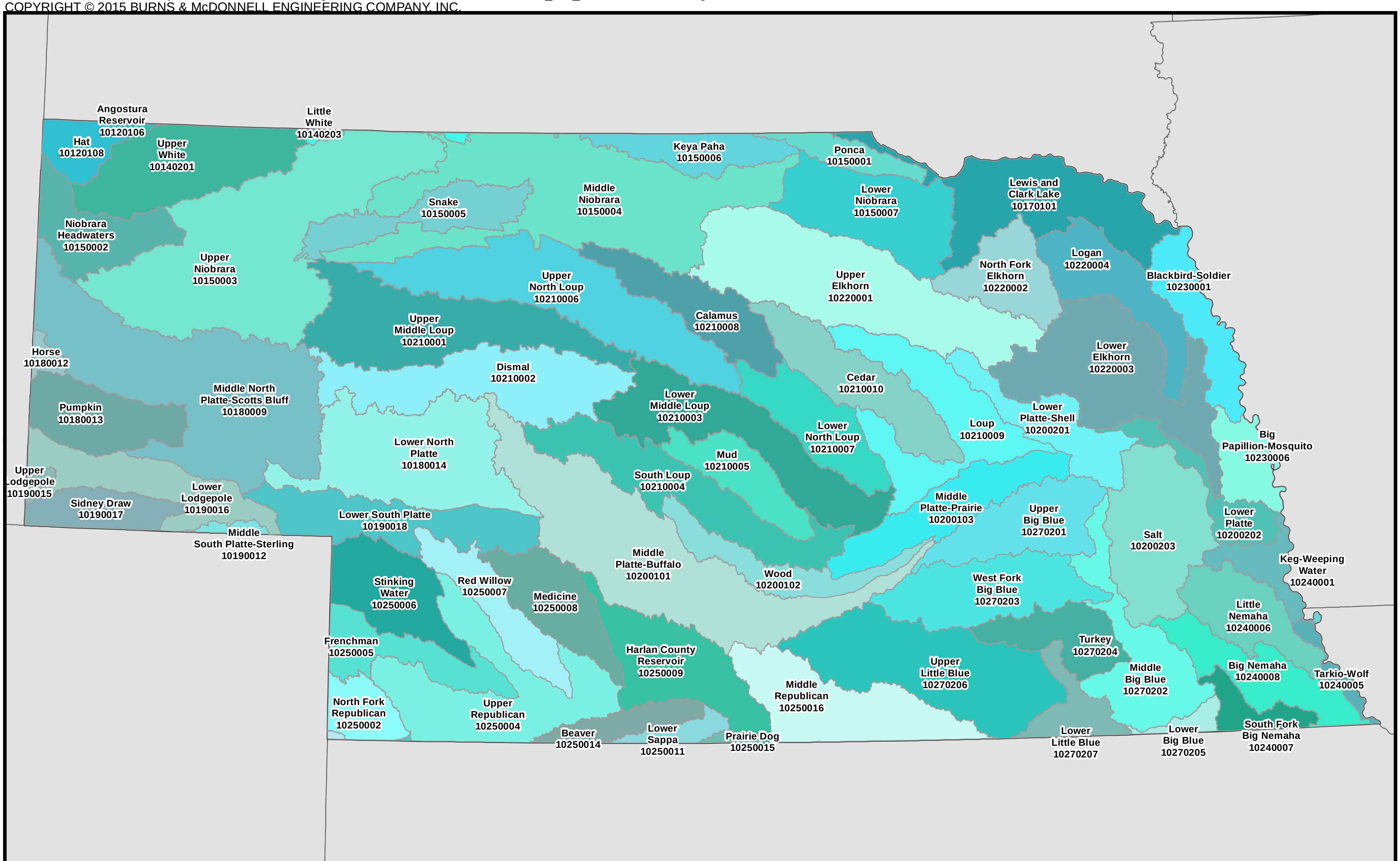
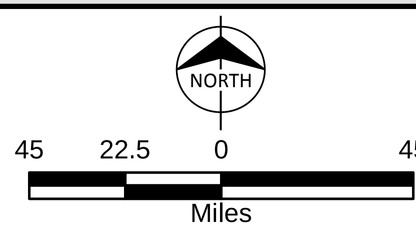


HUC-8 Watershed Boundary



NDOR Nebraska Department of Roads

Figure A-3
Nebraska Eight-Digit
Hydrologic Unit Code (HUC-8) Watersheds
Nebraska Departments of Roads

Source: Esri, NDOR, USGS, and Burns & McDonnell Engineering.

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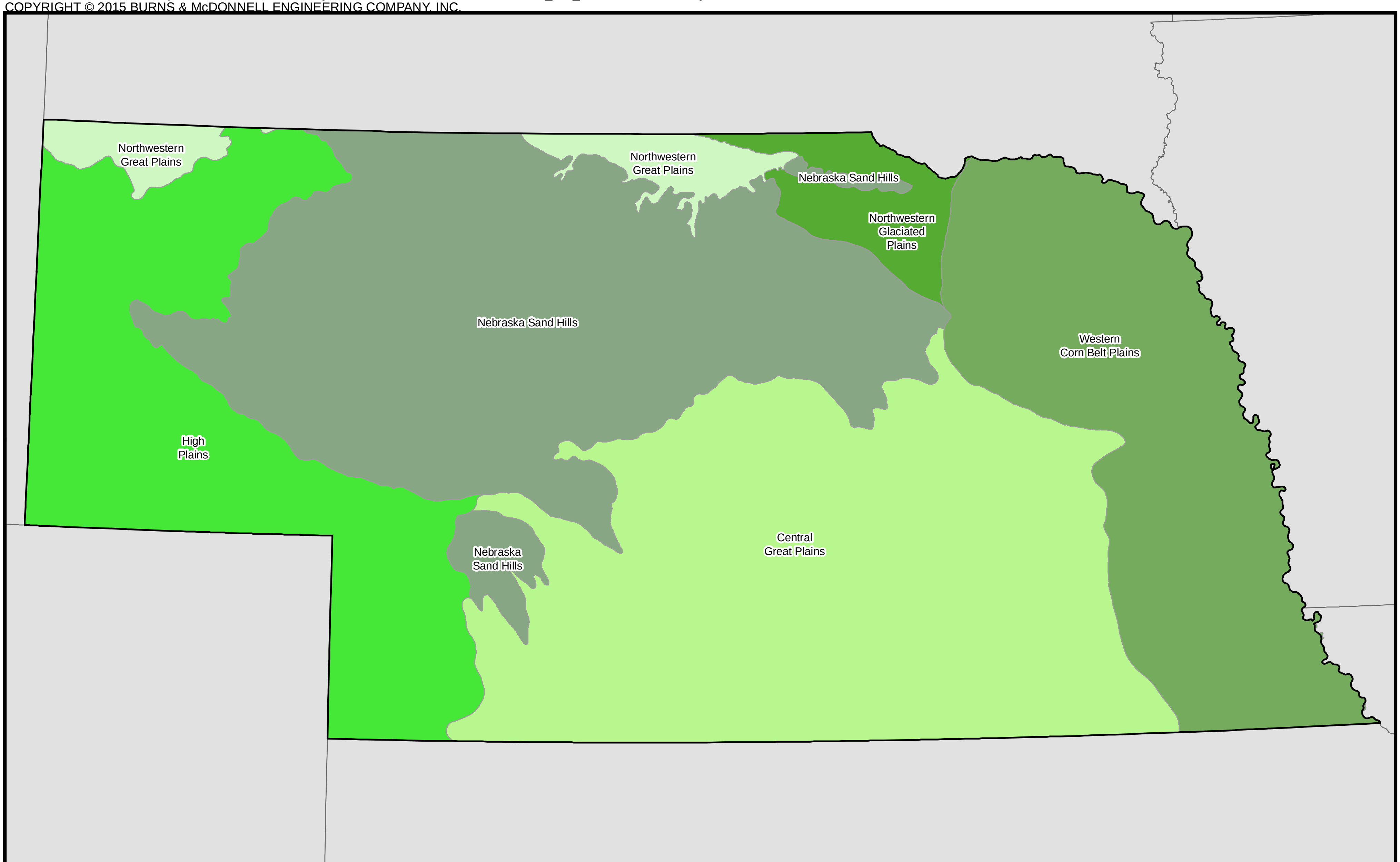

Level III Ecoregion Name
- Central Great Plains
- High Plains
- Nebraska Sand Hills
- Northwestern Glaciated Plains
- Northwestern Great Plains
- Western Corn Belt Plains

NDOR
Nebraska Department of Roads

Figure A-4
Nebraska Level III Ecoregions
Nebraska Department of Roads

Source: Esri, NDOR, USGS, and Burns & McDonnell Engineering.

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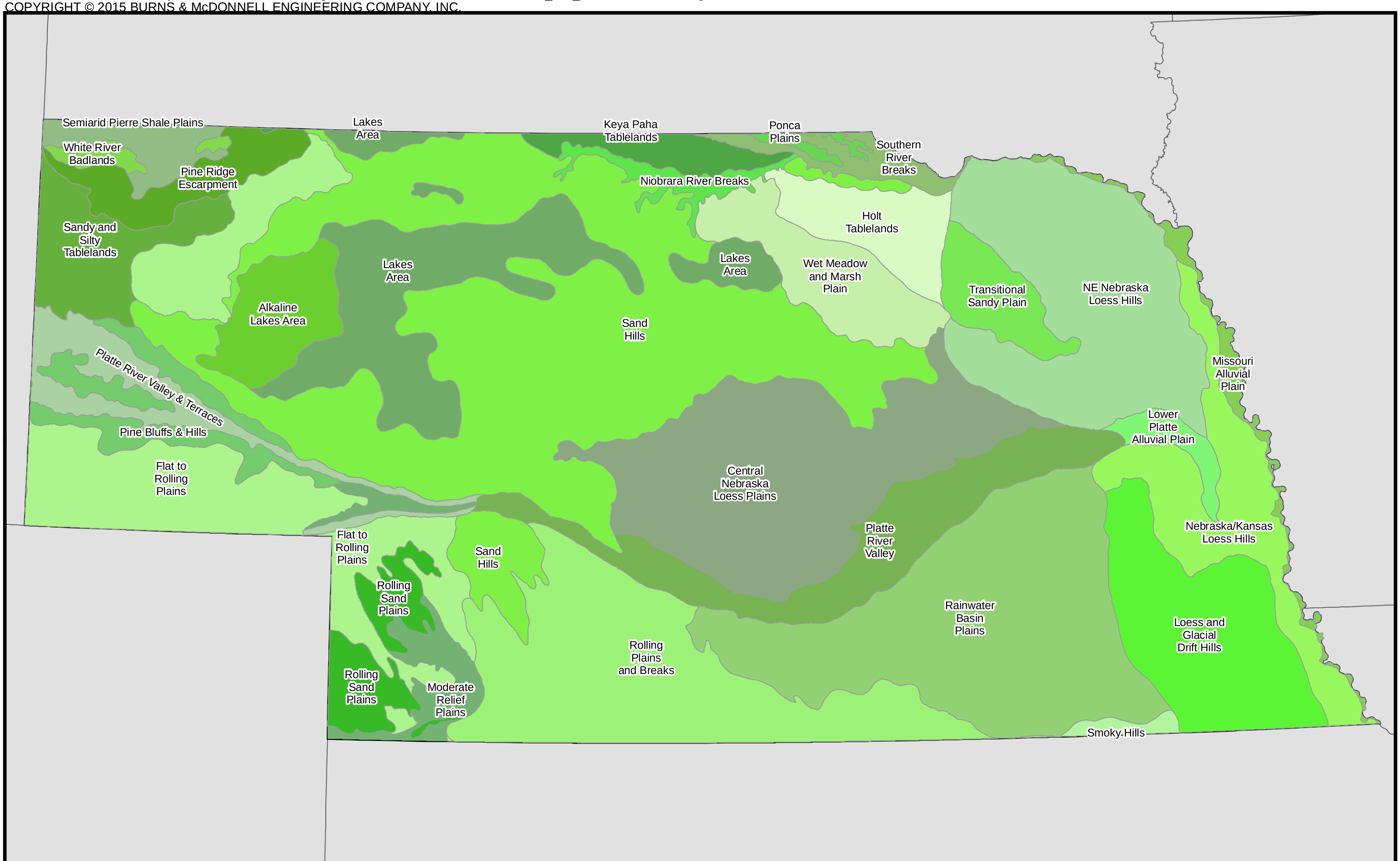

Level IV Ecoregion Boundary

NORTH

45 22.5 0 45

Miles

Figure A-5
Nebraska Level IV Ecoregions
Nebraska Department of Roads

Source: Esri, NDOR, USGS, and Burns & McDonnell Engineering.

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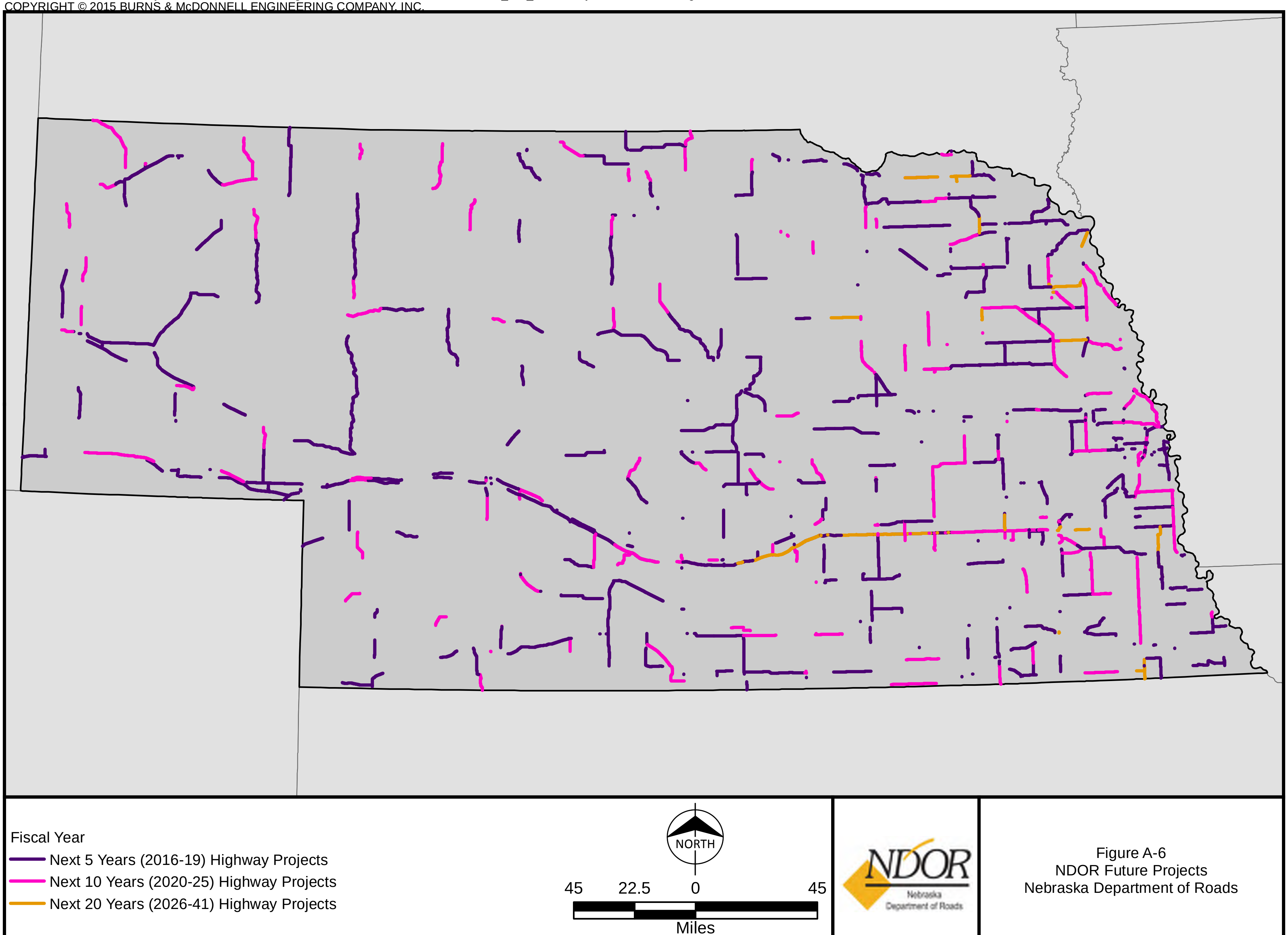

Figure A-6
NDOR Future Projects
Nebraska Department of Roads

Source: Esri, NDOR, and Burns & McDonnell Engineering.

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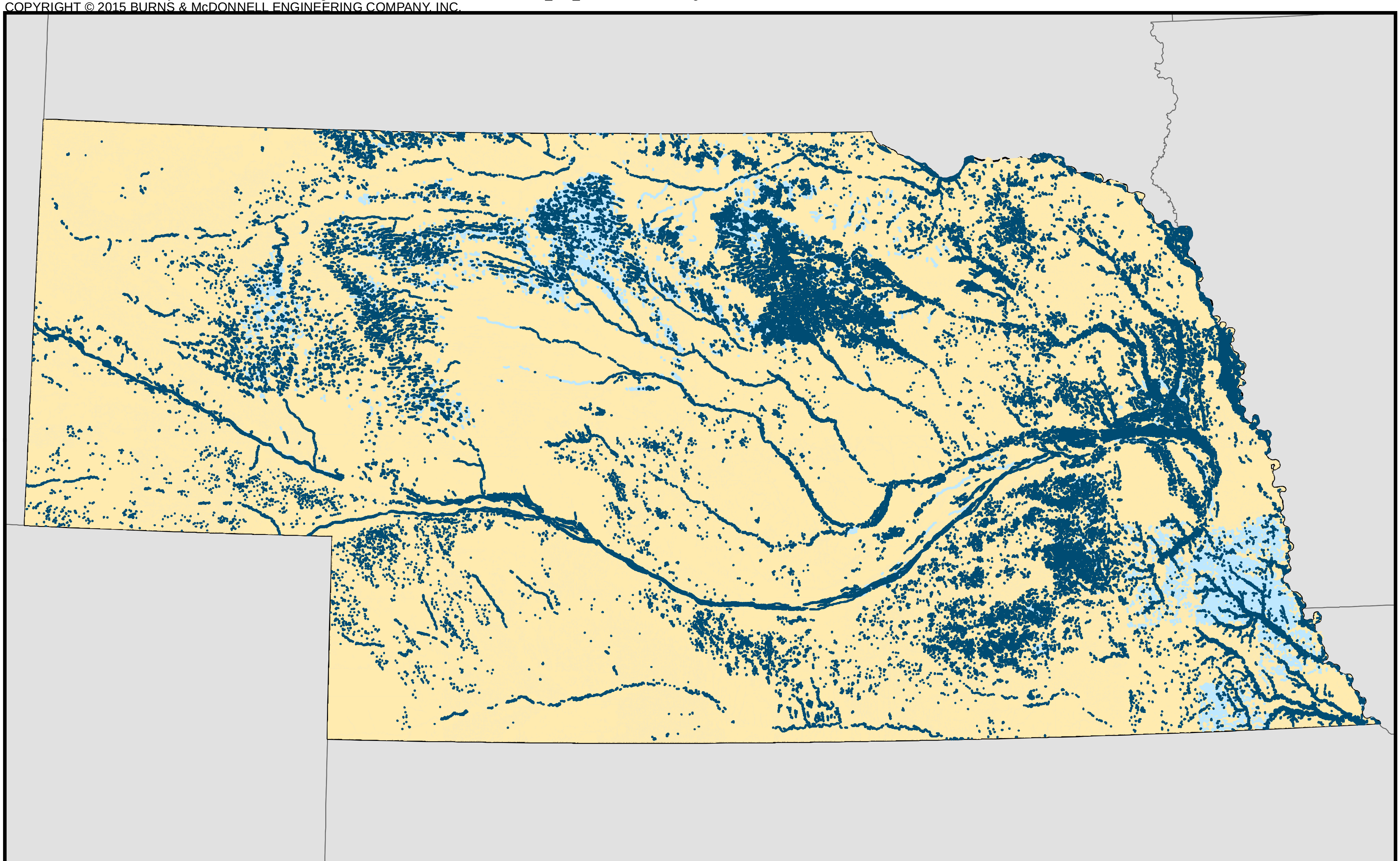

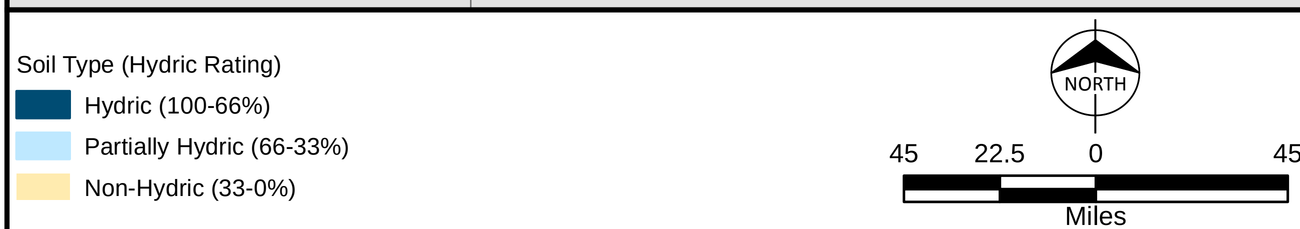

Figure A-7
USDA NRCS Soil Survey
Nebraska Department of Roads

Source: Esri, NDOR, USDA, and Burns & McDonnell Engineering.

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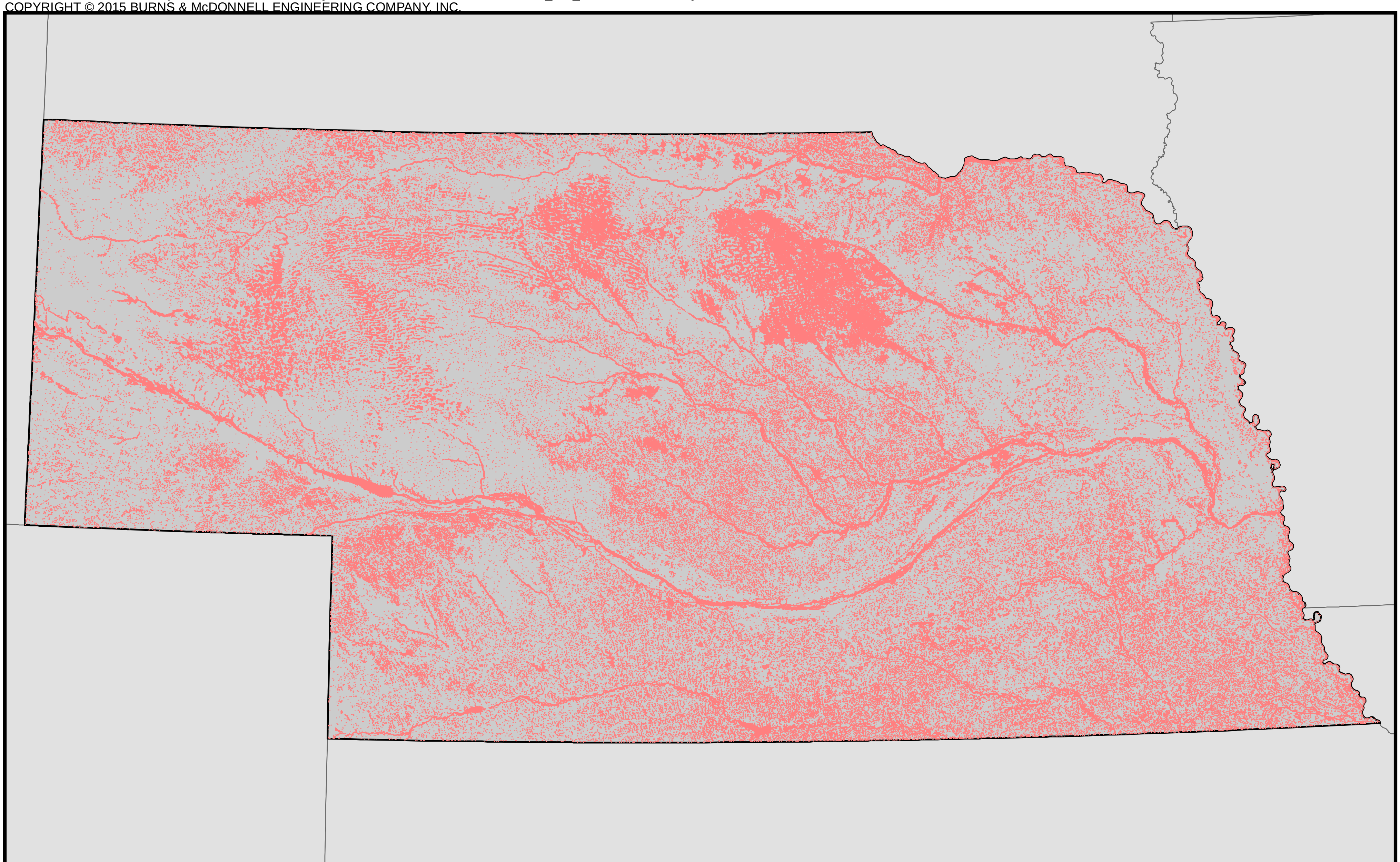

NWI Mapped Wetlands

NORTH

45 22.5 0 45

Miles

Figure A-8
USFWS National Wetland Inventory Map
Nebraska Department of Roads

Source: Esri, NDOR, USFWS-NWI, and Burns & McDonnell Engineering.

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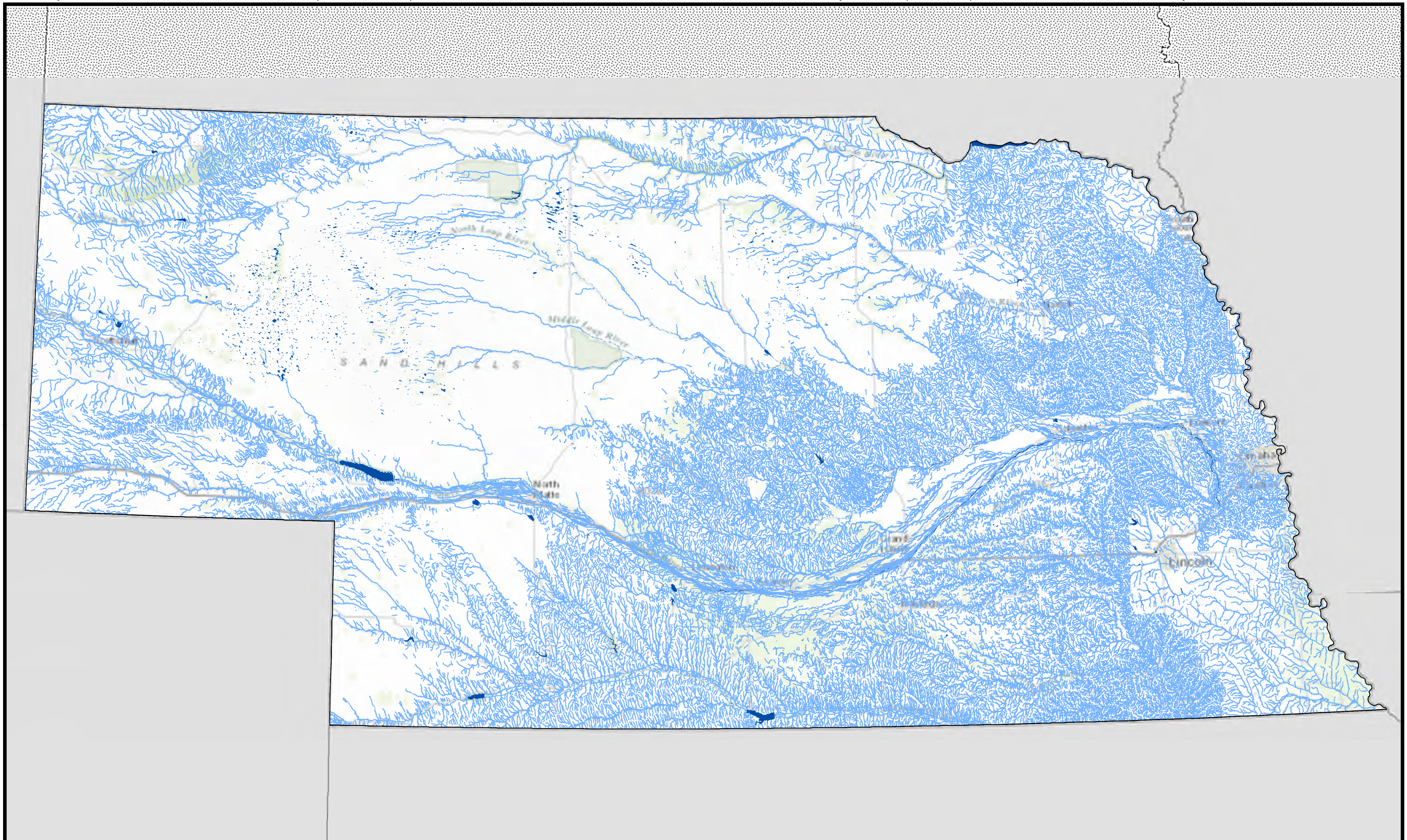
Service Layer Credits: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, METI, © OpenStreetMap contributors, and the GIS User Community



NHD Mapped Streams and Rivers

NHD Mapped Waterbodies

NORTH

45 22.5 0 45

Miles

NDOR
Nebraska
Department of Roads

Figure A-9
USGS Topographic Map
and National Hydrography Dataset
Nebraska Department of Roads

Source: Esri, NDOR, USGS-NHD, and Burns & McDonnell Engineering.

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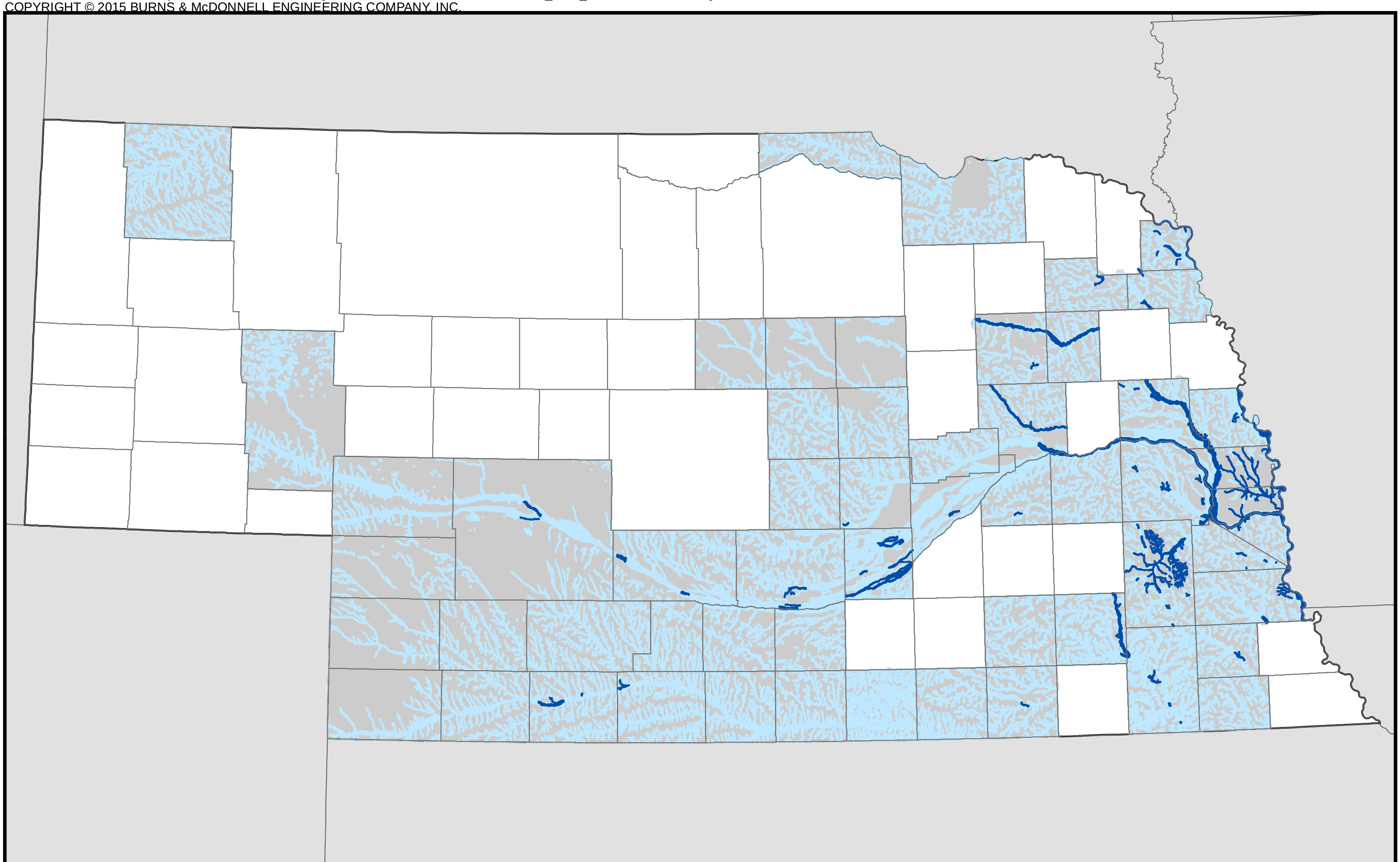

Floodway

Floodplain

Extent of FEMA Coverage

Not Mapped

NORTH

45 22.5 0 45

Miles

NDOR
Nebraska
Department of Roads

Figure A-10
FEMA Floodplain and Floodway Map
Nebraska Department of Roads

Source: Esri, NDOR, USGS, and Burns & McDonnell Engineering.

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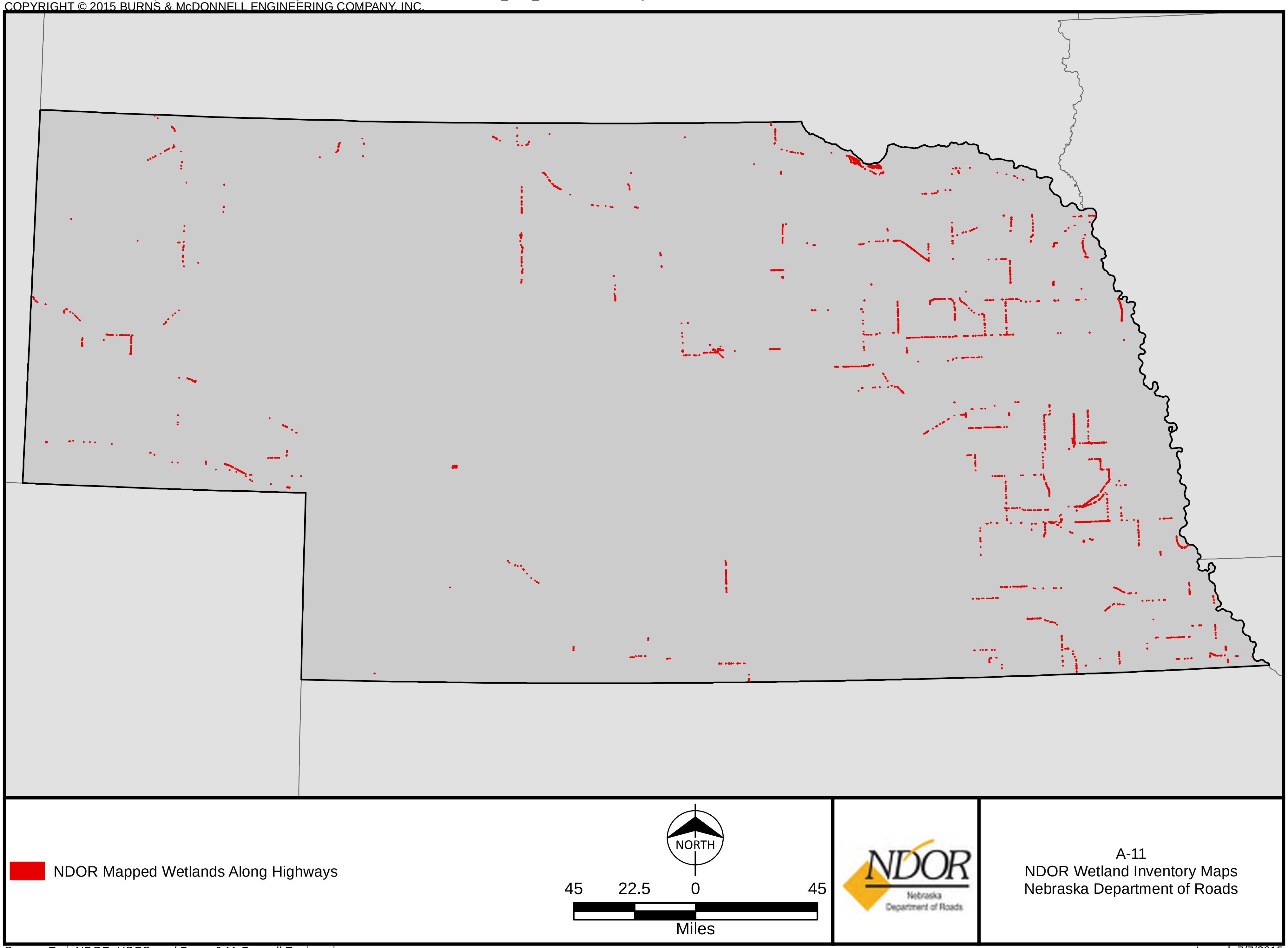

Source: Esri, NDOR, USGS, and Burns & McDonnell Engineering.

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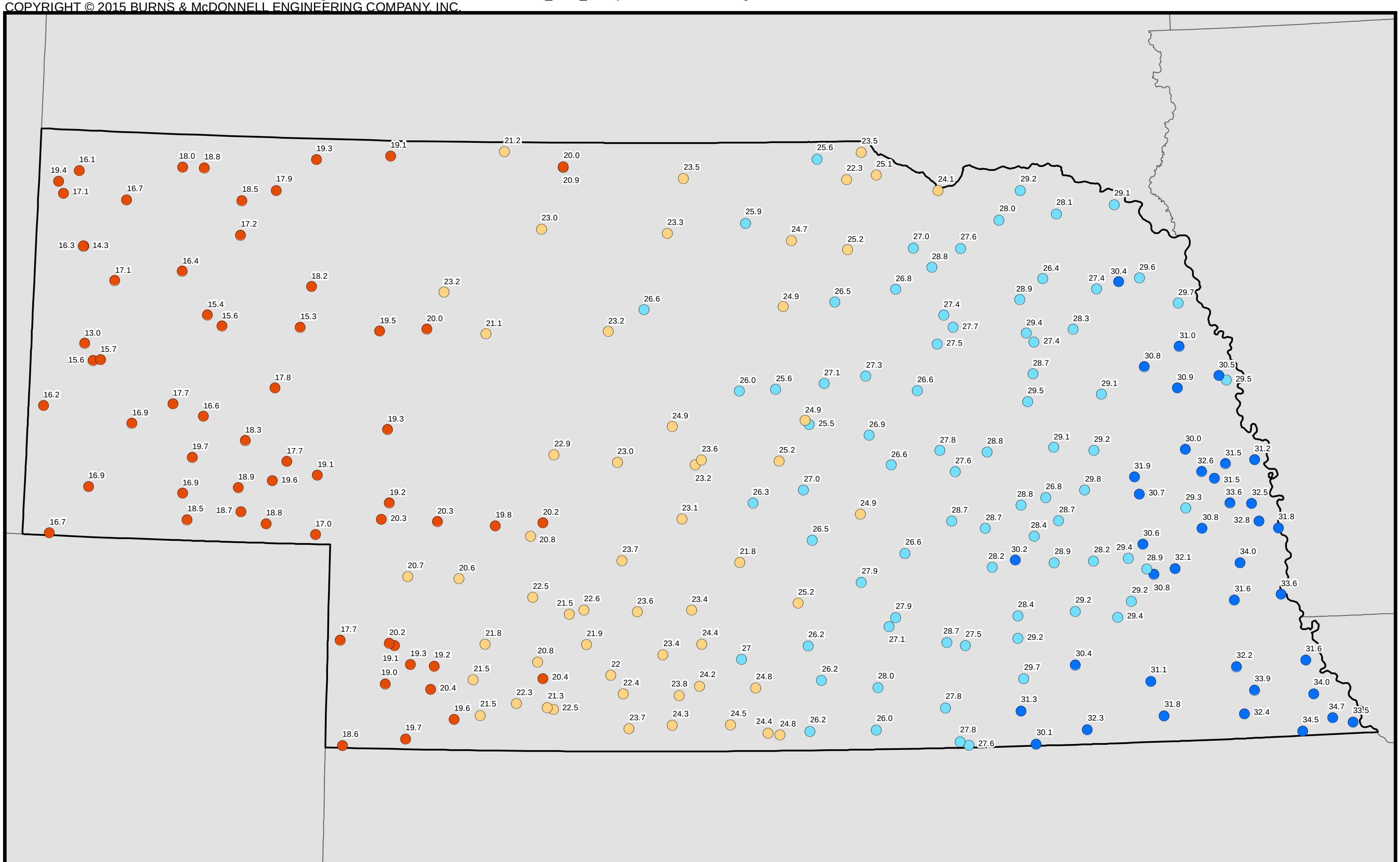

Normal Annual Precipitation (Inches)

- 13 - 20
- 21 - 25
- 26 - 30
- 31 - 35

NORTH

45 22.5 0 45

Miles

NDOR Nebraska Department of Roads

Figure A-12
NOAA Historic Precipitation Data
Nebraska Department of Roads

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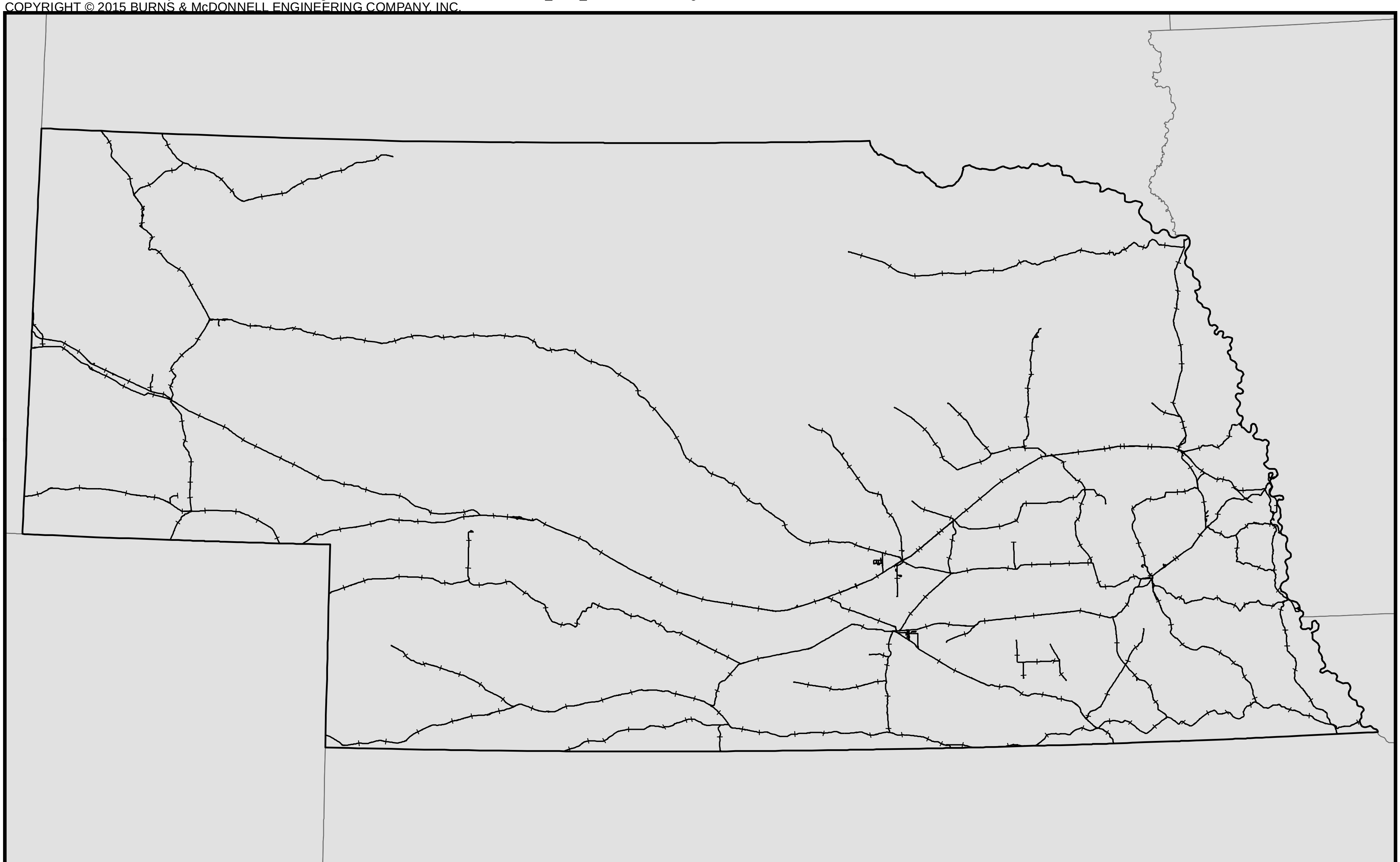
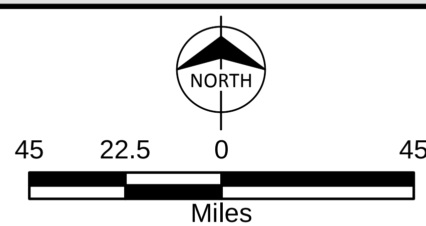


Railroads



NDOR Nebraska Department of Roads

Figure A-13
Railroads in Nebraska
Nebraska Department of Roads

Source: Esri, NDOR, and Burns & McDonnell Engineering.

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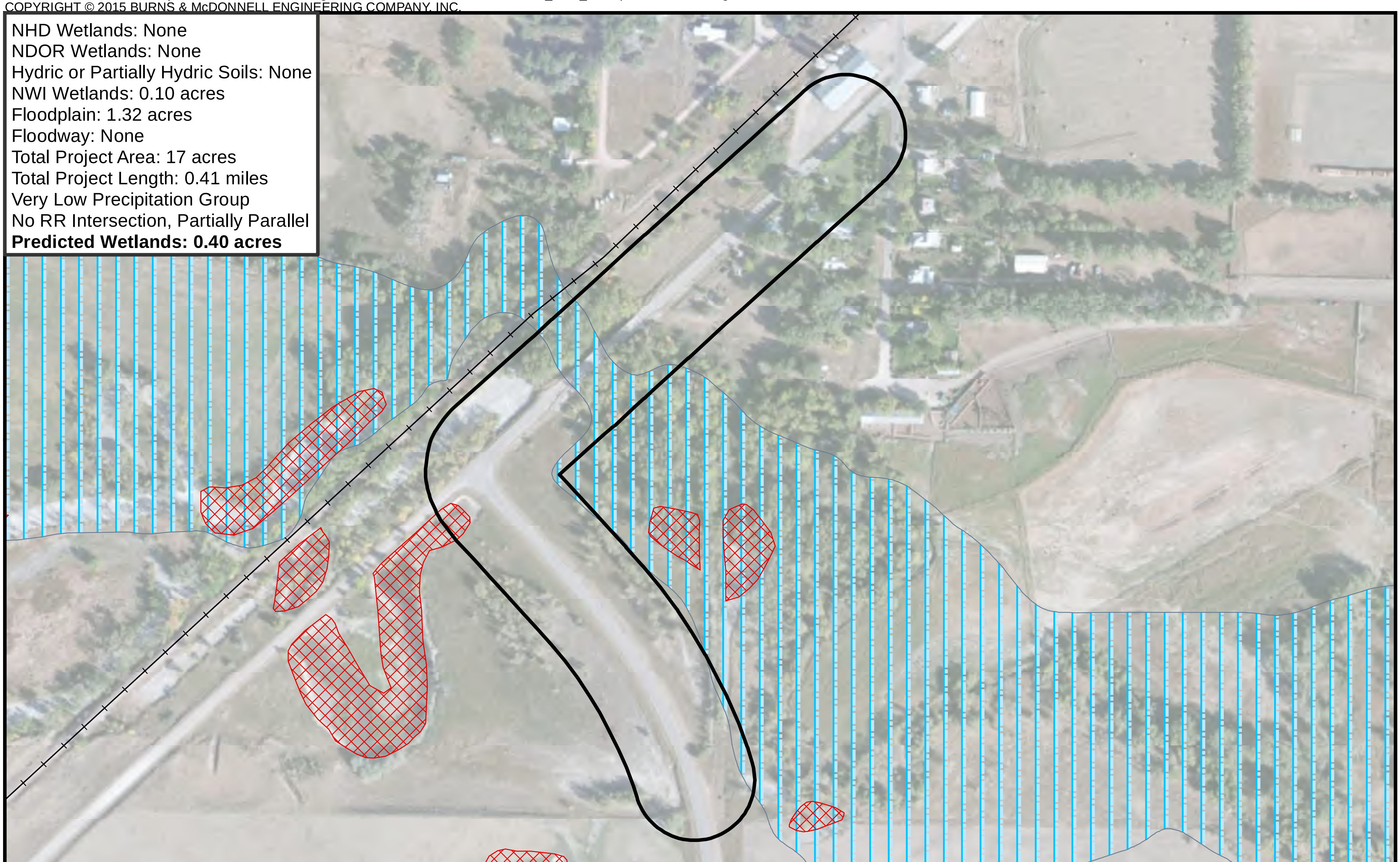

Study Area (150ft Buffer)

Railroad

NWI Wetlands

Floodplain

NORTH

330 165 0 330

Feet

NDOR Nebraska Department of Roads

Figure A-14
Project Example
Control Number: 51528
Nebraska Department of Roads

Source: Esri, NDOR, USFWS-NWI, FEMA, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, and GIS User Community, and Burns & McDonnell Engineering. Issued: 7/7/2015

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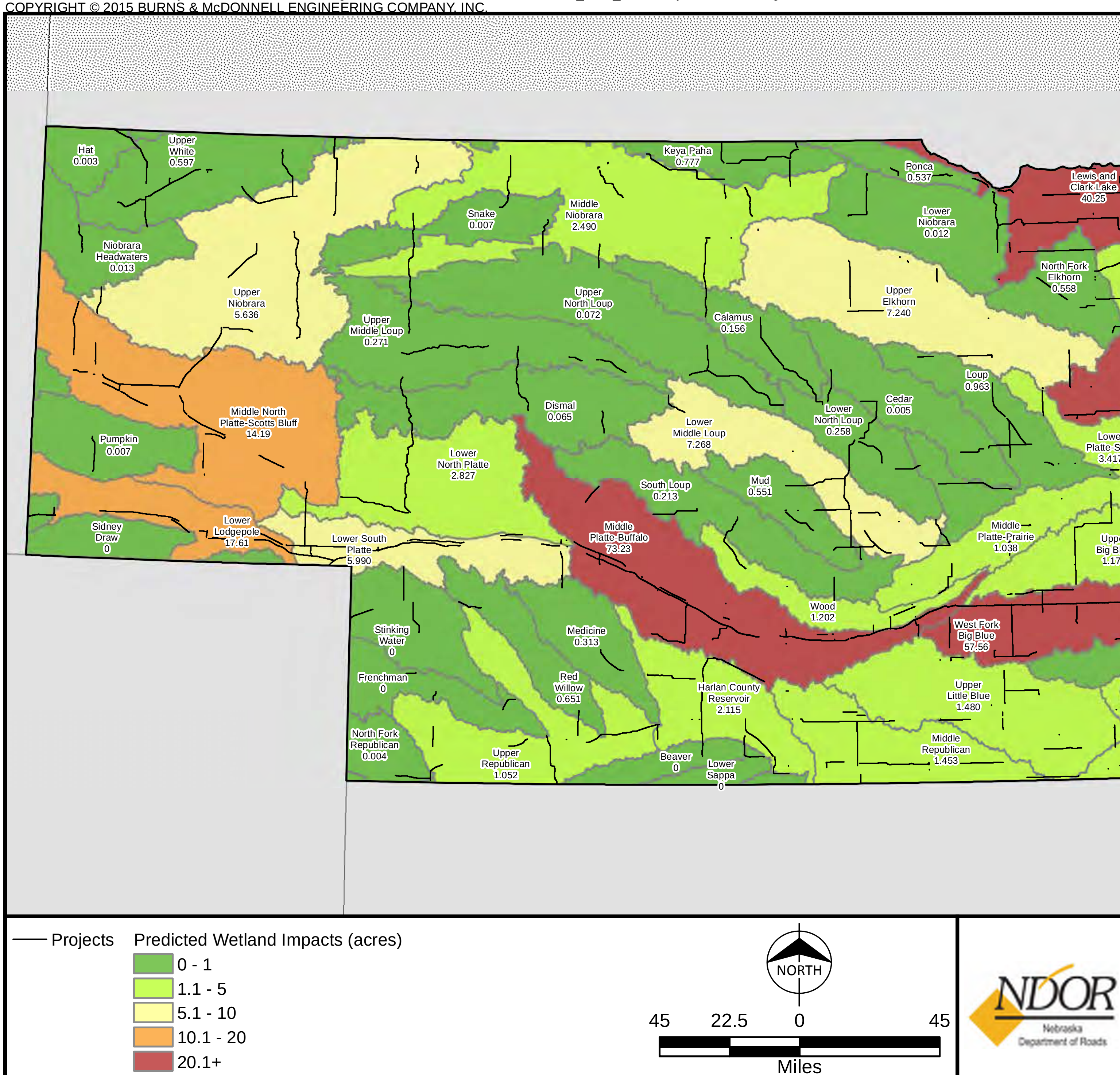

Figure A-15
Predicted Wetland Impacts by
HUC-8 Watershed
Nebraska Department of Roads

Source: Esri, NDOR, USGS, and Burns & McDonnell Engineering.

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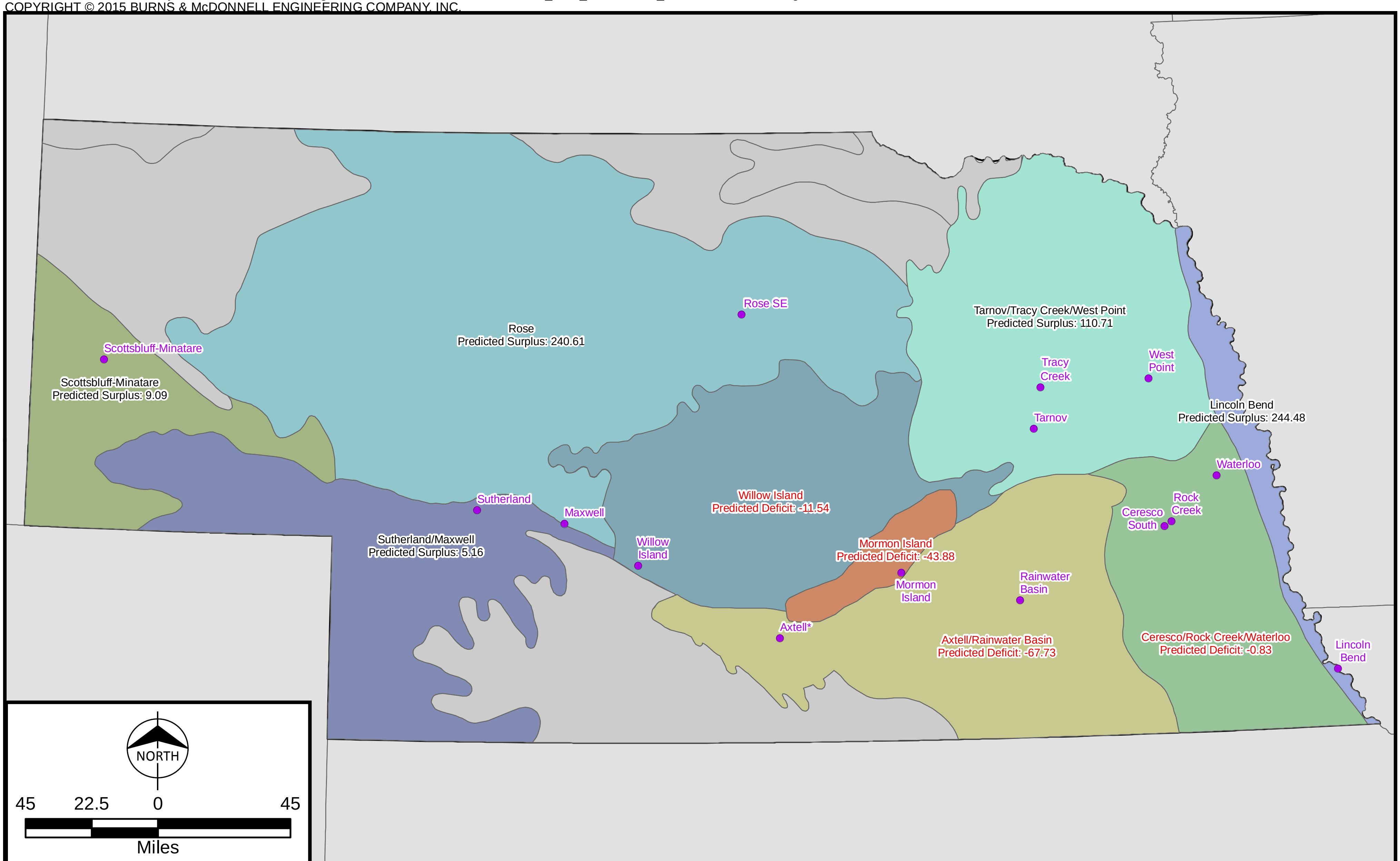

Service Area Name

- MLRA - Platte River Valley, Kearney to Central City (Mormon Island)
- MLRA 102B- Loess Uplands & Till Plains (Tarnov/Tracy Creek/West Point)
- MLRA 106- Loess Drift Hills (Ceresco/Rock Creek/Waterloo)
- MLRA 107- Iowa And Missouri Deep Loess Hills (Lincoln Bend)
- MLRA 65- Nebraska Sand Hills (Rose)
- MLRA 67- Central High Plains (Scottsbluff-Minatare)
- MLRA 71- Central Nebraska Loess Hills (Willow Island)
- MLRA 72- Central High Tableland (Sutherland/Maxwell)
- MLRA 75- Loess Plains (Axtell/Rainwater Basin)
- No Bank Present
- Mitigation Banks

NDOR
Nebraska Department of Roads

Figure A-16
Predicted Mitigation Bank Balance
at Conclusion of 20-year Project Forecast
Nebraska Department of Roads

Source: Esri, NDOR, USGS, and Burns & McDonnell Engineering.

Issued: 7/7/2015

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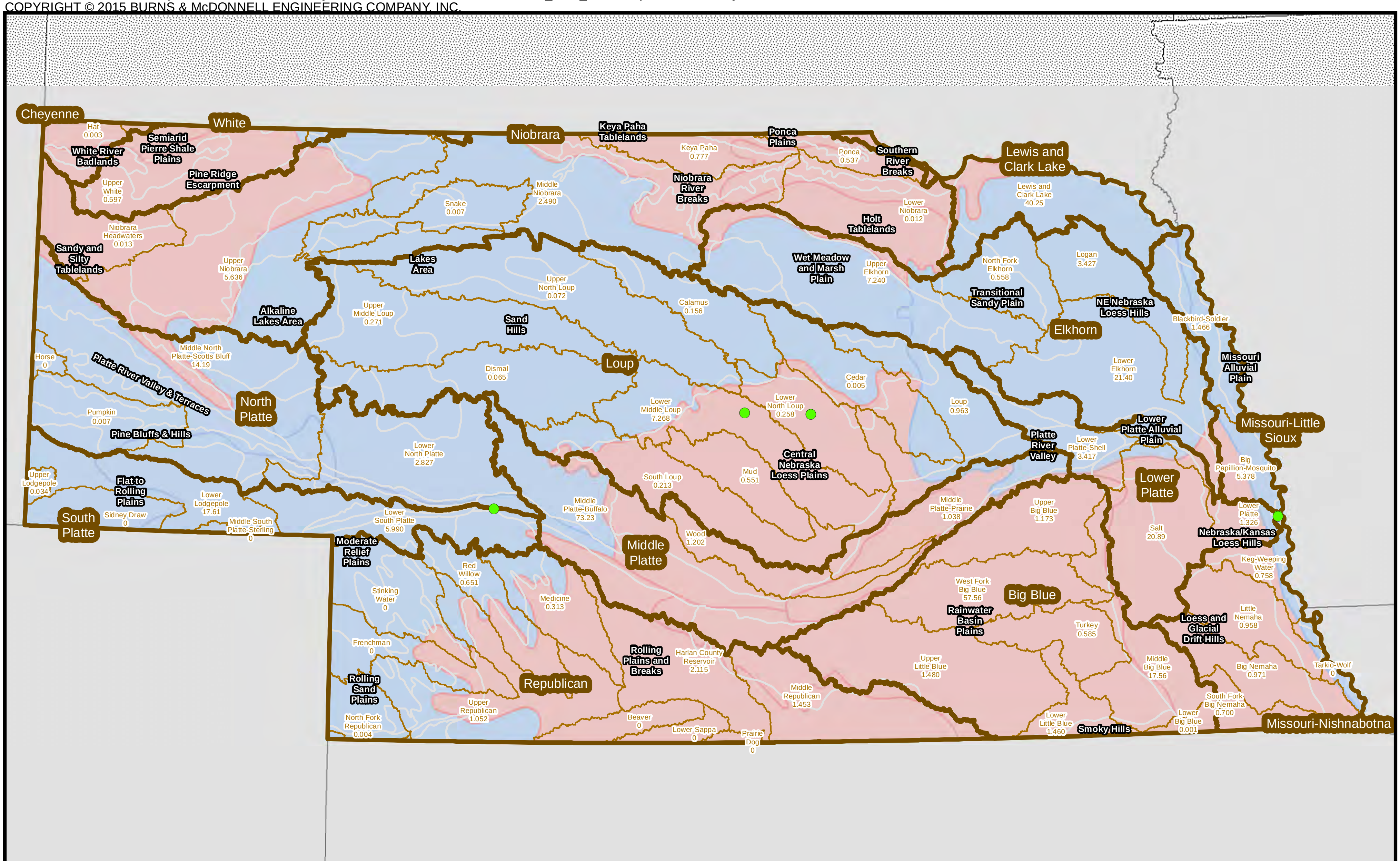

Potential NDOR Banks (In Development)

Ecoregion (Level 4)

HUC-6 Watersheds

HUC-8 Watersheds

Existing Banks & Available Credits

Need Additional Credits

Excess Credits Available

NORTH

45 22.5 0 45

Miles

NDOR Nebraska Department of Roads

Figure A-17
Predicted Mitigation Bank
Needs by HUC-8 and Ecoregion IV
Nebraska Department of Roads

Source: Esri, NDOR, USGS, and Burns & McDonnell Engineering.

Issued: 7/7/2015

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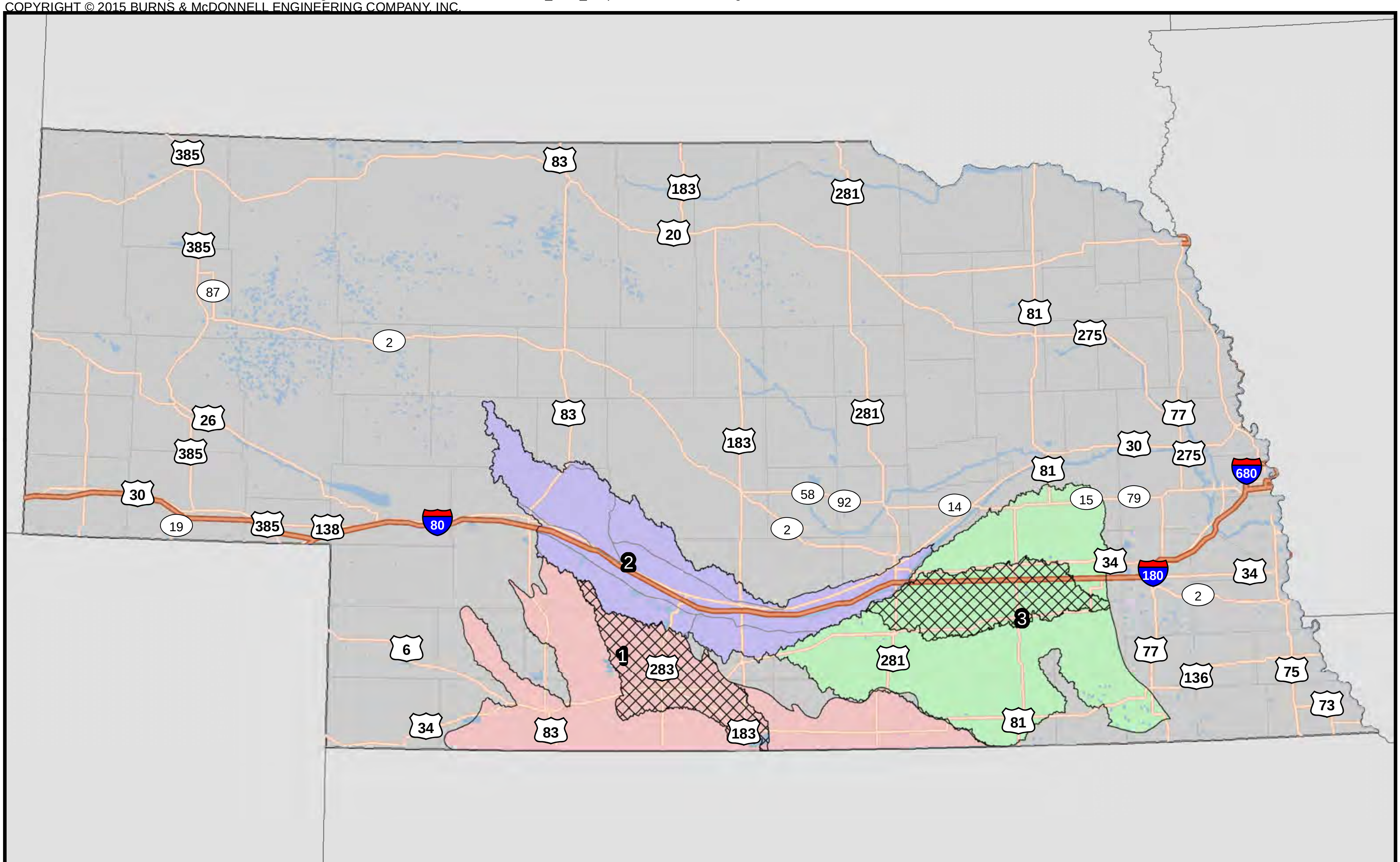

Bank Placement General Service Area

- Proposed Bank 1
- Proposed Bank 2
- Proposed Bank 3

NORTH

45 22.5 0 45

Miles

NDOR Nebraska Department of Roads

Figure A-18
Locations and General Service Areas
for Proposed New NDOR Mitigation Banks
Nebraska Department of Roads

Source: Esri, NDOR, USGS, and Burns & McDonnell Engineering.

Issued: 7/20/2015

APPENDIX B – TABLES

Table B-1. Predicted Wetland Impacts by Mitigation Bank and Year of Anticipated Impact

	Year of Impact																											**Grand**	*Anticipated Credits*
Mitigation Bank GSA	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	**Unk.**	**Total**	*Available*
Axtell/Rainwater Basin	1.38	0.75	1.40	0.77	1.85	5.29	6.73	8.46	6.58	5.93	10.54	3.79	3.29	5.41	9.97	2.05	2.03										0.11	76.32	*8.59*
Ceresco/Rock Creek/Waterloo	1.64	2.19	6.27	5.45	12.09	4.55	2.27	0.09		0.03																	1.91	36.49	*35.66*
Lincoln Bend	1.11	0.32	1.96	0.21	1.11	0.13	0.02						0.65															5.52	*250.00*
Mormon Island	0.53	0.32	0.53	0.01	0.21	0.23												37.81	1.79	10.79	1.87	1.79	8.41	4.22	0.29	0.14		68.95	*25.07*
Rose	0.49	0.77	5.85	0.59	1.16	0.53	0.00																					9.39	*250.00*
Scottsbluff	0.56	4.62	0.53	8.37	7.92	0.03																						22.02	*31.10*
Sutherland/Maxwell	1.49	0.41	4.11	12.21	0.36	0.02	0.01			0.00																		18.60	*23.76*
Tarnov/Tracy Creek/West Point	0.46	1.11	6.53	1.72	1.52	1.22	12.76	0.00	0.10	0.00	0.00	0.00	0.62															26.04	*136.75*
Willow Island	1.69	1.41	4.47	0.59	0.70	4.37	0.51		0.14																			13.89	*2.34*
No Service Area	0.64	7.21	40.68	1.40	0.87	2.17		0.01		0.03																		53.00	
Grand Total:	**9.99**	**19.11**	**72.33**	**31.31**	**27.78**	**18.53**	**22.31**	**8.55**	**6.82**	**5.99**	**10.54**	**3.79**	**4.56**	**5.41**	**9.97**	**2.05**	**2.03**	**37.81**	**1.79**	**10.79**	**1.87**	**1.79**	**8.41**	**4.22**	**0.29**	**0.14**	**2.02**	**330.21**	

Highlighted numbers indicate years in which the bank credit availabilty is deficient.

APPENDIX C – DRAFT AGENCY GUIDANCE

January 26, 2015

Service Area for Mitigation Banks and In-Lieu Fee Programs in the State of Nebraska

Service areas will be approved by the Corps following IRT coordination for each bank site or In-Lieu Fee site. The bank site sponsor will provide a proposed service area. The basis for determining the service area will be provided for review in the site plan by the bank sponsor. In general the following is an approach to preliminarily define the service area.

The service area will consist of the portion of the HUC 8 containing the bank and portions of adjacent HUC 8's that are located in the same EPA Eco-Region Level IV. No consideration will be given to the area where the EPA Eco-Region IV extends across the boundary of the HUC 6 containing the bank. Any portion of an adjacent HUC 8 that is not located within the boundary of the EPA Eco-Region Level IV containing the bank site will not be considered part of the service area.

The Corps will review each service area on a case-by-cases basis to determine the applicability of the above approach, including a review of the portions included of the adjacent HUC 8's located in the same EPA Eco-Region Level IV.

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