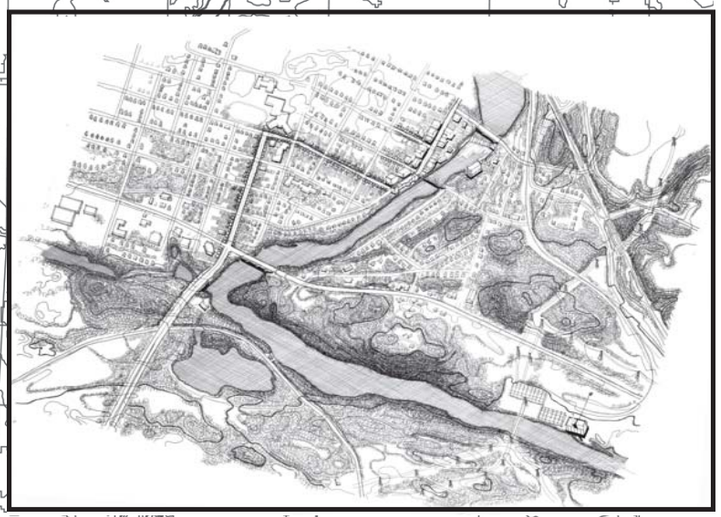
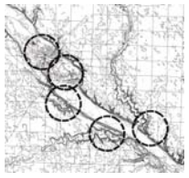
LINKING COMMUNITIES:
THE MINNESOTA RIVER TRAIL



THE CENTER FOR CHANGING LANDSCAPES
COLLEGE OF ARCHITECTURE &
LANDSCAPE ARCHITECTURE
COLLEGE OF NATURAL RESOURCES
UNIVERSITY OF MINNESOTA



ACKNOWLEDGEMENTS

This project was produced and completed by
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Chippewa County
Renville County
City of Granite Falls
Upper Sioux Community
Upper Sioux Agency State Park

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College of Natural Resources
University of Minnesota

CCL
Center for Changing Landscapes
University of Minnesota

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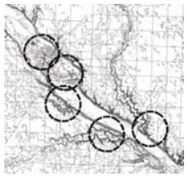
CENTER FOR CHANGING LANDSCAPES
UNIVERSITY OF MINNESOTA



INTRODUCTION

PROJECT SCOPE:

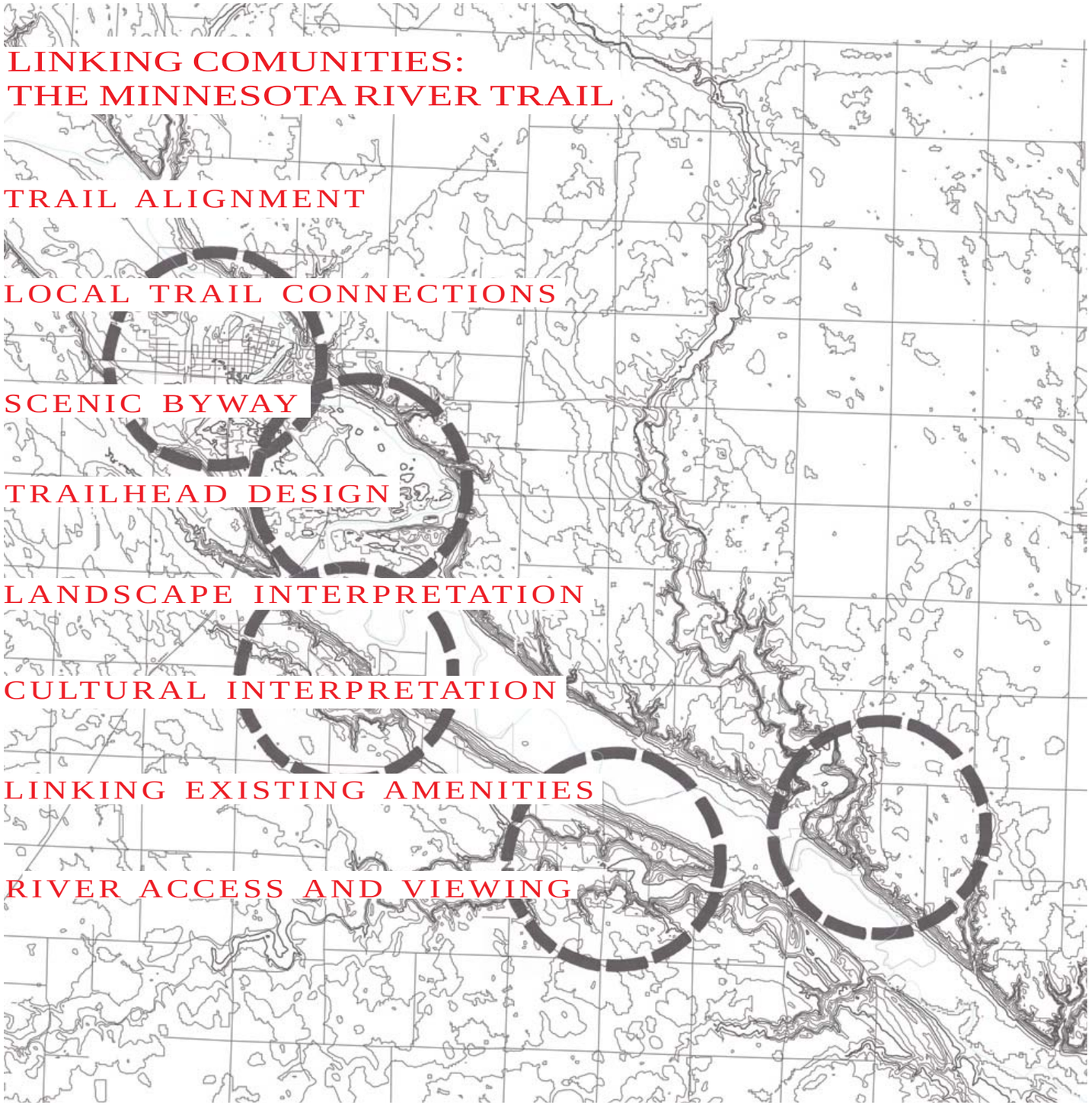
Recreation, natural and cultural resource protection, tourism, and community livability are promoted by designs for the Minnesota River State Trail by a University-DNR-community partnership using design, computer technology, and community participation.

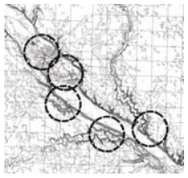
This work augments the Department of Natural Resource's master plan trail work with communities to create a whole systems approach to integrating state trails in communities and their landscapes. Future development patterns in the trail corridor were projected using computer technology. Site specific designs for the integration of the trail with trail communities that address such elements as trail head facilities, trail connections to natural and cultural sites, design of community trail systems that connect to the state trail, and alternative potential state trail corridor alignments.

State recreational trails are very popular because they create opportunities for Minnesotans to experience the natural environment, add to the livability of communities, and contribute considerably to the tourist economy. Valuable in and of themselves, state trails can leverage even more value if the larger context of natural resource systems, cultural amenities, future development patterns, and community form are considered and linked to trail corridors. High-quality recreational experiences, alignment alternatives, natural systems protection strategies, community aspirations and concerns, linkages to cultural and natural amenities, impact of current and future development patterns, the needs of a variety of trail users, specific site designs, and local trail designs were studied. The Granite Falls to Skalbakken proposed trail segment was selected based on timeliness, community interest, opportunities to enhance existing and create new amenities, and the need to remove trail development challenges.

A project team from the Center for Changing Landscapes, an interdisciplinary design center of the College of Architecture and Landscape Architecture (CALA) and the College of Natural Resources (CNR) of the University of Minnesota, the Trails and Waterways Division of the DNR, users groups, and local community groups worked together. The DNR led work with communities and trail groups to ensure local and user input on recreational, tourism, and community issues. The Center for Changing Landscapes provided both technical and design expertise. CNR project team members used existing data, satellite imaging and sophisticated computer technology including neural network modeling methodology to project current land use trends and model land transformations that predict future land use scenarios. CALA project team members created design scenarios for the trail, trail connections, trail amenities, and the trail communities. The work was presented in public meetings for discussion, feedback, and final presentations.

The project has several products. These include maps of the ecology of the trail's landscape and projections of future development and land use trends and designs that can be used by communities to make decisions that make local connections to the state trail and enhance local landscapes and community form.


LINKING COMUNITIES:
THE MINNESOTA RIVER TRAIL
TRAIL ALIGNMENT
LOCAL TRAIL CONNECTIONS
SCENIC BYWAY
TRAILHEAD DESIGN
LANDSCAPE INTERPRETATION
CULTURAL INTERPRETATION
LINKING EXISTING AMENITIES
RIVER ACCESS AND VIEWING

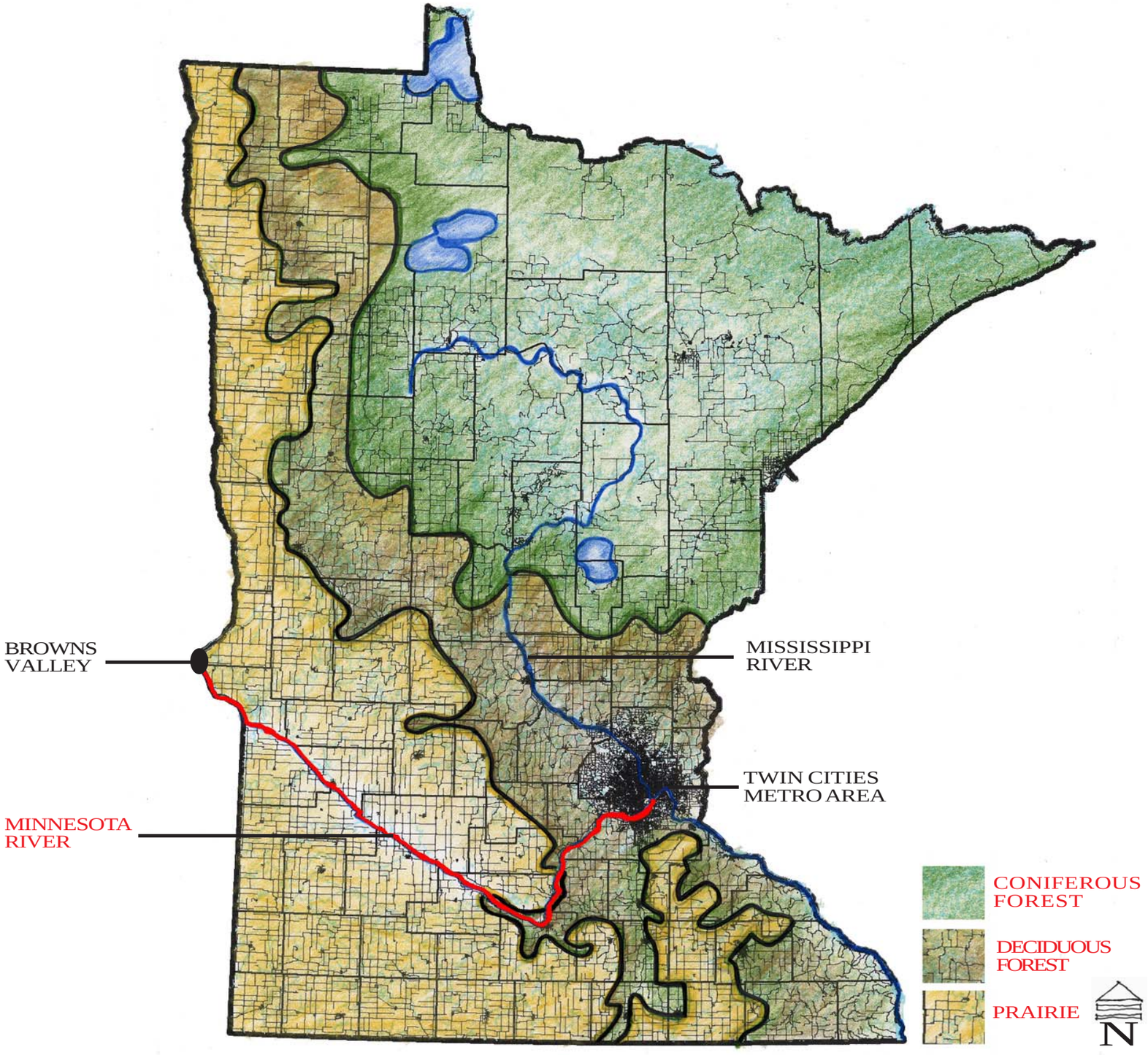


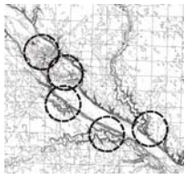
THE REGION

MINNESOTA'S THREE BIOMES:

Minnesota contains parts of the three separate biomes of the North American continent, the northern coniferous forest, deciduous forest, and the tall grass prairie. Plant and animal communities are particularly diverse at the points where these different plant communities meet.

The Minnesota River traversing through this varied landscape makes it of special interest to visitors to the region as well as to state inhabitants. The Minnesota River was historically flanked for nearly its full length by prairie. This combined with the natural topography of the Minnesota River bluff has managed to preserve patches of natural prairie on the steep "loess" slopes along the river. Some of these prairie remnants are now part of the Department of Natural Resources Native Prairie Bank Program providing an additional layer of history to interpret along the Minnesota River Trail.

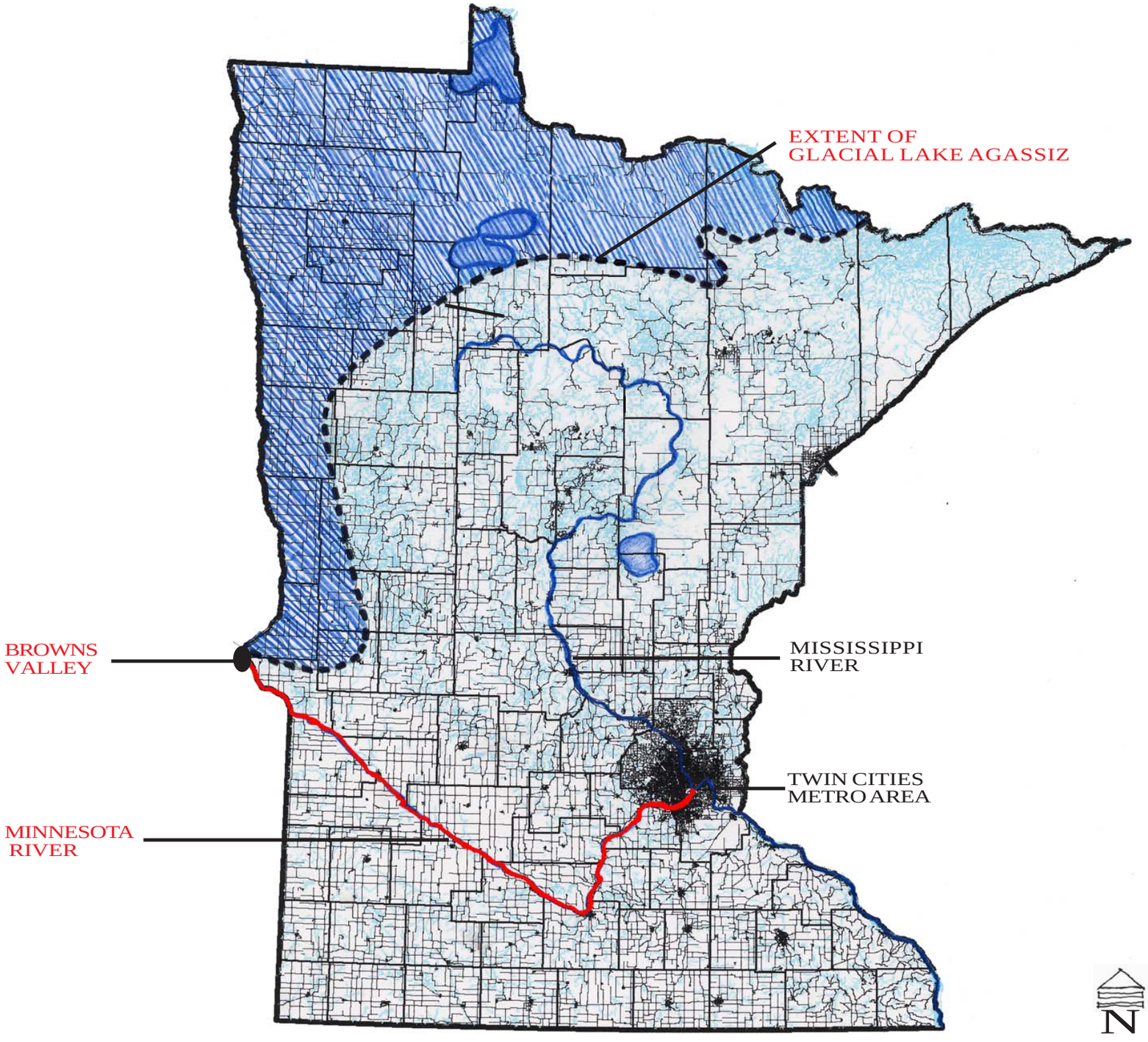

BROWNS VALLEY
MISSISSIPPI RIVER
TWIN CITIES METRO AREA
MINNESOTA RIVER
CONIFEROUS FOREST
DECIDUOUS FOREST
PRAIRIE
N

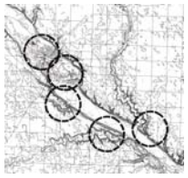


THE REGION

GLACIAL LAKE AGASSIZ & THE MN RIVER VALLEY:

During the final retreat of the Wisconsin Glacier, about 10,000 to 12,000 years ago, the ice mass in Canada prevented normal drainage of the Red River through Hudson Bay and into the Atlantic Ocean. The continental divide in western Minnesota prevented the melt water from draining southeastward into the Mississippi River. As a result, the huge Glacial Lake Agassiz formed along the Minnesota – Dakota border and extended eastward and northward many hundreds of miles. The level of Lake Agassiz eventually rose high enough that it began to drain over the top of the moraine dam near Browns Valley. The Glacial River Warren, which formed from this drainage, carved what is now the valley of the Minnesota River.


EXTENT OF
GLACIAL LAKE AGASSIZ
BROWNS
VALLEY
MISSISSIPPI
RIVER
TWIN CITIES
METRO AREA
MINNESOTA
RIVER
N



THE REGION

MNRIVER VALLEY SCENIC BYWAY:

The scenic byway starts at Belle Plaine and extends west along the Minnesota River to Browns Valley. This route takes the visitor through the landscape of floodplains, tributary rivers, bluffs, historic communities, and rich agricultural land. The culture, history and landscape features along the byway are interpreted by markers and kiosks. In addition to the main byway, alternate routes are designated in the Ortonville, Granite Falls, Redwood Falls, and Mankato areas.

The Minnesota River Valley Scenic Byway was fully designated in 1996 by Minnesota State Scenic Byway Commission. The byway was nominated by many groups and individuals including:

Western Minnesota Prairie Waters Tourism Coalition

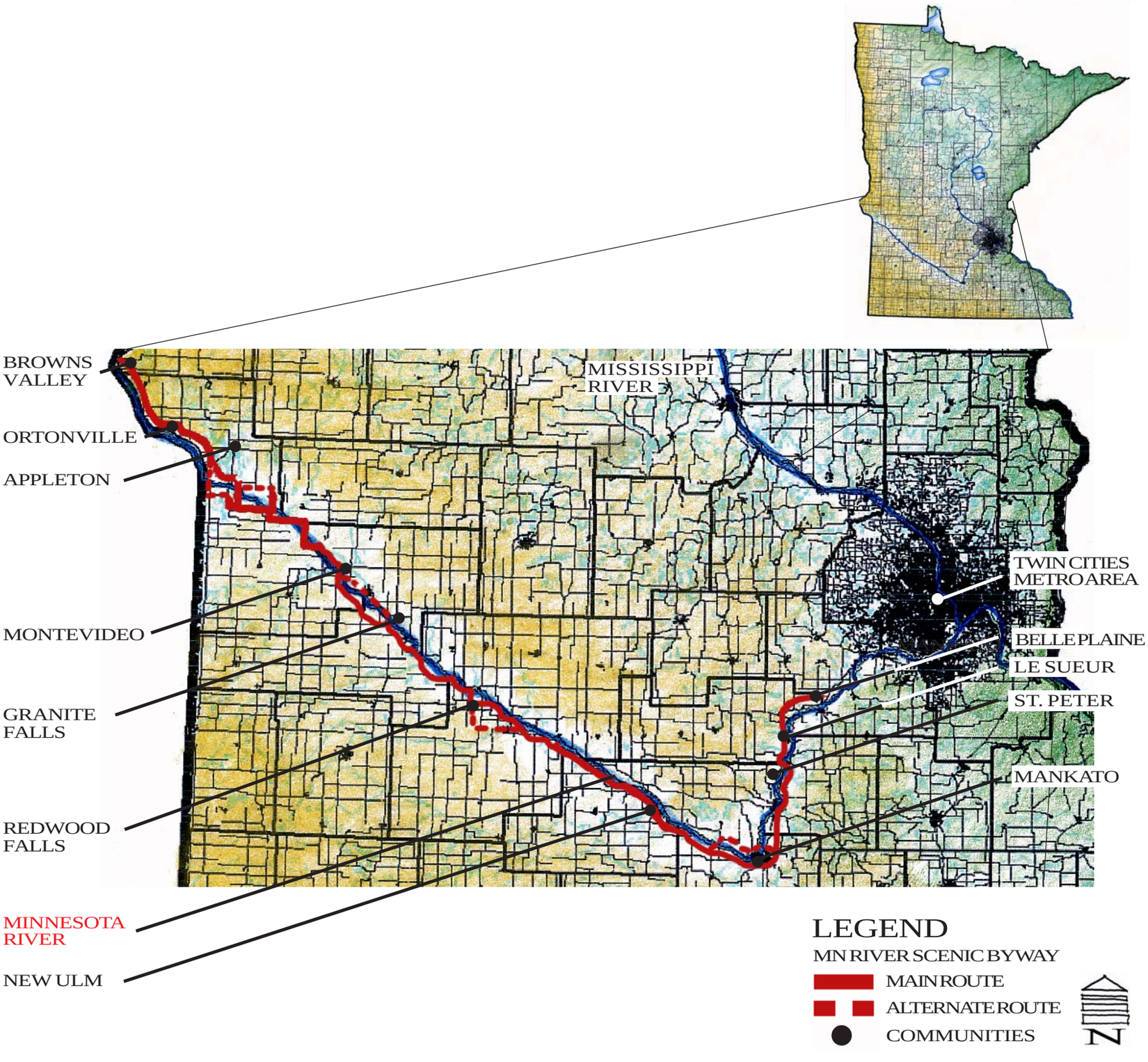
Minnesota River Valley Task Force

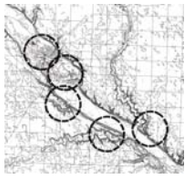
Region Nine Development Commission

Upper Minnesota Valley Regional Development Commission

The counties, cities, townships, and state agencies along the byway.

The Minnesota River Valley Scenic Byway Alliance was formally organized as a Minnesota non profit corporation (according to Minnesota Statute Chapter 317A) in February 1997. The Alliance continues to meet monthly to “promote and develop the scenic byway along the Minnesota River.”


BROWNS VALLEY
ORTONVILLE
APPLETON
MONTEVIDEO
GRANITE FALLS
REDWOOD FALLS
MINNESOTA RIVER
NEW ULM
MISSISSIPPI RIVER
TWIN CITIES METRO AREA
BELLE PLAINE
LE SUEUR
ST. PETER
MANKATO
LEGEND
MN RIVER SCENIC BYWAY
MAIN ROUTE
ALTERNATE ROUTE
COMMUNITIES
N



ANALYSIS

GIS ANALYSIS OVERVIEW:

A regional resource analysis was made of a study area ten miles on each side of the Minnesota River from Montevideo to New Ulm by the Regional Design Graduate Studio, Department of Landscap Architecture, University of Minnesota, Led by Professor David Pitt, the analysis included data layers of:

Bedrock Geology

Surficial Geology

Elevation

Hydrology

Original Vegetation

National Wetlands Inventory

Native Plant Communities

Biodiversity Sites

Land Use

Population Change from 1990 - 2000

Gap Land Ownership

Hydric & Highly Erodable Soils

Infrastructure

These layers were used as the basis from which the initial planning process was begun. The resource maps and a brief description are found in the index pages 74-85. Additional resources considered in the trail alignment and trailhead selection were:

DNR Heritage Database mapping of rare and endangered species

DNR Prairie Bank potential sites

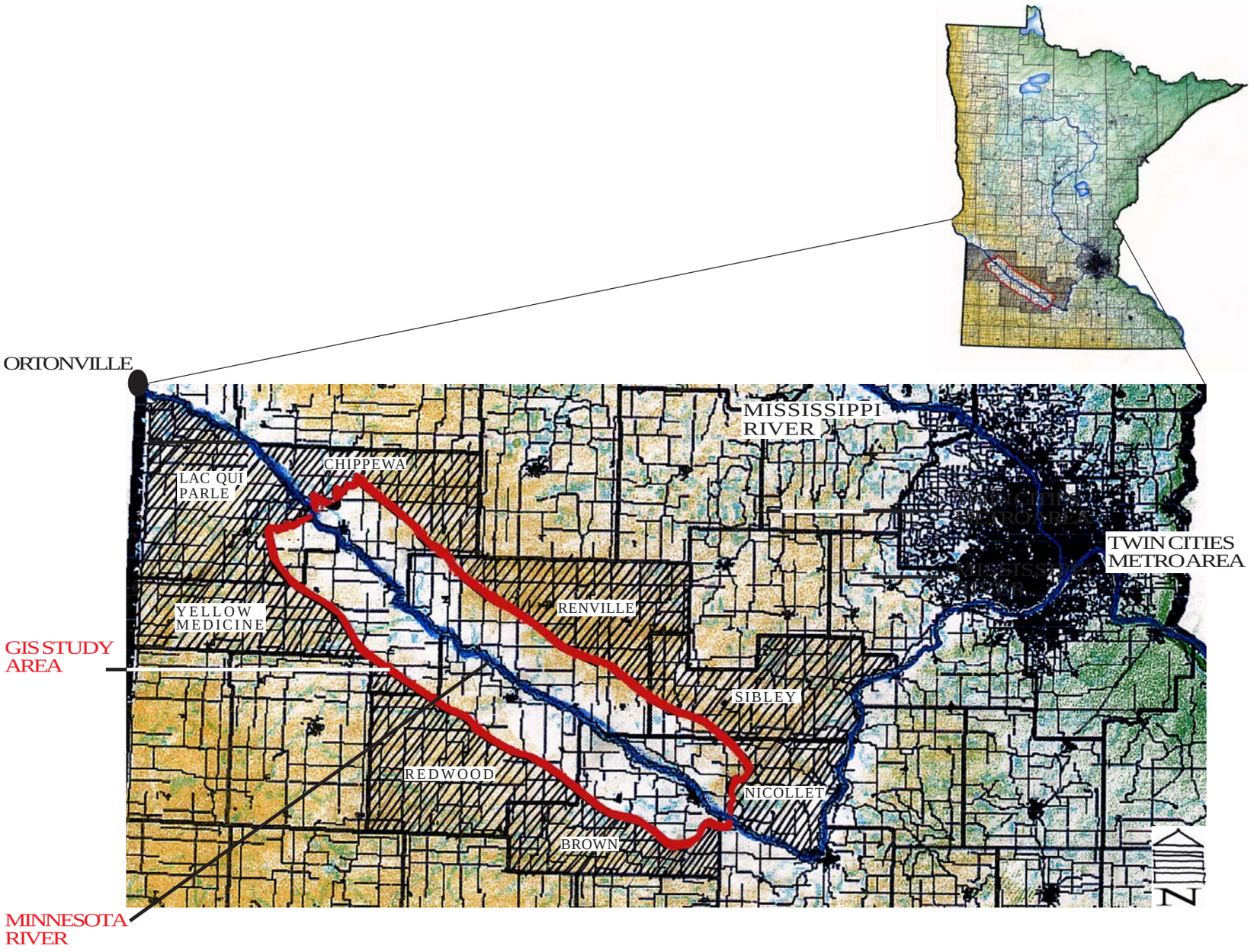
DNR mapping of rare and protected habitats

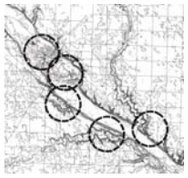
Historic Structures

Recreation Sites

Utilities

County Well Index (CWI)


ORTONVILLE
MISSISSIPPI RIVER
CHIPPEWA
LAC QUI PARLE
YELLOW MEDICINE
RENVILLE
SIBLEY
REDWOOD
NICOLLET
BROWN
TWIN CITIES METRO AREA
GIS STUDY AREA
MINNESOTA RIVER
N



ANALYSIS

LAND TRANSFORMATION MODELING:

The research team considered the implications of future growth patterns on the character of the area in the context of the opportunities and challenges that the area's many amenities provide for its future. Emphasis will be on the on the area's physical form.

To determine how much non-urban land within and around the Minnesota River Trail will transition to urban land in the future, specifically by years 2020 and 2050, analysts from the College of Natural Resources used a digital modeling tool called the Land Transformation Model (LTM). Developed by Michigan State University, this tool uses land use and land use change data from the past to predict how land use will change in the future. The model makes its predictions by considering factors that drive change, like distance to lakes, distance to interstates, and elevation. Details of this model and its application in this study are provided in the appendix pages 86-89.

PURPOSE OF THE REPORT:

The research team will analyze the area's natural systems, existing natural and cultural amenities, development patterns, and land uses. The purpose of this report is twofold: First, to describe the application of the Land Transformation Model (LTM) to an analysis and projection of land use for the Minnesota River study area in Southern Minnesota shown on page 15. Second, to show how the LTM results can be applied to guide specific community planning and design.

STUDY AREA:

The study area traverses the length of the Minnesota River in Minnesota. This is an area long known for its fishing, golfing, biking, and birding opportunities. Additionally, the area is an important part of the southern Minnesota ecosystem that provides high quality aesthetic features, and habitat for a wide range of game and non game wildlife species. Our study focuses on the Minnesota River Valley and its surrounding area.

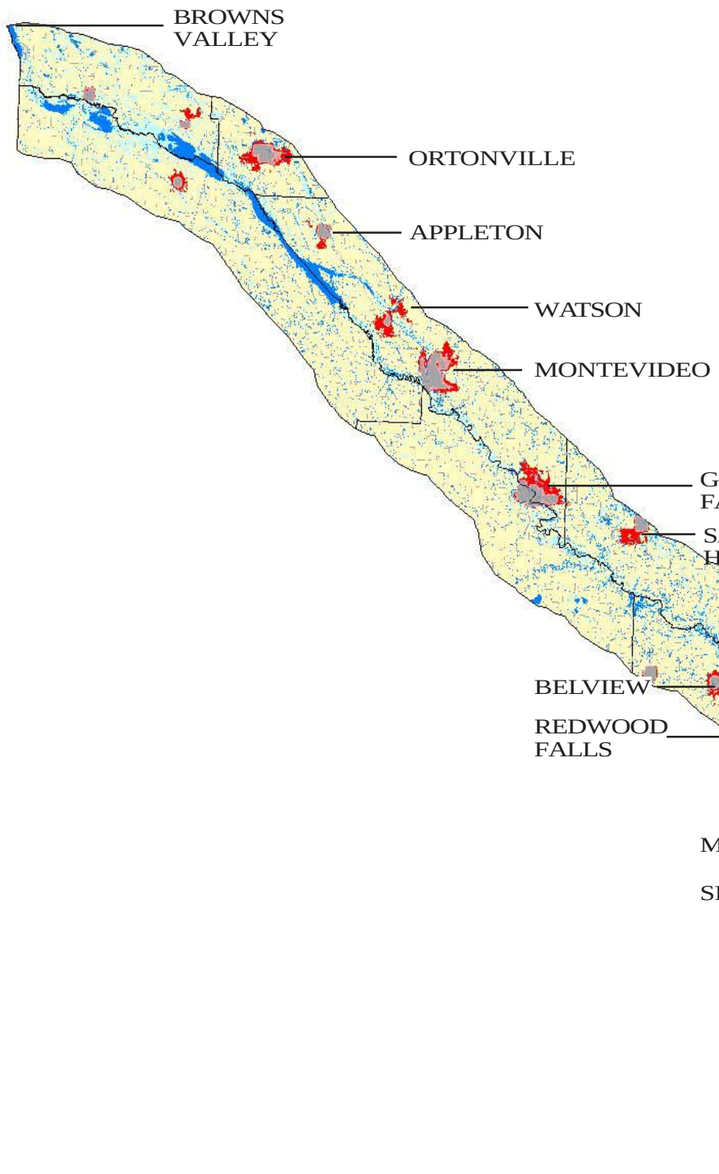
URBAN TRANSFORMATION PROJECTION:

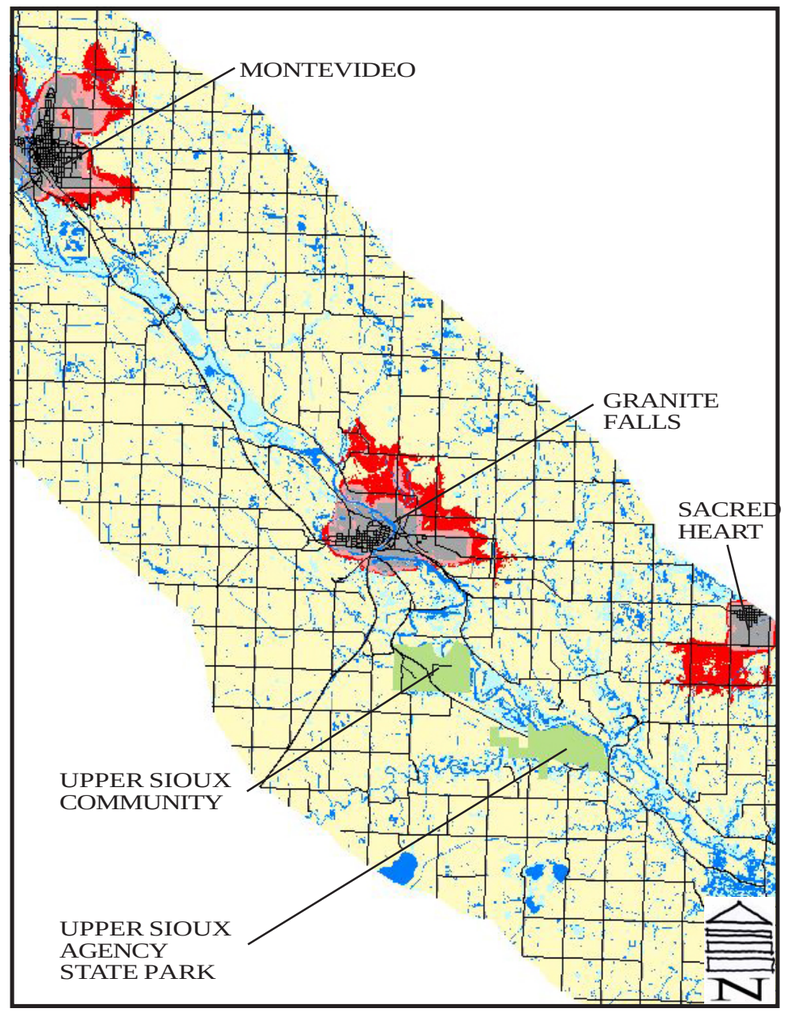
Using the same method to project the 1991-2000 urban transformation, analysts projected urban transformation for years 2020 and 2050. Here's what they found:

The LTM projected a 56 percent increase in the area classified as urban land between 2000 and 2020. The increase projected for 2000 to 2050 was 140 percent. Among the 10-predictor variables, the four most significant variables for predicting land-use change for 1991-2000 were, in decreasing order of importance: distance to urban; distance to highways and county roads; population density, and; distance to water. Based on these variables, the LTM indicates that over the 9-year study period, non-urban to urban land change is concentrated around areas of existing population and development.

The Minnesota River Trail may also be analyzed further by subregion based on differences in landscape character or selected communities.

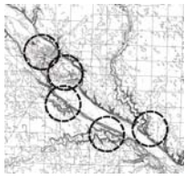
In using these projections, caution is urged to avoid over-interpretation. These projections assume rates of change observed from 1991-2000 will continue. That further implies continuation of the driving forces and constraints behind change. Yet we know there is change in these forces and constraints over time. Thus the projections should be viewed as suggestive of change and where it will likely occur, but not as a precise forecast. Additionally, the 2050 projection should be viewed as much more speculative than the projection to 2020.





LEGEND

- WETLANDS
- URBAN
- AGRICULTURE
- 2020 PROJECTION
- 2050 PROJECTION
- WATER



ANALYSIS

LANDSCAPE SUITABILITY COMPOSITE:

Map themes were set up and overlaid to analyze physical suitability of the landscape for trail construction. This focused look at the landscape between Granite Falls and Skalbakken County Park identified areas of opportunity and constraint for trail routing shown on the map layout on the facing page. The data layers used to create this composite included:

Data Layers used to create this composite:

100 year Floodplain from the Federal Emergency Management Agency (FEMA)

National Wetlands Inventory (NWI)

Slopes in excess of 15% from USGS Minnesota Digital Elevation Model (DEM)

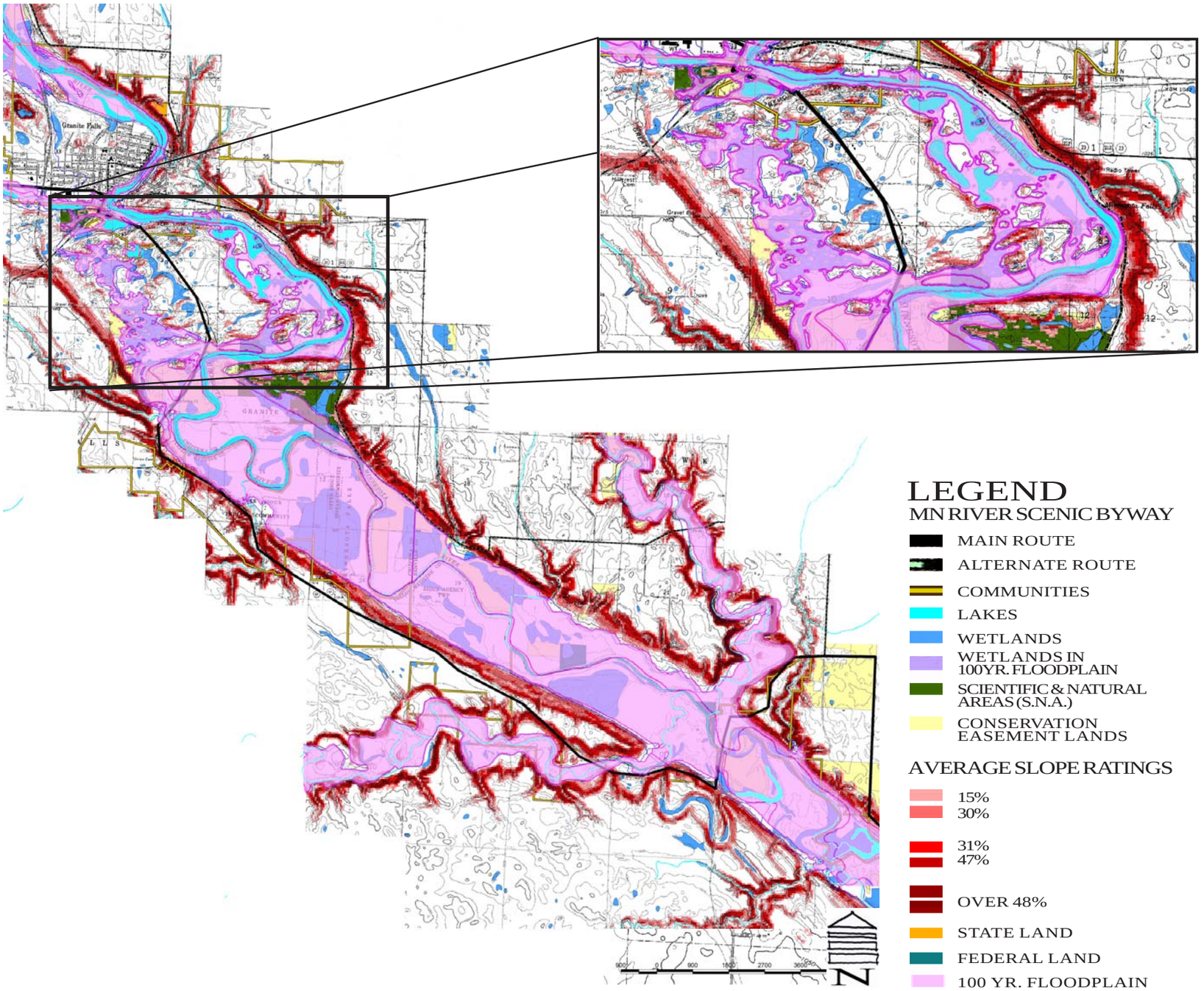
Scientific & Natural Area (S.N.A)

Conservation Easement Lands (C.R.E.P & R.I.M.)

State Land

Federal Land

GRANITE FALLS - SKALBAKKEN COUNTY PARK



TRAIL STRATEGIES

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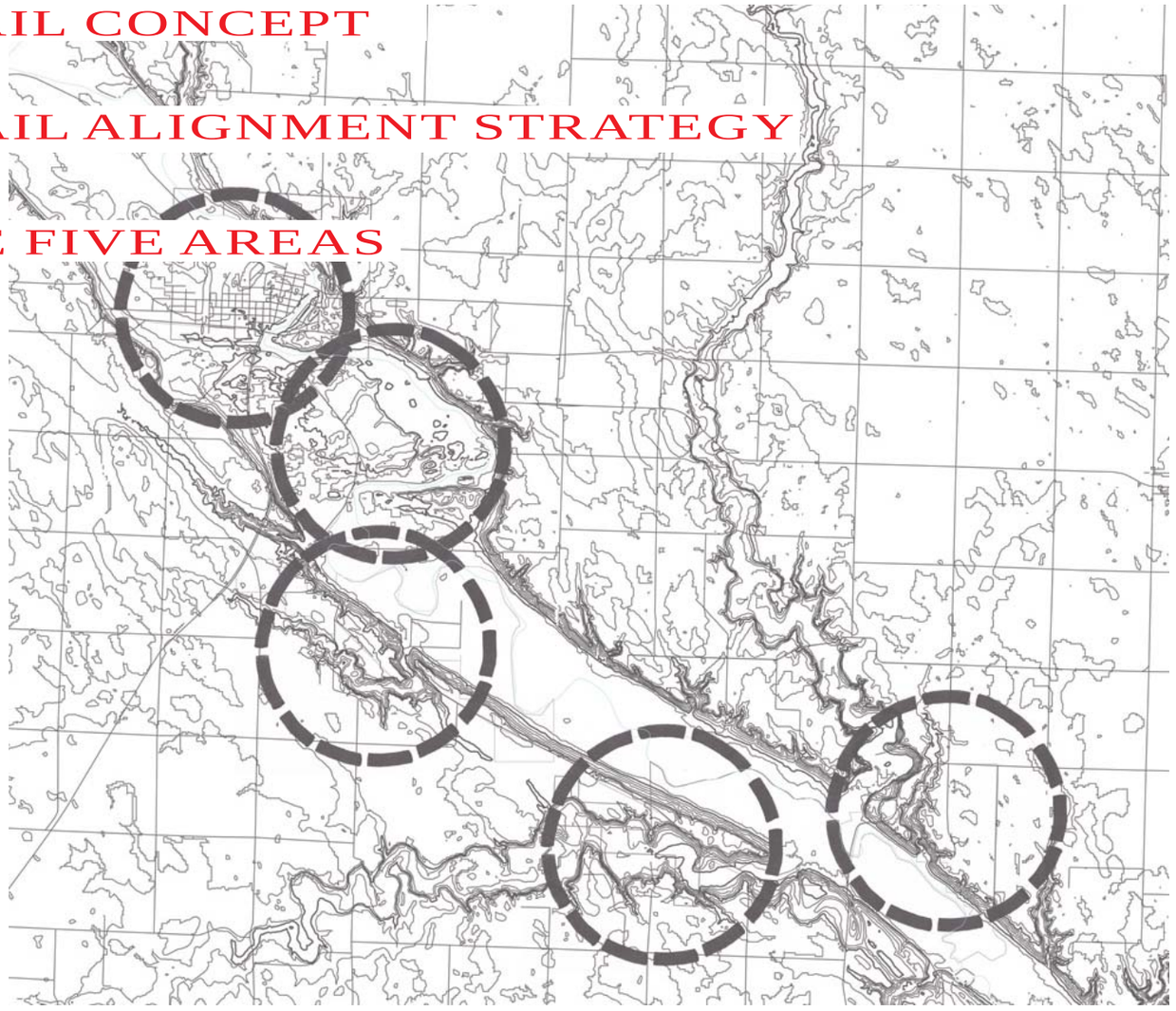
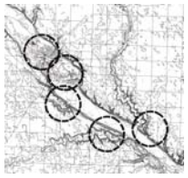
TRAIL CONCEPT

TRAIL ALIGNMENT STRATEGY

THE FIVE AREAS





TRAIL STRATEGIES

TRAIL CONCEPT & ALIGNMENT STRATEGY:

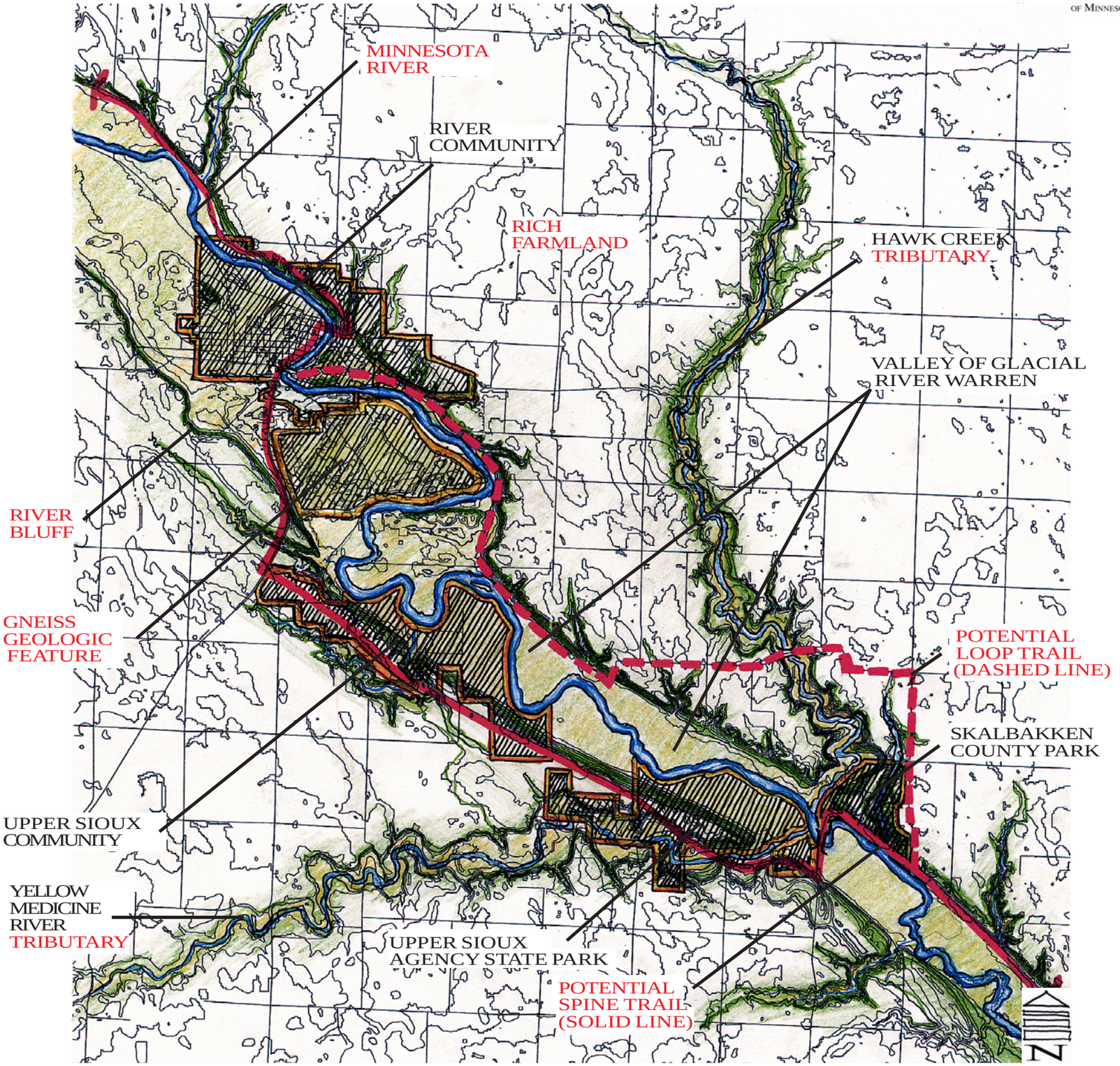
The Minnesota River State Trail is to follow the Minnesota River as it transverses the southern third of the State of Minnesota. When completed it will stretch from the City of LeSuer in the east to the City of Ortonville in the west. The initial phases of the design investigation focused on understanding the nature of this varied and interesting landscape and creating design strategies for the trail. It developed two trail strategies: celebrating the unique characteristics of this vast Glacier River Warren landscape and creating memorable, ride-able, walk-able trail loops that are accessed from the many towns along the Minnesota River. The richness of the landscape in the segment selected for this study is evident in the map on the page opposite.

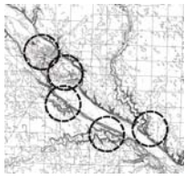
THE VALLEY OF THE GLACIAL RIVER WARREN CONCEPT:

The powerful torrential waters from Glacial Lake Aggassiz that became the mighty Glacial River Warren carved a wide riverbed across Minnesota that is visible today long after the glacial waters have gone. The modern Minnesota River meanders through this riverbed on its way to its confluence with the Mississippi River at Fort Snelling. The design team sought to celebrate the unique landscape features that the River Warren created and revealed which include some of the oldest rock formations on earth. It also sought to interpret the landscape that the River Warren moved through including the many tributaries to the modern Minnesota River and the rich farmlands and prairies on the bluff lands far above the ancient river bed. Interpretation focused on both the natural and the cultural aspects of the historic and present day landscape.

TRAIL SPINE & LOOPS STRATEGY:

The second design strategy conceptualized the trail having a main spine consisting of a two-way paved trail with trailheads in the Minnesota River towns. In addition to the main spine, paved and unpaved trail loops off the main trail would move through the river bottom lands, climb to the bluff lands, cross the river, and return to the main trail and the town of origin. Existing and potential amenities that could be accessed from the trail were identified. Care was taken to respect the rights of property owners and the restrictions imposed upon protected lands.


MINNESOTA RIVER
RIVER COMMUNITY
RICH FARMLAND
HAWK CREEK TRIBUTARY
VALLEY OF GLACIAL RIVER WARREN
RIVER BLUFF
GNEISS GEOLOGIC FEATURE
POTENTIAL LOOP TRAIL (DASHED LINE)
SKALBAKKEN COUNTY PARK
UPPER SIOUX COMMUNITY
YELLOW MEDICINE RIVER TRIBUTARY
UPPER SIOUX AGENCY STATE PARK
POTENTIAL SPINE TRAIL (SOLID LINE)
N



TRAIL STRATEGIES

THE FIVE AREAS:

Five areas of unique identity were identified for focused work through an analysis of the environmental and cultural characteristics of the trail segment. These included the City of Granite Falls, the Minnesota Falls Area, the Upper Sioux Community, the Upper Sioux Agency State Park, and Skallbakken County Park.

RIVER WARREN CITY, GRANITE FALLS:

Granite Falls is the only city sited within the riverbed of the Glacial River Warren. Its rock outcroppings, falls, historic buildings, historic sites, and riverfront parks could make it a rich trail environment. Because the city experienced recent flooding, it also offers an opportunity to link the development of a new trailhead to the flood control projects and business district revitalization that are to start soon in the riverfront area.

GNEISS / PRAIRIE BANKS, MINNESOTA FALLS:

Geological outcroppings, a prairie landscape, and a public riverside park characterize this area. It has a park with river access and many other facilities. One of the falls of the Minnesota River is located here by the site of an early white settlement.

DAKOTA CULTURE, UPPER SIOUX COMMUNITY:

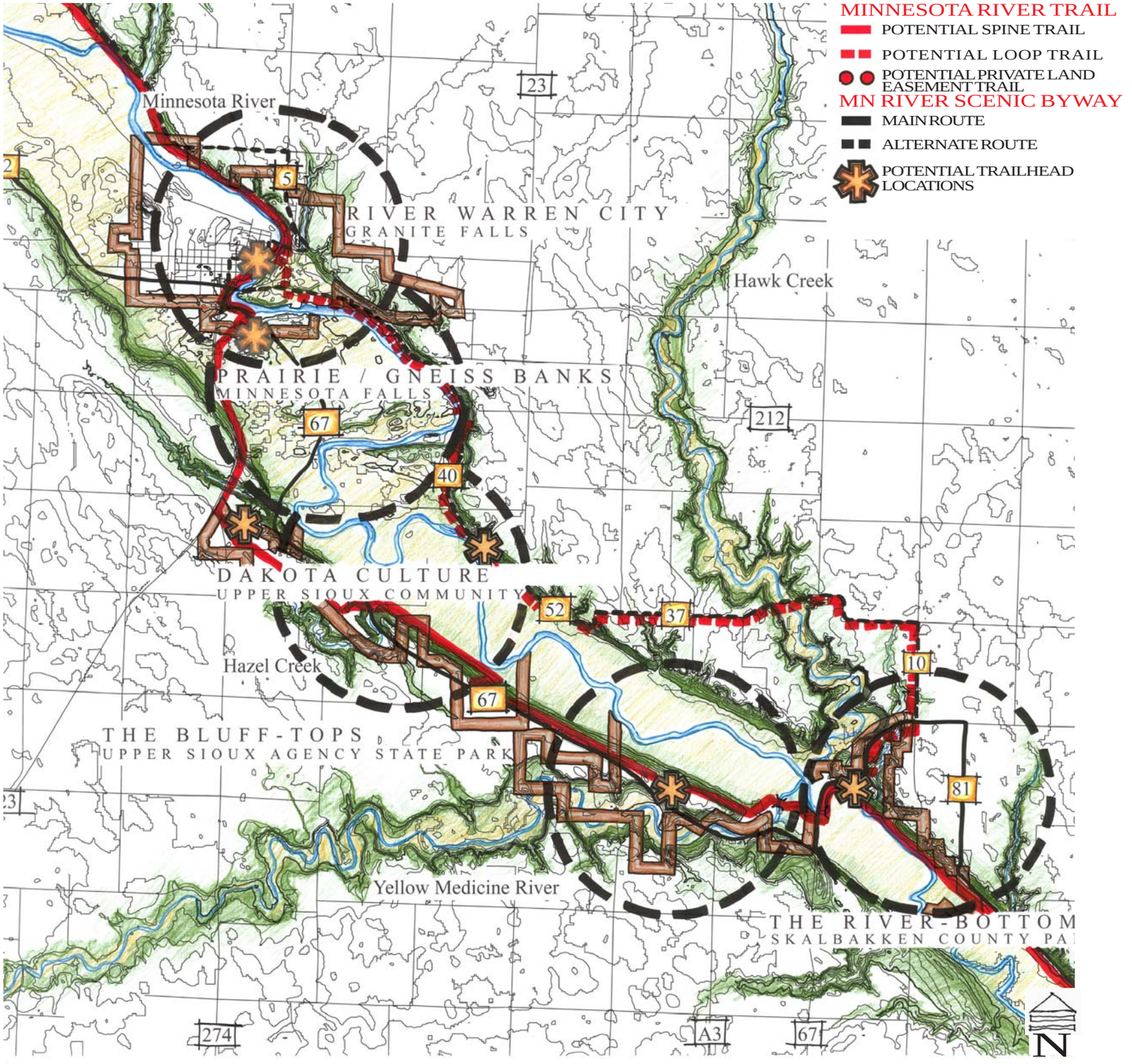
The Upper Sioux Community is the home of a Dakota tribe of Native Americans. Lands owned by the tribe include both river bottom lands and bluff-top lands.

THE BLUFF-TOPS, UPPER SIOUX AGENCY STATE PARK:

This state park has a variety of recreational facilities and good areas to view across the expanse of the River Warren Valley. It also has a pow-wow site and historic federal agency sites dating from the contact time with native peoples.

THE RIVER-BOTTOM, SKALBAKKEN COUNTY PARK:

This river bottom park is located at the confluence of Hawk Creek and the Minnesota River. It is part of a series of riverfront parks in Renville County.


MINNESOTA RIVER TRAIL
POTENTIAL SPINE TRAIL
POTENTIAL LOOP TRAIL
POTENTIAL PRIVATE LAND EASEMENT TRAIL
MN RIVER SCENIC BYWAY
MAIN ROUTE
ALTERNATE ROUTE
POTENTIAL TRAILHEAD LOCATIONS
Minnesota River
RIVER WARREN CITY
GRANITE FALLS
PRAIRIE / GNEISS BANKS
MINNESOTA FALLS
DAKOTA CULTURE
UPPER SIOUX COMMUNITY
THE BLUFF-TOPS
UPPER SIOUX AGENCY STATE PARK
Hawk Creek
Hazel Creek
Yellow Medicine River
THE RIVER-BOTTOM
SKALBAKKEN COUNTY PA
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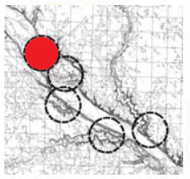
RIVER WARREN CITY

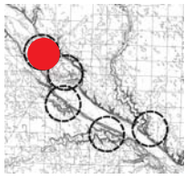


GRANITE FALLS:

AREA CHARACTER ANALYSIS

ALIGNMENT STRATEGY

TRAILHEAD DESIGN



AREA CHARACTER ANALYSIS:
OPPORTUNITIES & CONSTRAINTS

The following locations in Granite Falls were analyzed for their potential as trailheads and points of interest along the trail.

OAK STREET BRIDGE:

This two-lane bridge is to be retrofitted to accept the two lanes of bicycle traffic. The existing bridge could accommodate two 12-foot driving lanes, a 10-foot sidewalk, and a 16-foot striped two-way trail can be accommodated.

OPPORTUNITIES: The Oak Street Bridge provides views of the Minnesota River, but viewing areas would need to be created. The bridge could bring trail users to downtown.

CONSTRAINTS: Steep slopes lead to the bridge from the trail. A potential re-routing to Central Avenue, Baldwin Street, Miller Avenue, and Oak Street would avoid the steep grades. A cantilever on the bridge's south side would eliminate crossing the road twice. The new water line on the bridge may make this challenging.

GRANDVIEW STREET:

This vacated city street is strategically positioned at the intersection of the proposed Minnesota River Trail and the Minnesota River Scenic Byway is within a short walking distance of downtown Granite Falls.

OPPORTUNITIES: Proximity to downtown and the availability of public land make this site a potential trailhead location.

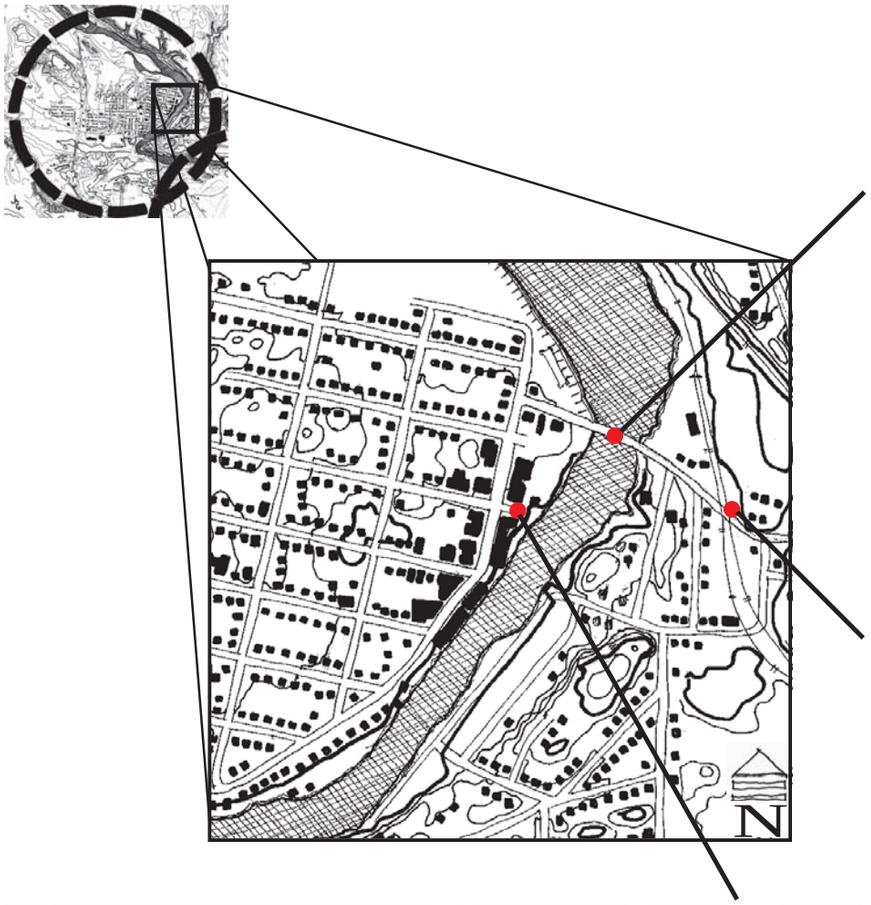
CONSTRAINTS: Steep slopes would challenge bicyclists and its small size would accommodate only a few parked cars.

7th AVENUE TERMINUS / FARMERS' MARKET DISTRICT:

The terminus of 7th Avenue is a key civic space that is currently underutilized. An ideal location for a trailhead, it is a block from downtown and is close to the pedestrian bridge, Oak Street Bridge, and Rice Park. The site is large enough to accommodate a trailhead building and parking.

OPPORTUNITIES: With improvements and trail routing along the west bank of the river, this location can become a focal point to highlight the historical, recreational, and geological resources of Granite Falls. A trailhead at this location would increase the vitality of downtown.

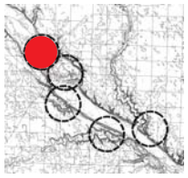
CONSTRAINTS: Although much of this land is in public ownership, some privately held land might need to be acquired.



OAK ST. BRIDGE

GRANDVIEW ST.

7TH AVE. TERMINUS / FARMERS' MARKET DISTRICT



RIVER WARREN CITY

AREA CHARACTER ANALYSIS:
OPPORTUNITIES & CONSTRAINTS

RICE PARK & PEDESTRIAN BRIDGE:

Rice Park occupies the east bank of the river and acts as the sister park to the downtown riverfront. Amenities include river fishing access and areas for picnicking. A pedestrian bridge connects the two riverbanks providing easy access to downtown from the park.

OPPORTUNITIES: An existing public space, the park's existing amenities make it a potential destination along the trail. The trailhead could be located in the park.

CONSTRAINTS: The pedestrian bridge is currently signed "No Bicycles"; cyclists must walk their bikes across the bridge. The bridge does not meet the minimum dimensional requirements for bicycles. Its 7.5 foot width is short of the 8 foot minimum, and its 8 foot vertical clearance is short of the required 10 feet. Much of the park is in the floodplain.

HIGHWAY 212 BRIDGE UNDERPASS TRAIL:

The trail needs to cross busy State Highway 212. Routing the trail under the highway bridge along the current sidewalk is a safe alternative because it mitigates potential conflicts between trail users and highway traffic.

OPPORTUNITIES: Routing the trail under the existing highway bridge provides access to the Works Progress Administration (WPA) River Overlook.

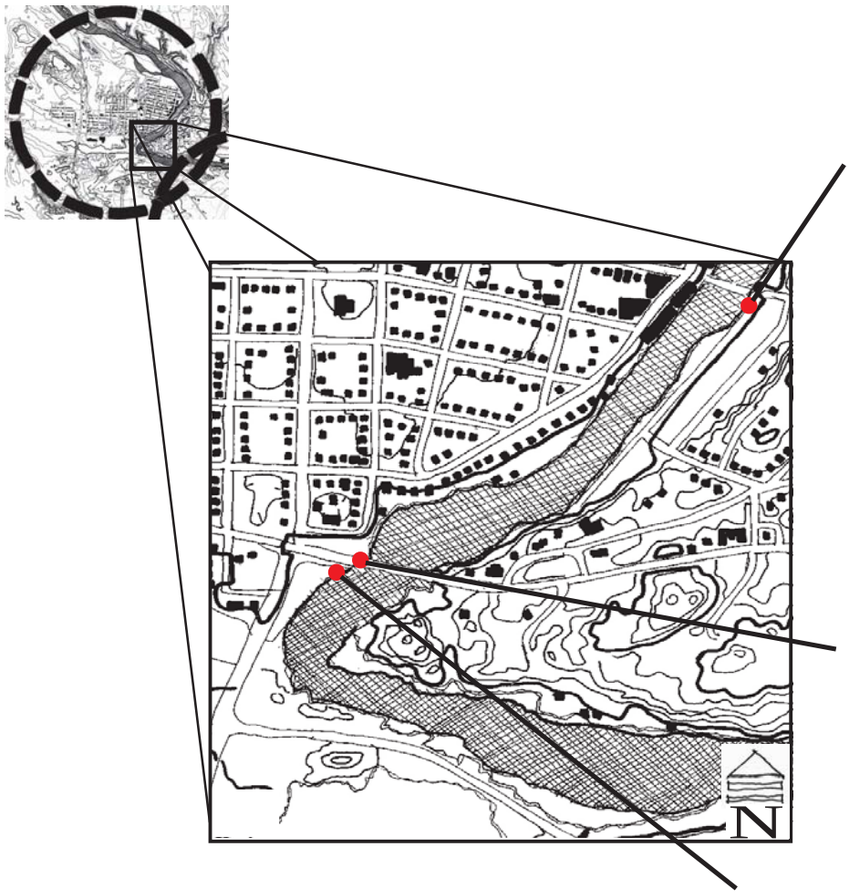
CONSTRAINTS: The sidewalk needs to be redesigned to accommodate bicycle traffic. The vertical clearance needs to be increased to 10 feet, the pathway widened to 12 feet, the steps eliminated, the trail regraded, and safety railings added.

W.P.A. OVERLOOK HISTORIC SITE:

This river observation structure offers views of the natural beauty of the Minnesota River Valley and historic sites. This historic overlook is attributed to the well known Minnesota landscape architect A.R. Nichols. Built between 1933-1943, it is on the National Historic Register.

OPPORTUNITIES: This resting place along the trail allows for panoramic views of the river as well as an historical interpretation of the structure.

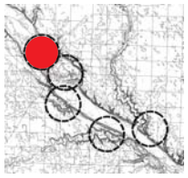
CONSTRAINTS: Because the overlook is on the historic register, the trail alignment has to maintain the historic integrity of the site.



RICE PARK & PEDESTRIAN BRIDGE

HWY. 212 BRIDGE UNDERPASS TRAIL

W.P.A OVERLOOK HISTORIC SITE



RIVER WARREN CITY

TRAIL ALIGNMENT STRATEGY:

The proposed trail alignment and trailhead in the City of Granite Falls:

Celebrates Granite Falls ancient geology and its unique location within the riverbed of the Glacial River Warren,

Supports activity in the downtown,

Add value to the city's flood recovery projects,

Add to amenities and increases trail access for local residents.

TRAIL ALIGNMENT: POTENTIAL SPINE TRAIL

The potential spine trail:

Follows the Burlington Northern/Santa Fe railroad corridor from Wegdahl,

Crosses the Oak Street Bridge with striping on the south side of the existing bridge deck,

Connects the trail to the Granite Falls Riverfront Greenway and the Downtown Trailhead,

Continues south along the riverfront to 10th Avenue where it crosses Prentice Street with painted cross walks, flashing yellow lighting, and pedestrian crossing signs,

Runs along Prentice Street on the traffic side of the existing parking lanes with separate bike lanes in both directions,

Is marked with a painted crosswalk, flashing yellow lighting, and pedestrian crossing signs at the intersection of Prentice St. and 4th Street, and

Moves south on 4th Street passing beneath Highway 212.

TRAIL ALIGNMENT: POTENTIAL ALTERNATE SPINE TRAIL

The potential alternate spine trail:

Follows the Burlington Northern/Santa Fe railroad corridor from Wegdahl,

Crosses the Oak Street Bridge with striping on the south side of the existing bridge deck,

Connects the trail to the Granite Falls Riverfront Greenway and the Downtown Trailhead,

Crosses the pedestrian bridge from downtown to Rice Park, follows Baldwin St. to Lincoln St,

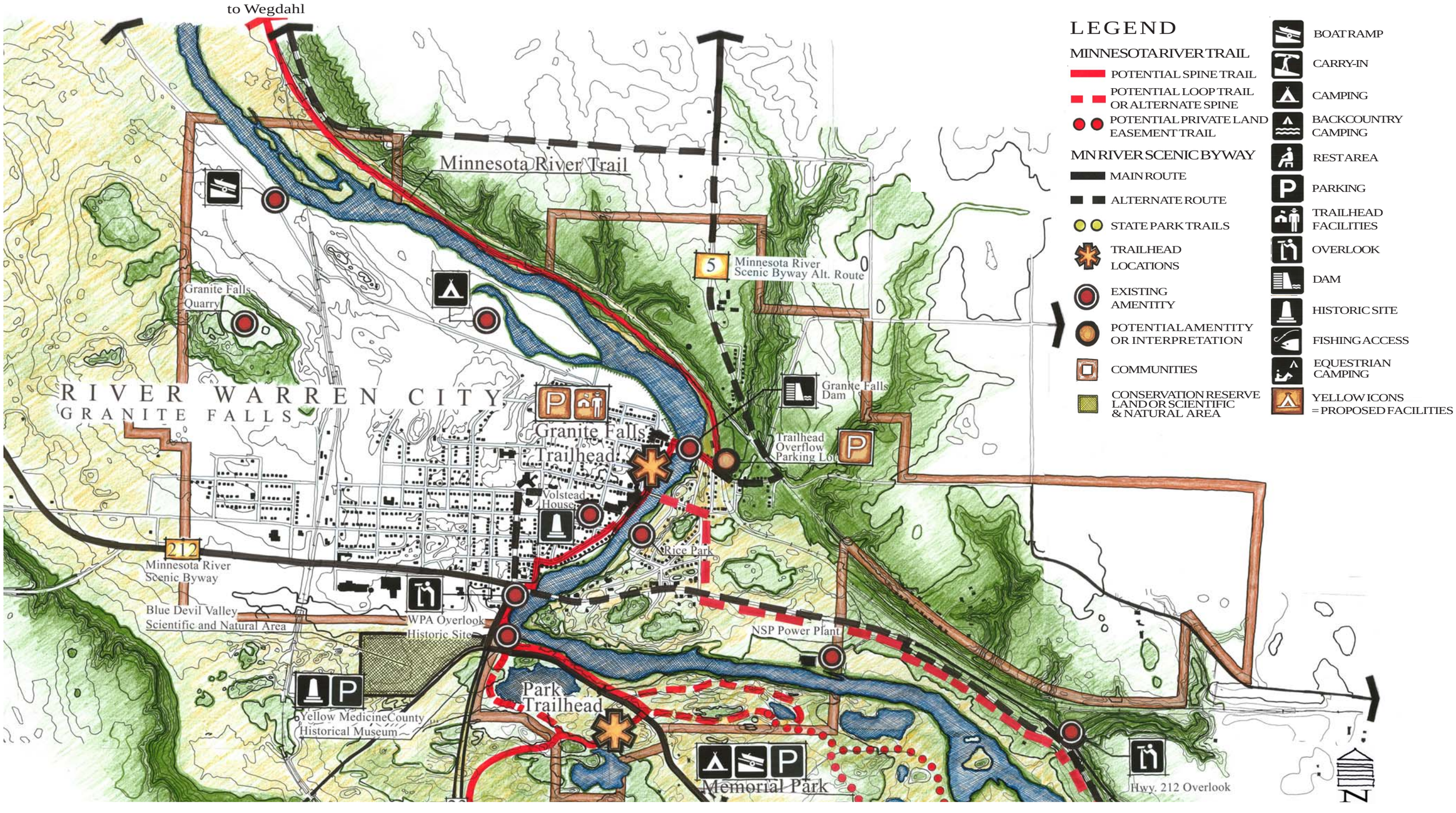
Crosses Hwy. 212 and proceeds along the Minnesota River Scenic Byway Alternate Route.

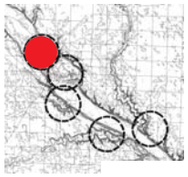
ADDITIONAL PARKING LOCATIONS:

Two locations are identified as potential additional parking locations. In addition to providing parking:

The junction of the trail and Oak Street could provide information welcoming the trail user to Granite Falls, and

The Rice Park location could provide recreation next to the river.


to Wegdahl
Minnesota River Trail
Granite Falls Quarry
RIVER WARREN CITY
GRANITE FALLS
Granite Falls Trailhead
Volstead House
Rice Park
Granite Falls Dam
Trailhead Overflow Parking Lot
5
Minnesota River Scenic Byway Alt. Route
212
Minnesota River Scenic Byway
Blue Devil Valley Scientific and Natural Area
WPA Overlook
Historic Site
NSP Power Plant
Yellow Medicine County Historical Museum
Park Trailhead
Memorial Park
Hwy. 212 Overlook
N
LEGEND
MINNESOTA RIVER TRAIL
POTENTIAL SPINE TRAIL
POTENTIAL LOOP TRAIL OR ALTERNATE SPINE
POTENTIAL PRIVATE LAND EASEMENT TRAIL
MN RIVER SCENIC BYWAY
MAIN ROUTE
ALTERNATE ROUTE
STATE PARK TRAILS
TRAILHEAD LOCATIONS
EXISTING AMENITY
POTENTIAL AMENTITY OR INTERPRETATION
COMMUNITIES
CONSERVATION RESERVE LAND OR SCIENTIFIC & NATURAL AREA
BOAT RAMP
CARRY-IN
CAMPING
BACKCOUNTRY CAMPING
REST AREA
PARKING
TRAILHEAD FACILITIES
OVERLOOK
DAM
HISTORIC SITE
FISHING ACCESS
EQUESTRIAN CAMPING
YELLOW ICONS = PROPOSED FACILITIES



RIVER WARREN CITY

TRAILHEAD STRATEGY:

The Granite Falls Downtown Trailhead is located on the riverfront at the terminus of 7th Street; it:

Creates a focal point for 7th Street and connects it to the amenities along the river,

Reuses the restored BNSF depot or a building of the same scale as the trailhead building,

Increases activity in the downtown and on the riverfront,

Provides parking, bicycle racks, restrooms, water, and information, and

Ties together existing amenities such as the farmers' market, the proposed amphitheater, and the redesigned riverfront park into a vital district of public activities and public spaces.

TRAILHEAD RESOURCES:

The resources close to the trailhead in downtown are the:

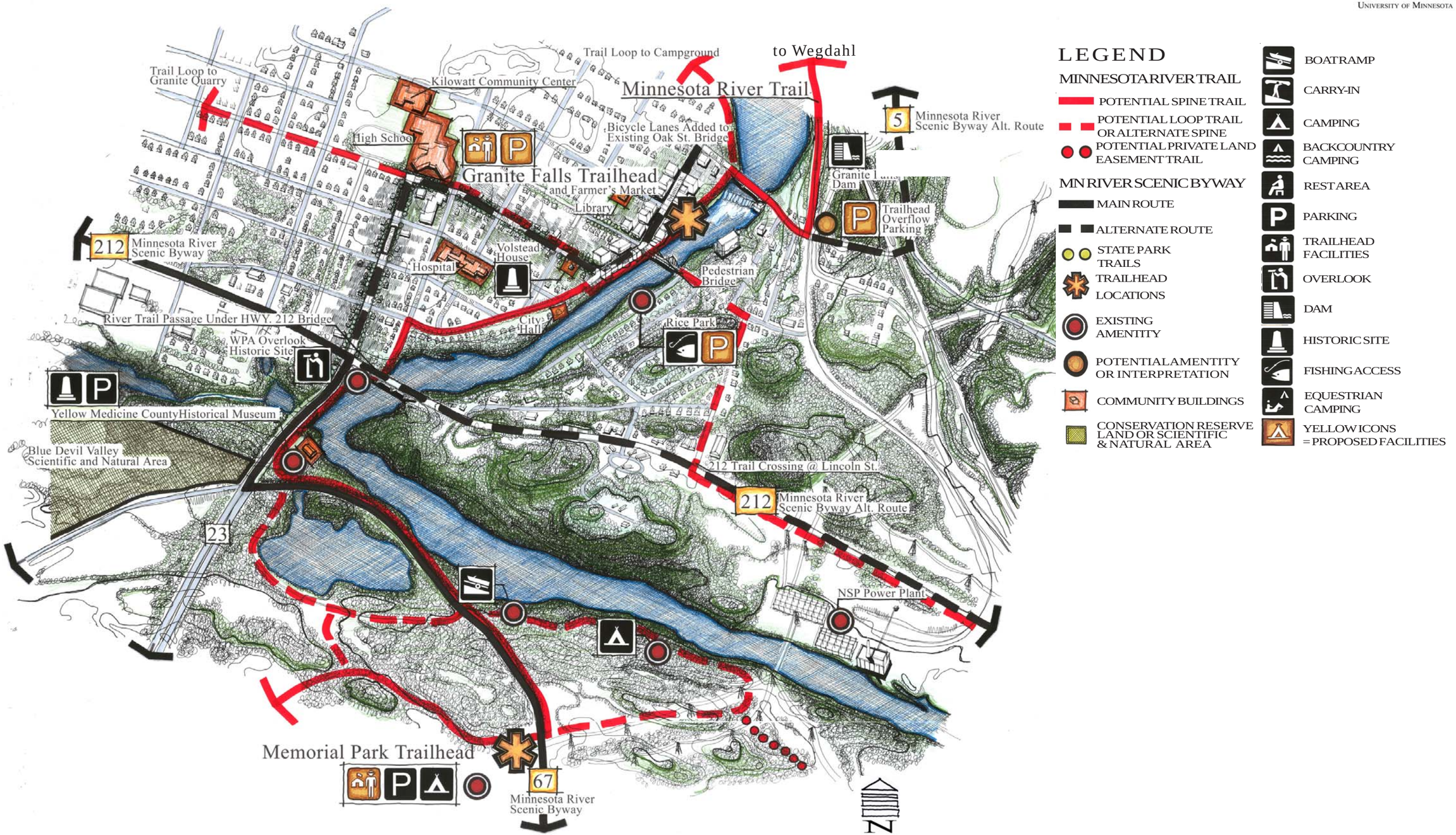
Proposed River greenway,

Pedestrian bridge,

Local trail connections,

Historic sites, and

Downtown businesses.



LEGEND

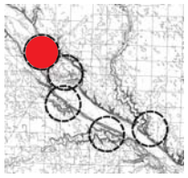
MINNESOTA RIVER TRAIL

- POTENTIAL SPINE TRAIL
- POTENTIAL LOOP TRAIL OR ALTERNATE SPINE
- POTENTIAL PRIVATE LAND EASEMENT TRAIL

MN RIVER SCENIC BYWAY

- MAIN ROUTE
- ALTERNATE ROUTE
- STATE PARK TRAILS
- TRAILHEAD LOCATIONS
- EXISTING AMENITY
- POTENTIAL AMENITY OR INTERPRETATION
- COMMUNITY BUILDINGS
- CONSERVATION RESERVE LAND OR SCIENTIFIC & NATURAL AREA

- BOAT RAMP
- CARRY-IN
- CAMPING
- BACKCOUNTRY CAMPING
- REST AREA
- PARKING
- TRAILHEAD FACILITIES
- OVERLOOK
- DAM
- HISTORIC SITE
- FISHING ACCESS
- EQUESTRIAN CAMPING
- YELLOW ICONS = PROPOSED FACILITIES



RIVER WARREN CITY

TRAILHEAD DESIGN OPTION ONE:

The Granite Falls Downtown Trailhead, civic gathering space, is incorporated into the Granite Falls Flood Mitigation Plan in order to provide access by trail users to amenities and to enhance the city's historic core. Clusters of locally mined granite boulders spill across the site connecting the riverfront, the gathering spaces, and the main commercial street. Boulder-walled terraces planted with native hardwoods and prairie plants provide both flood protection and storm water management. Two options for a trailhead were designed.

The Option one Trailhead design:

Relocates the refurbished historic train depot at the terminus of 7^{tth} Street to serve as a multi-use facility and trailhead,

Invites visitors to explore the train depot and the new amphitheater from entrances flanked by linden trees set in prairie groundcover and marked with spilling boulders and prairie plants,

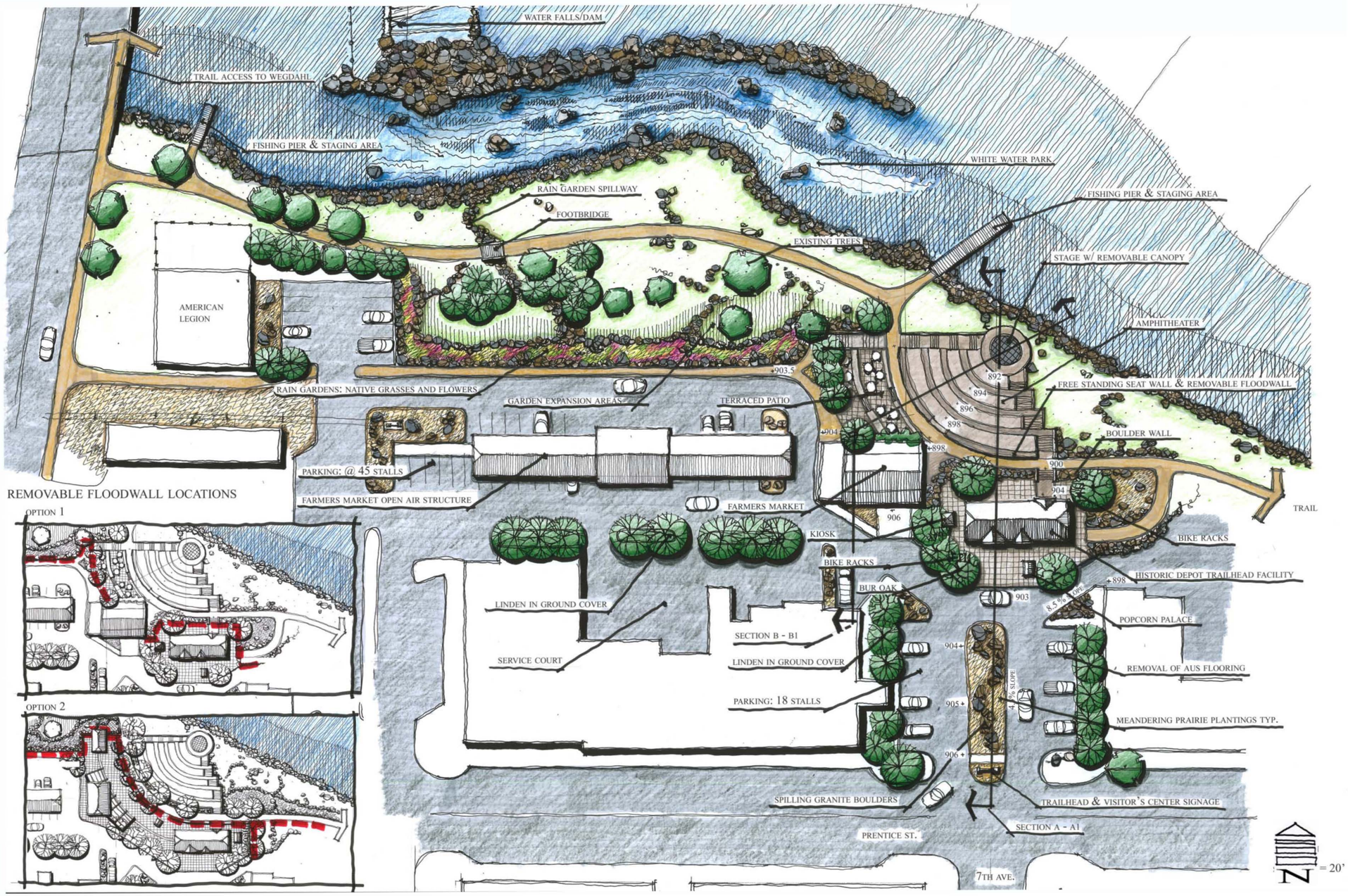
Provides a new open-air structure that expands the existing farmer' market that accommodates festivals, other events, and off-season parking,

Creates a picnicking patio on the north side of the existing blue barn farmers' market that also serves as terraced amphitheater seating,

Locates a new parking lot for the trailhead and the amphitheater that uses granite boulder walls to create terraced storm water gardens that treat pollutants running off the parking lot,

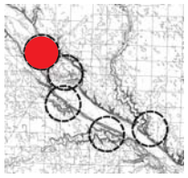
Uses boulder walls around the new trailhead to elevate the train depot structure above the one hundred-year flood plain, and

Creates a protected riverfront greenway along the river in downtown Granite Falls.



CENTER FOR CHANGING LANDSCAPES
UNIVERSITY OF MINNESOTA

35



TRAILHEAD DESIGN OPTION TWO:

The second trailhead design for downtown Granite Falls incorporates many of the same features of option one, but it has some significant differences. Like option one “Spilling Boulders” lead visitors’ from the historic downtown to the riverfront.

The Option two Trailhead design:

Creates a design signature for the trailhead district contiguous to the main street using granite boul ders, linden trees, prairie plants, and green metal building roofs,

Removes the existing farmers’ market building and replaces it with a smaller market building and an open-air structure on a large plaza,,

Provides an expanded farmers’ market in an open-air structure that can also be used for off-season parking,

Makes a floodwall along the southern edge of the trail,

Ties the trailhead to the proposed riverfront amphitheater,

Recycles the historic depot as the trailhead building for interpretative displays, restrooms, meeting rooms, etc.,

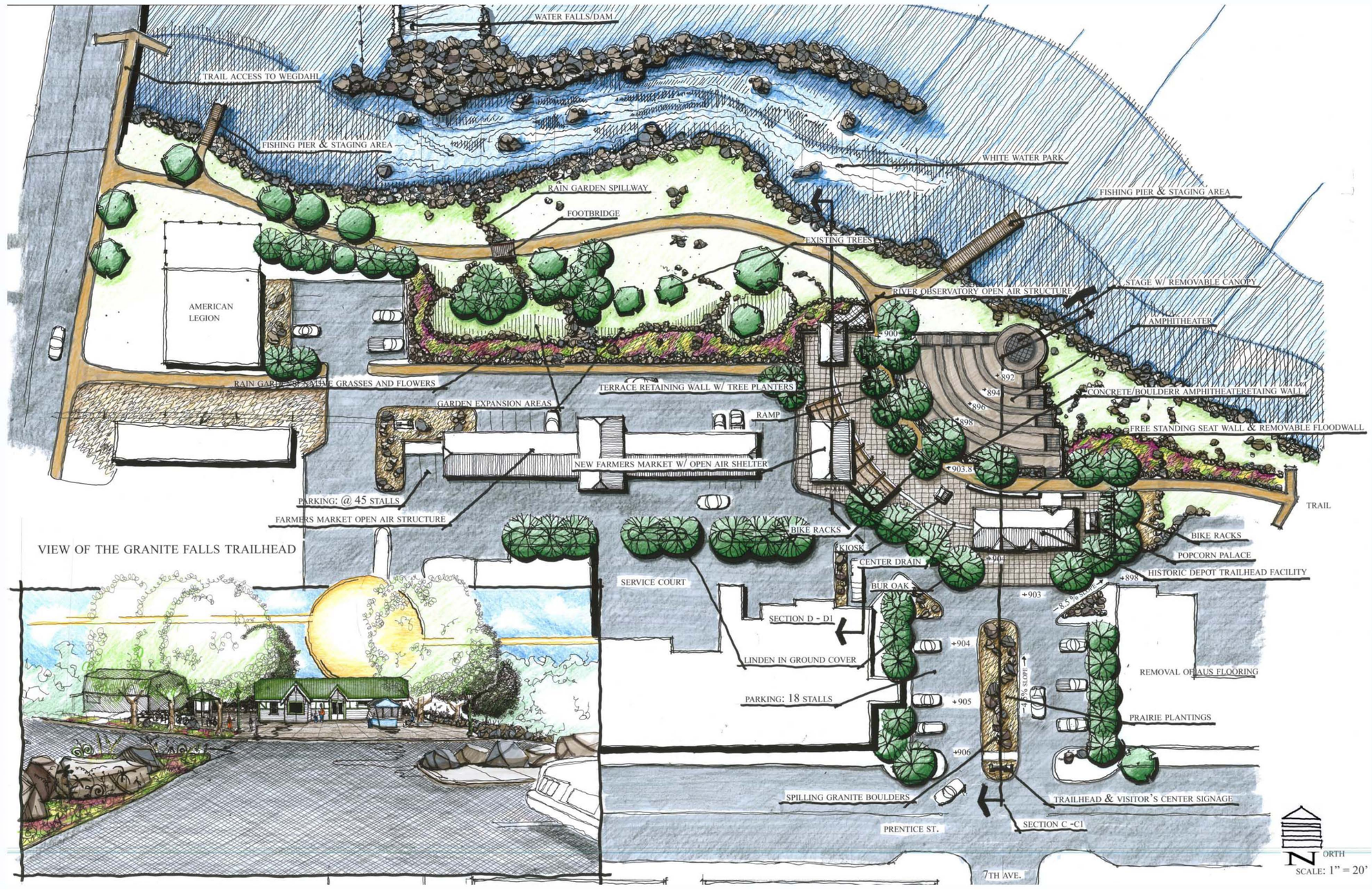
Adds a terraced patio for eating or other activities to the existing farmers’ market,

Accommodates the Popcorn Palace,

Provides exterior bike racks,

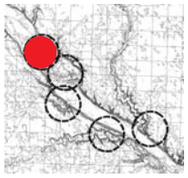
Increases parking for the riverfront and downtown businesses, and

Creates rainwater gardens to treat storm water run off.



CENTER FOR CHANGING LANDSCAPES
UNIVERSITY OF MINNESOTA

37



SECTIONAL VIEWS OF TRAILHEAD OPTIONS:

The sectional views are identified on the corresponding plans from pages 35 and 37, intend to illustrate the programmatic relationship between the Prentice St. business and downtown district and the riverfront. Both design options use the same entry linkage, signage, and the "Spilling Boulders" concept with variations seen in the farmers' market area.

TRAILHEAD OPTION ONE:

Creates grade separation between the restored BNSF train Depot and the trail,

Uses boulder walls in concert with the proposed concrete flood walls to protect the Historic Depot and the downtown from flood damage,

And creates and enclosed outdoor gathering space around the BNSF Depot with oak and prairie plantings.

TRAILHEAD OPTION TWO:

Uses the "Spilling Boulders" concept to keep the trail and the depot at the same grade,

Incorporates a adaptable seating wall which also acts as a flood wall,

Has oak plantings in boulder walls to define the spaces between the depot and amphitheater,

Proposes a new farmers' market structure with an open air shelter attached,

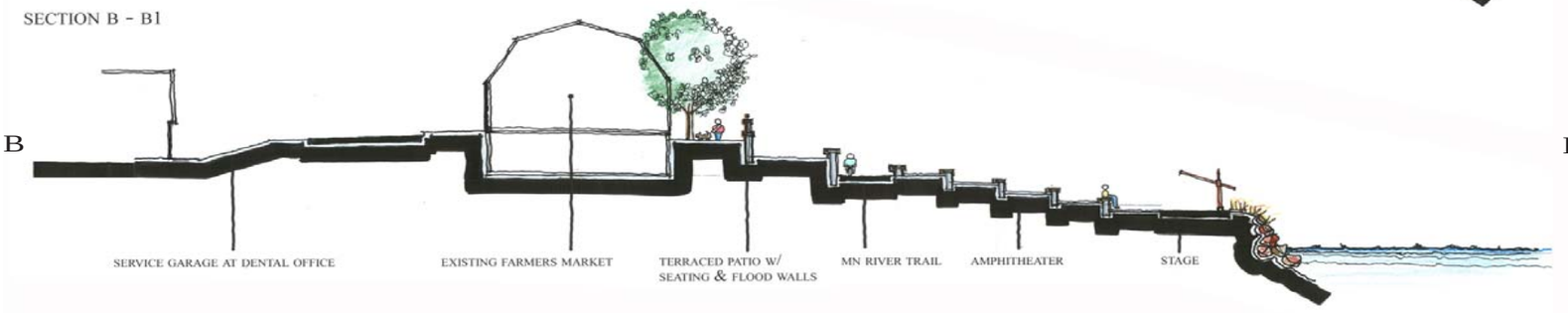
Places a new open air shelter at the amphitheater terrace edge creating a riverfront observation platform,

Uses storm water gardens to manage storm water flows.

TRAILHEAD OPTION ONE

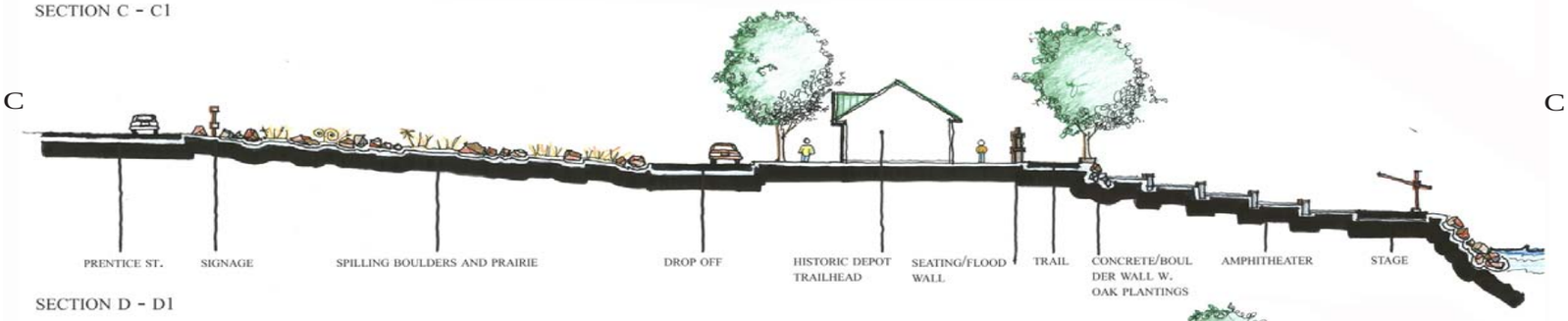
SECTION A - A1

SECTION B - B1

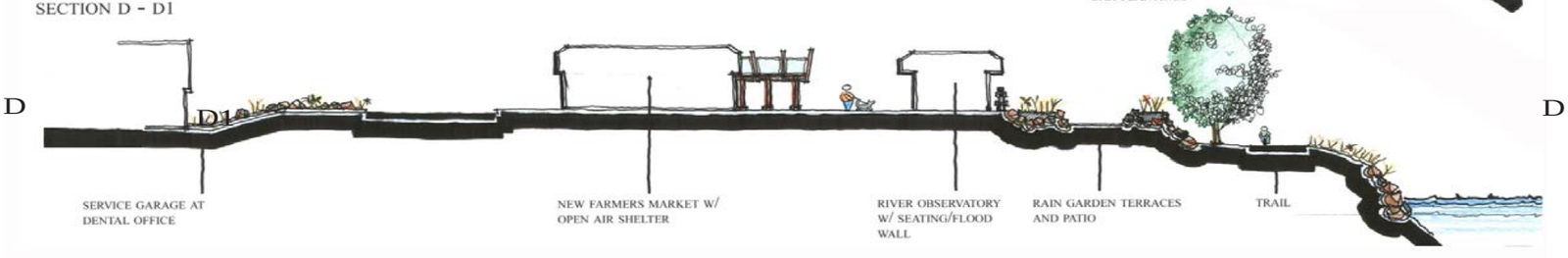


TRAILHEAD OPTION TWO

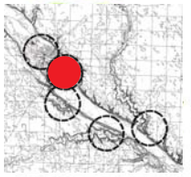
SECTION C - C1



SECTION D - D1



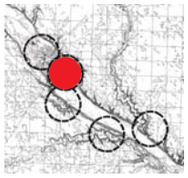
GNEISS / PRAIRIE BANKS



MINNESOTA FALLS:

AREA CHARACTER ANALYSIS

ALIGNMENT STRATEGY



GNEISS / PRAIRIE BANKS

AREA CHARACTER ANALYSIS:
OPPORTUNITIES & CONSTRAINTS

WORLD WAR MEMORIAL PARK:

World War Memorial Park is a 100-acre park south of downtown Granite Falls. Created in 1925, it was improved in the 1930s by the Works Progress Administration. Highway 67 divides this historic park into two sections. The northern section is along the river and has a local trail, monumental stone entry, boat launch, picnic area, pavilion for large gatherings, swimming beach, and boarded-up beach house in disrepair.

OPPORTUNITIES: Access to the river and the park's many amenities make this an attractive destination for trail users and a potential trailhead location. Interpretation of the parks history and geology could be an interesting addition to trail user's experience

CONSTRAINTS: Creating a trailhead in the park's main section would compromise the park's integrity and historic character. Poor sight lines make crossing busy Highway 67 hazardous.

MEMORIAL PARK CAMPGROUND:

Located across Highway 67 from the park's main entrance, the campground area features gneiss outcroppings and a lake. Existing facilities include campsites, picnic structures, restrooms, and parking.

OPPORTUNITIES: The campgrounds' unique location within the gneiss formations and its facilities make this an attractive stop for trail users and a potential trailhead location.

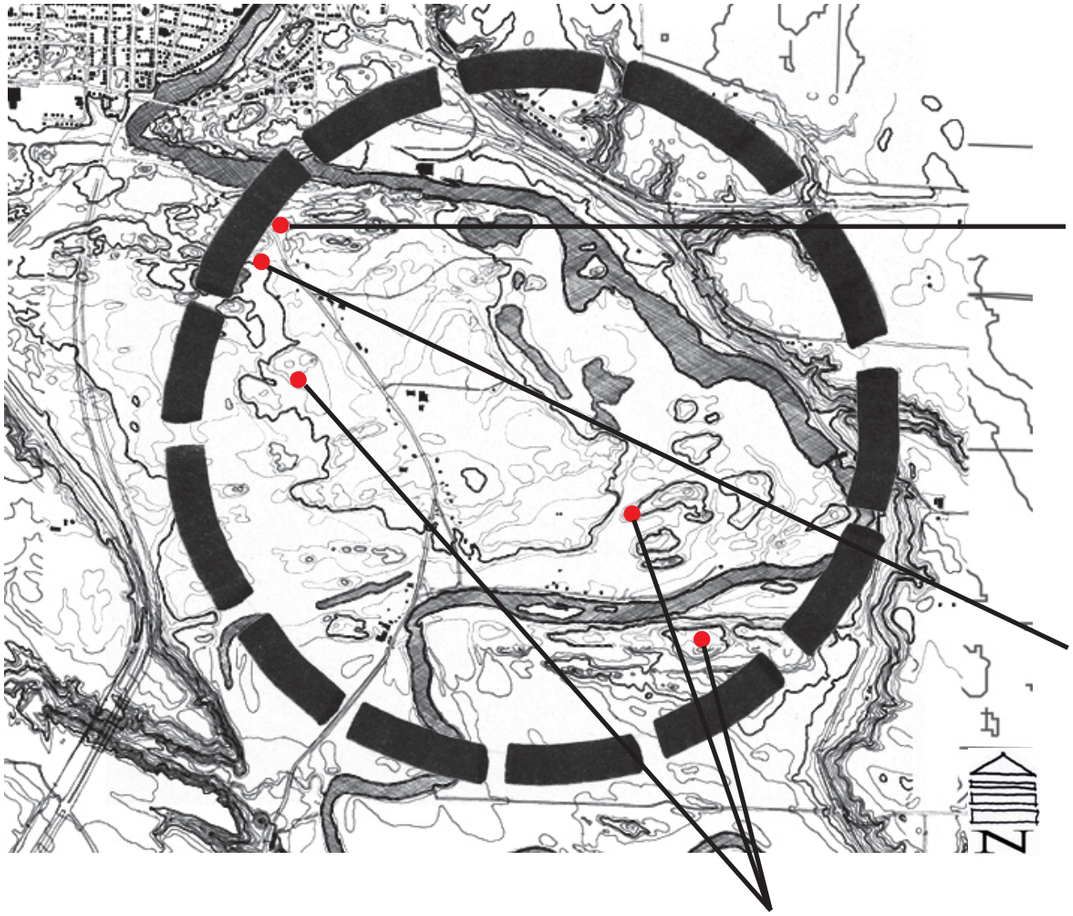
CONSTRAINTS: Making the crossing of Highway 67 less hazardous is an important safety issue. Reduced speeds, striped crosswalks, and/or flashing lights are needed.

GNEISS OUTCROPPINGS:

Estimated at 3.8 billion years old, these landscape features are some of the oldest exposed rocks on earth.

OPPORTUNITIES: The gneiss formations provide an opportunity to interpret the geologic history of the region by highlighting this compelling ancient landscape.

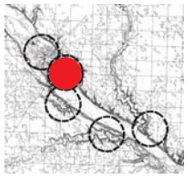
CONSTRAINTS: These outcroppings are best viewed as objects at a distance, which has implications for the trail alignment. The trail should not run adjacent to or on top of the mounds.



WORLDWAR MEMORIAL PARK

MEMORIAL PARK CAMPGROUND

GNEISS OUTCROPPINGS



GNEISS / PRAIRIE BANKS

AREA CHARACTER ANALYSIS:
OPPORTUNITIES & CONSTRAINTS

MINNESOTA FALLS DAM:

The Minnesota Falls Dam is a remaining vestige of the nineteenth century Minnesota Falls settlement that was dismantled when the county seat was moved to Granite Falls and the mills were burned.

OPPORTUNITIES: Despite its limitations on access, this historic settlement site has value as an amenity along the trail. The settlement site could be interpreted at a rest stop along the trail that overlooks the dam.

CONSTRAINTS: Physical access to the dam site is not possible because the dam is flanked on both sides by private land and is in a federally designated flood plain.

GNEISS OVERLOOK:

As the trail leaves the river bottoms to ascend the gneiss prairie bluff, a splendid panorama of the Glacial River Warren Valley is revealed. The City of Granite Falls, the bluffs that form the northern edge of the glacial river bed, and the present day Minnesota River are within the glacial river bed and are all clearly visible. Numerous gneiss outcroppings and the remnant native prairie vegetation are visible on the hill itself.

OPPORTUNITIES: Locating an overlook along the trail's long ascent to the bluff top would provide trail users an opportunity to view the river valley and a place to stop and rest as they pedal up the hill.

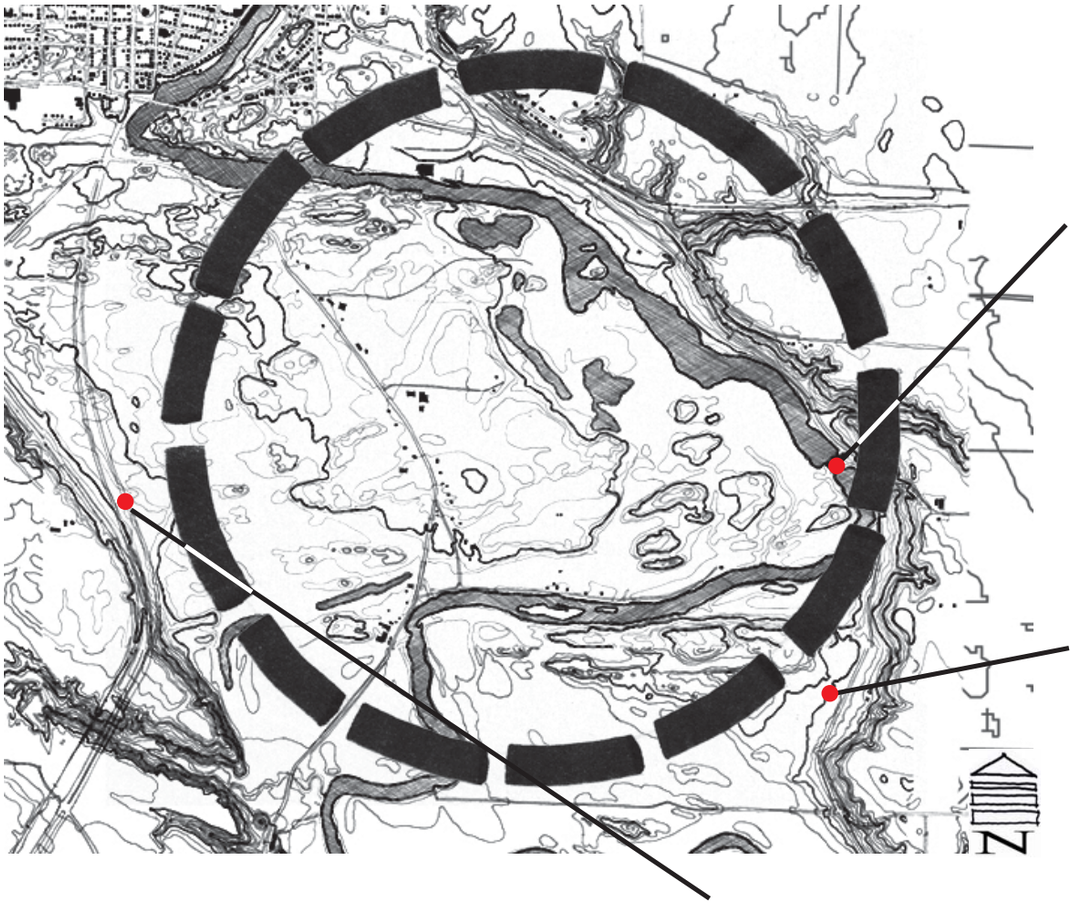
CONSTRAINTS: The ascent to the bluff top is long and challenging. This steep, sensitive, and relatively undisturbed landscape may require special design solutions to accommodate the construction of the trail.

BLUFF TOP VIEW & HIGHWAY 23 RIGHT OF WAY:

On the bluff top the right-of-way along Highway 23 offers another opportunity for siting an overlook. This breathtaking view from the one hundred foot tall bluff top provides an expansive view of the Minnesota River Valley and the City of Granite Falls.

OPPORTUNITIES: This overlook could be used as a rest area. It could also interpret the Minnesota Department of Natural Resources Native Prairie Bank Program.

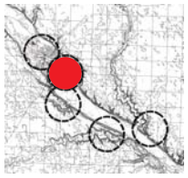
CONSTRAINTS: The best views of the valley are from lands enrolled in the Native Prairie Banks Program and the DNR's Conservation Easement Lands Program that restrict access and use.



MINNESOTA FALLS DAM

GNEISS OVERLOOK

BLUFF TOP VIEW& HIGHWAY 23 RIGHT OF WAY



GNEISS / PRAIRIE BANKS

TRAIL ALIGNMENT STRATEGY:

In the Gneiss / Prairie Banks two potential alignments were identified.

TRAIL ALIGNMENT: POTENTIAL SPINE TRAIL

The option one trail alignment connects to the local Memorial Park Trail which is being built and links the trail to park amenities. It:

Crosses under the Highway 212 Bridge and passes the Highway 23 WPA overlook and the Yellow Medicine County Historical Society,

Parallels Highway 67 to Memorial Park,

Follows the Memorial Park Trail (phase two) past the boat launch to the eastern park limits,

Proceeds south on the XCEL Energy utility right of way to the Granite Falls Golf Club boundary,

Follows the Memorial Park Trail (phase three) and links back to a long and gradual switchback past rock out-croppings and wetlands,

Climbs the bluff along Highway 23,

Provides a view of Granite Falls and the gneiss valley at three interpretive rest areas, and

Arrives at the bluff top at the Upper Sioux Community.

TRAIL ALIGNMENT: POTENTIAL ALTERNATE SPINE TRAIL

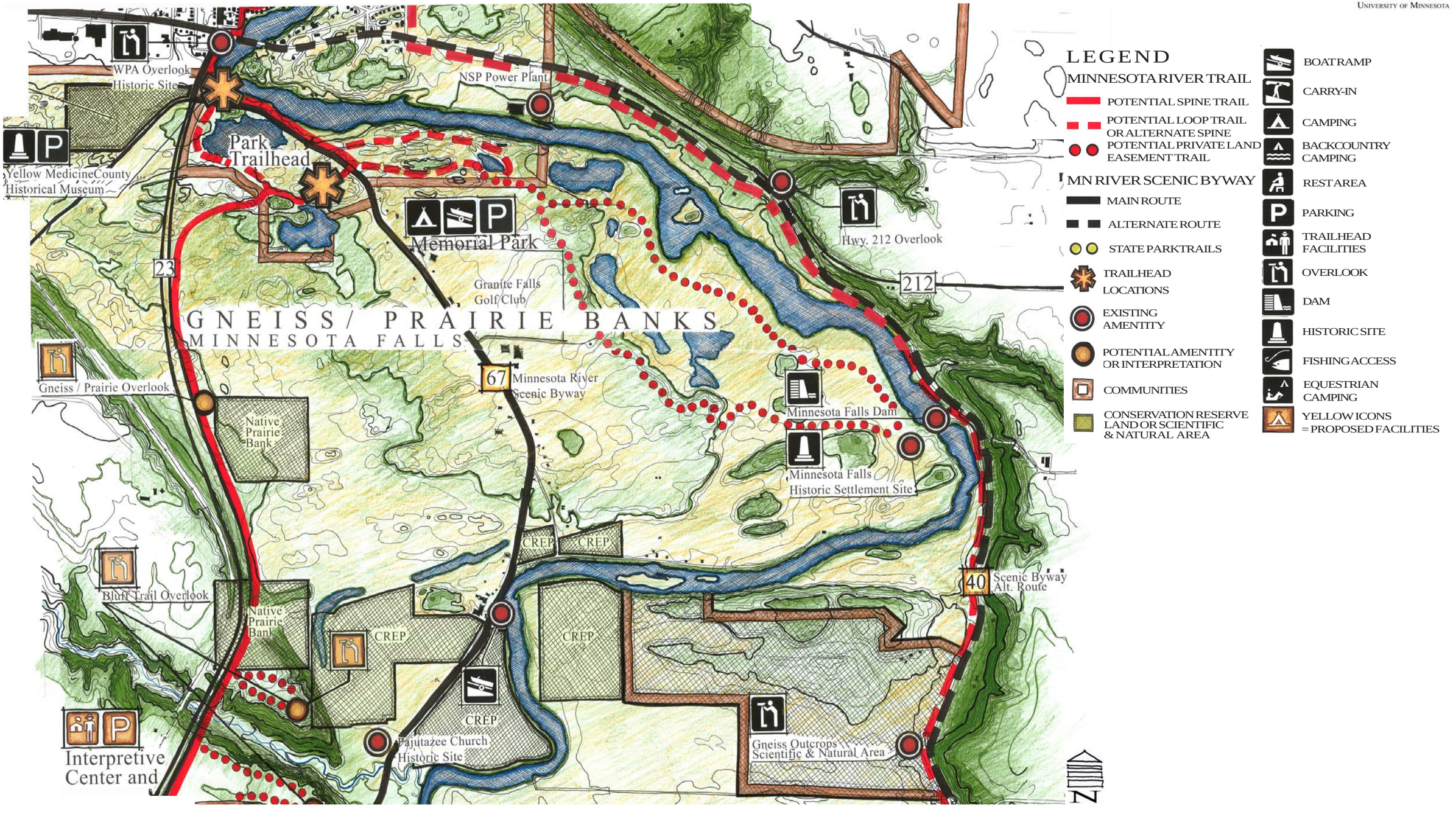
The option two trail alignment:

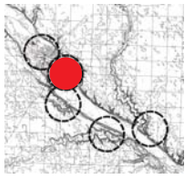
Skirts the local trail to Memorial Park (phase two),

Climbs the long, difficult hill on a separate right of way parallel to Highway 23,

Provides views of the rock out-croppings and wetlands and a long view of Granite Falls and gneiss valley, and

and Arrives at the top of the bluff at the intersection of Highway 23 and State Highway 274.


WPA Overlook
Historic Site
NSP Power Plant
Park
Trailhead
Yellow Medicine County
Historical Museum
Memorial Park
Granite Falls
Golf Club
Hwy. 212 Overlook
23
212
GNEISS/ PRAIRIE BANKS
MINNESOTA FALLS
67 Minnesota River
Scenic Byway
Gneiss / Prairie Overlook
Native
Prairie
Bank
Minnesota Falls Dam
Minnesota Falls
Historic Settlement Site
CREP
CREP
Bluff Trail Overlook
Native
Prairie
Bank
CREP
CREP
CREP
40 Scenic Byway
Alt. Route
Pajutazee Church
Historic Site
Gneiss Outcrops
Scientific & Natural Area
Interpretive
Center and
N
LEGEND
MINNESOTA RIVER TRAIL
POTENTIAL SPINE TRAIL
POTENTIAL LOOP TRAIL
OR ALTERNATE SPINE
POTENTIAL PRIVATE LAND
EASEMENT TRAIL
MN RIVER SCENIC BYWAY
MAIN ROUTE
ALTERNATE ROUTE
STATE PARK TRAILS
TRAILHEAD
LOCATIONS
EXISTING
AMENITY
POTENTIAL AMENTITY
OR INTERPRETATION
COMMUNITIES
CONSERVATION RESERVE
LAND OR SCIENTIFIC
& NATURAL AREA
BOAT RAMP
CARRY-IN
CAMPING
BACKCOUNTRY
CAMPING
REST AREA
PARKING
TRAILHEAD
FACILITIES
OVERLOOK
DAM
HISTORIC SITE
FISHING ACCESS
EQUESTRIAN
CAMPING
YELLOW ICONS
= PROPOSED FACILITIES



GNEISS / PRAIRIE BANKS

TRAILHEAD OPTIONS:

Two potential sites for trailheads were identified in the Minnesota Falls: Gneiss / Prairie Banks.

INTERPRETIVE CENTER & TRAILHEAD:

The first trailheasd option is located at the Yellow Medicine County Historical Museum; it:

- Works for both proposed trail alignments,
- Uses the cultural assets and the existing facilities associated with the museum, and
- May be too close to the trailhead in downtown Granite Falls.

PARK TRAILHEAD:

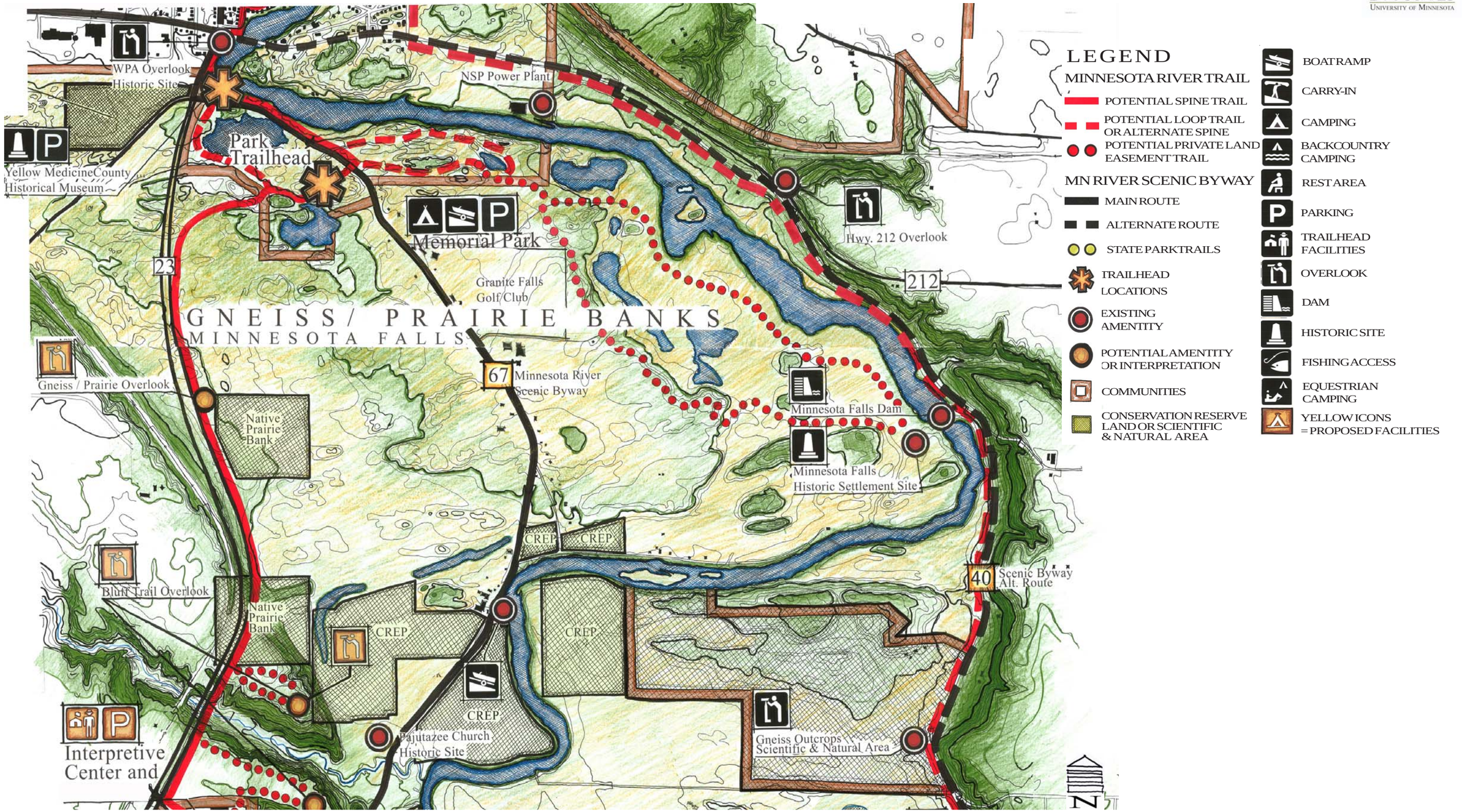
The second trailhead is located at the Memorial Park Campgrounds; it:

- Works only for the first alignment option, and
- Links the trail with the lake, the river, the campsites, the beach, the restrooms, the picnic facilities, and the parking at Memorial Park.

TRAIL RESOURCES:

The resources close to the proposed trailhead include:

- The Yellow Medicine County Historical Museum,
- A “canotidan” or the hole in the rock where the little people live,
- Picnic areas and restrooms in Memorial Park,
- River access for swimming and boating,
- Campgrounds,
- Exposed ancient gneiss outcroppings, and
- Native plant communities.


WPA Overlook
Historic Site
NSP Power Plant
Park
Trailhead
Yellow Medicine County
Historical Museum
Memorial Park
Granite Falls
Golf Club
Hwy. 212 Overlook
23
212
GNEISS/ PRAIRIE BANKS
MINNESOTA FALLS
67 Minnesota River
Scenic Byway
Gneiss / Prairie Overlook
Native
Prairie
Bank
Minnesota Falls Dam
Minnesota Falls
Historic Settlement Site
CREP
CREP
Bluff Trail Overlook
Native
Prairie
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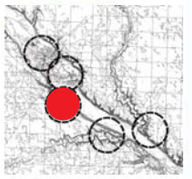
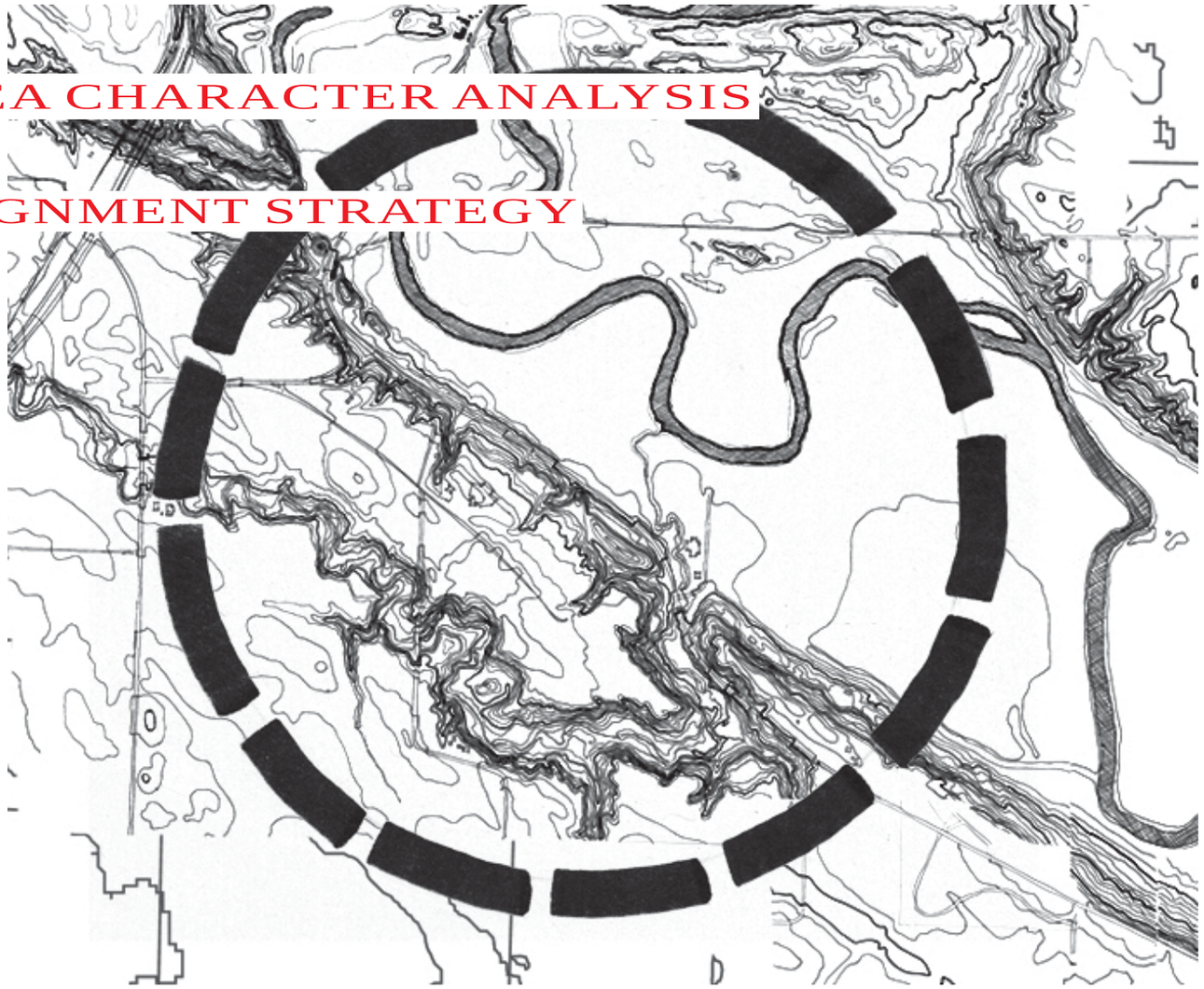
DAKOTA CULTURE

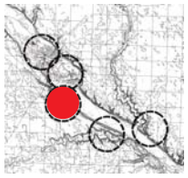


UPPER SIOUX COMMUNITY:

AREA CHARACTER ANALYSIS

ALIGNMENT STRATEGY





AREA CHARACTER ANALYSIS:
OPPORTUNITIES & CONSTRAINTS

RECREATIONAL VEHICLE PARK:
A recreational vehicle park will be built to accommodate visitors to the Upper Sioux Community on this former agricultural field. A short walking distance to the Prairie's Edge Casino and the Casino Store, it is to be connected to them by a short walking path.

OPPORTUNITIES: The recreational vehicle park is also in close proximity to The Scout Island Overlook, the Sioux Veterans Memorial, the Union Cemetery, and the proposed visitors center.

CONSTRAINTS: Tribal officials would like access from this park to the state trail. Steep slopes to the east and a small site are constraints.

STAGECAOCH TRAIL:
The existing Stage Coach Trail, a vacated road, is currently being used by Upper Sioux Community Facilities Management as a means of getting down the bluff without using the public roads.

OPPORTUNITIES: This area is located close to all recreational amenities in the community.

CONSTRAINTS: In order to work as a trail the road would have to be redesigned with switchbacks to compensate for the steep grade. The proximity to private homes many limit the design.

TRIBAL OFFICES:
The tribal offices of the Upper Sioux Community are located in the river bottoms below the bluff. Its amenities include bathrooms, drinking water, visitor information, and a parking lot.

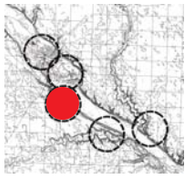
OPPORTUNITIES: The tribal office site could be a site for interpreting contemporary Dakota culture and a trailhead.

CONSTRAINTS: The native flowers and berries in the area need to be respected. Trail alignment should not disrupt hunting by tribal members.

RECREATIONAL VEHICLE PARK

STAGECOACH TRAIL

TRIBAL OFFICES



DAKOTA CULTURE

AREA CHARACTER ANALYSIS:
OPPORTUNITIES & CONSTRAINTS

PROPOSED INTERPRETIVE CENTER:

The Upper Sioux Community plans to build an interpretative center next to its sign adjacent to the cemetery. This center would welcome visitors to the community and interpret the past and the present culture of the Dakota community. The site is very visible from the road and has striking views of the Minnesota River Valley.

OPPORTUNIITES: This is a good place for a trailhead. The proposed center would have access to water, bathrooms, and parking, but more importantly, it could be a place for trail users to learn about the Dakota peoples.

CONSTRAINTS: Although the center is planned, no construction date has been set.

TRIBAL NEIGHBORHOOD:

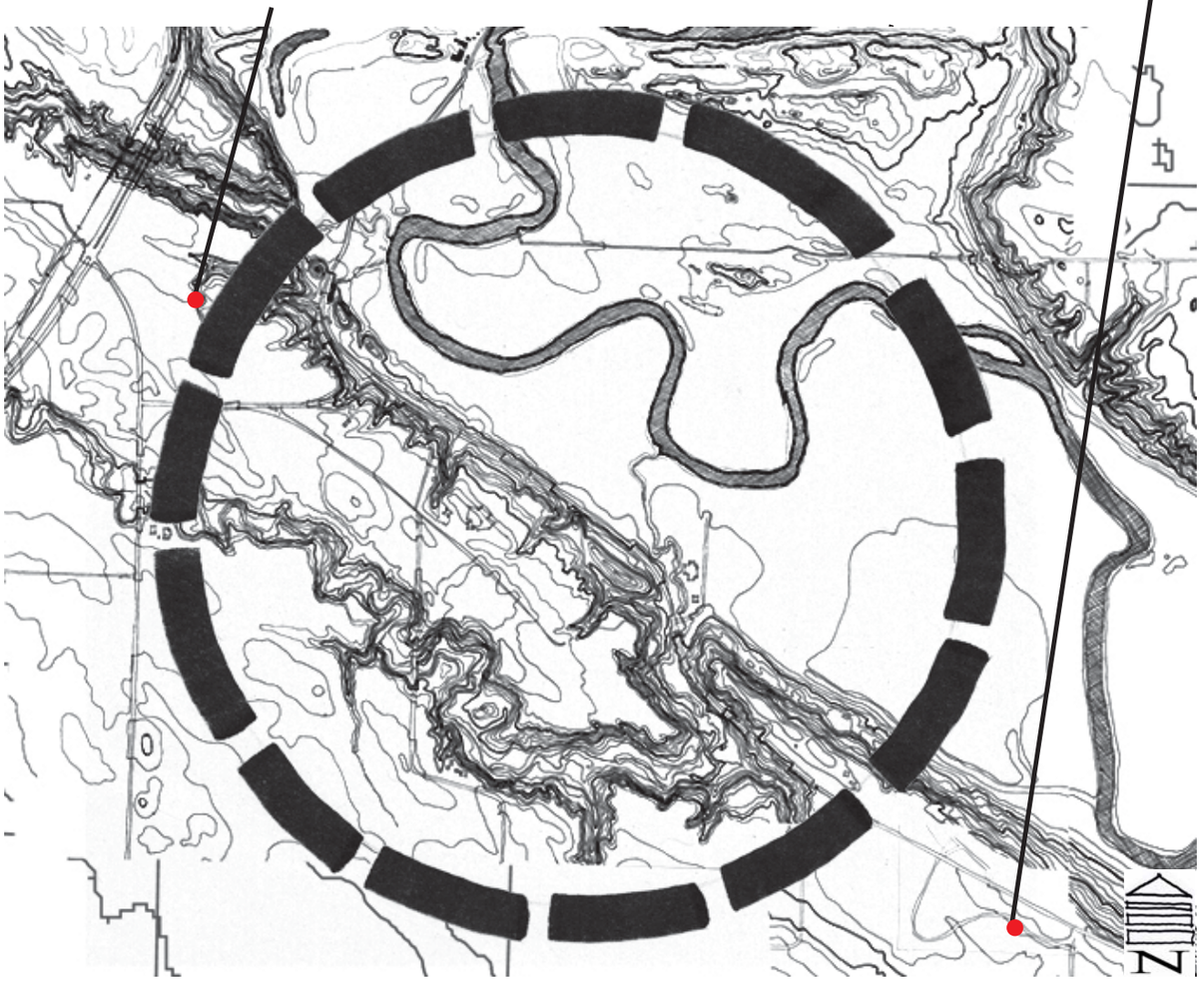
The tribe's newly constructed residential neighborhood on the top of the bluff has many amenities besides the housing. Visitor information, drinking water, bathrooms, and a parking lot are available at the Upper Sioux Community Center.

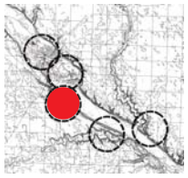
OPPORTUNITIES: Routing the state trail through the neighborhood is undesirable; however, a local trail could connect to the state trail providing an opportunity for local residents to use the state trail.

CONSTRAINTS: If the local trail connection were to be built, it needs to be designed to protect the neighborhood and individuals who live there.Community members and residents have concerns if the state trail were to go through the residential neighborhood. Concerns were expressed that opening the neighborhood to public use would compromise privacy and be disruptive. There is also a concern for the existing native flowers and berries.

PROPOSED INTERPRETIVE CENTER

TRIBAL NEIGHBORHOOD





DAKOTA CULTURE

TRAIL ALIGNMENT & TRAILHEAD STRATEGY:

The trail alignment and trailhead strategies for the Upper Sioux Community:

Bring trail users into the Upper Sioux Community,

Provide views of the Glacial River Warren Valley,

Interpret the pre-European settlements and the contact history of the community,

Protect existing native flora and fauna,

Leverage existing and proposed community amenities, and

Protect the privacy of community residents.

TRAIL ALIGNMENT: POTENTIAL SPINE TRAIL:

The potential spine trail:

Leaves Highway 23 at Prairie's Edge Lane and passes the proposed Upper Sioux Community Center, the Upper Sioux Veteran's Memorial Plaza, the Union Cemetery, the Prairie View Recreational Vehicle Park, the Scout Island lookout and the Prairie's Edge Casino and Hotel,

Turns east on Cavender Lane,

Connects to the Wagon Trail Road via the utility right-of-way,

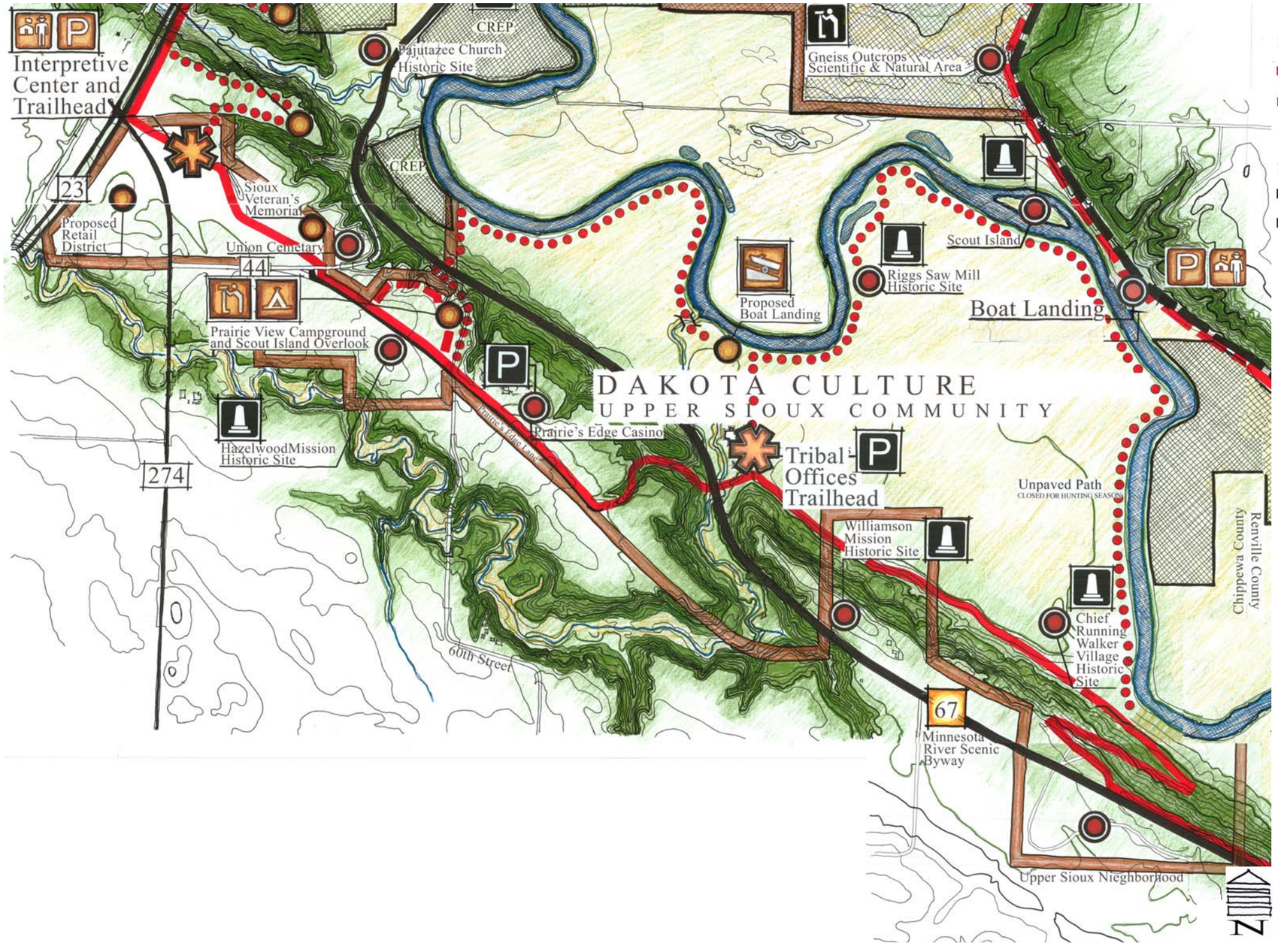
Crosses Highway 67 and proceeds to 565th Street passing the Upper Sioux Round House and administration buildings,

Follows the bluff and to Waste Water Road to Highway 67, and

Continues south to the Upper Sioux State Park.

TRAILHEAD LOCATIONS:

Two potential trailhead locations are identified within the Upper Sioux Comunity.



LEGEND

MINNESOTA RIVER TRAIL

- POTENTIAL SPINE TRAIL
- POTENTIAL LOOP TRAIL
- POTENTIAL PRIVATE LAND EASEMENT TRAIL

MN RIVER SCENIC BYWAY

- MAIN ROUTE
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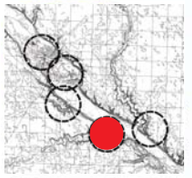
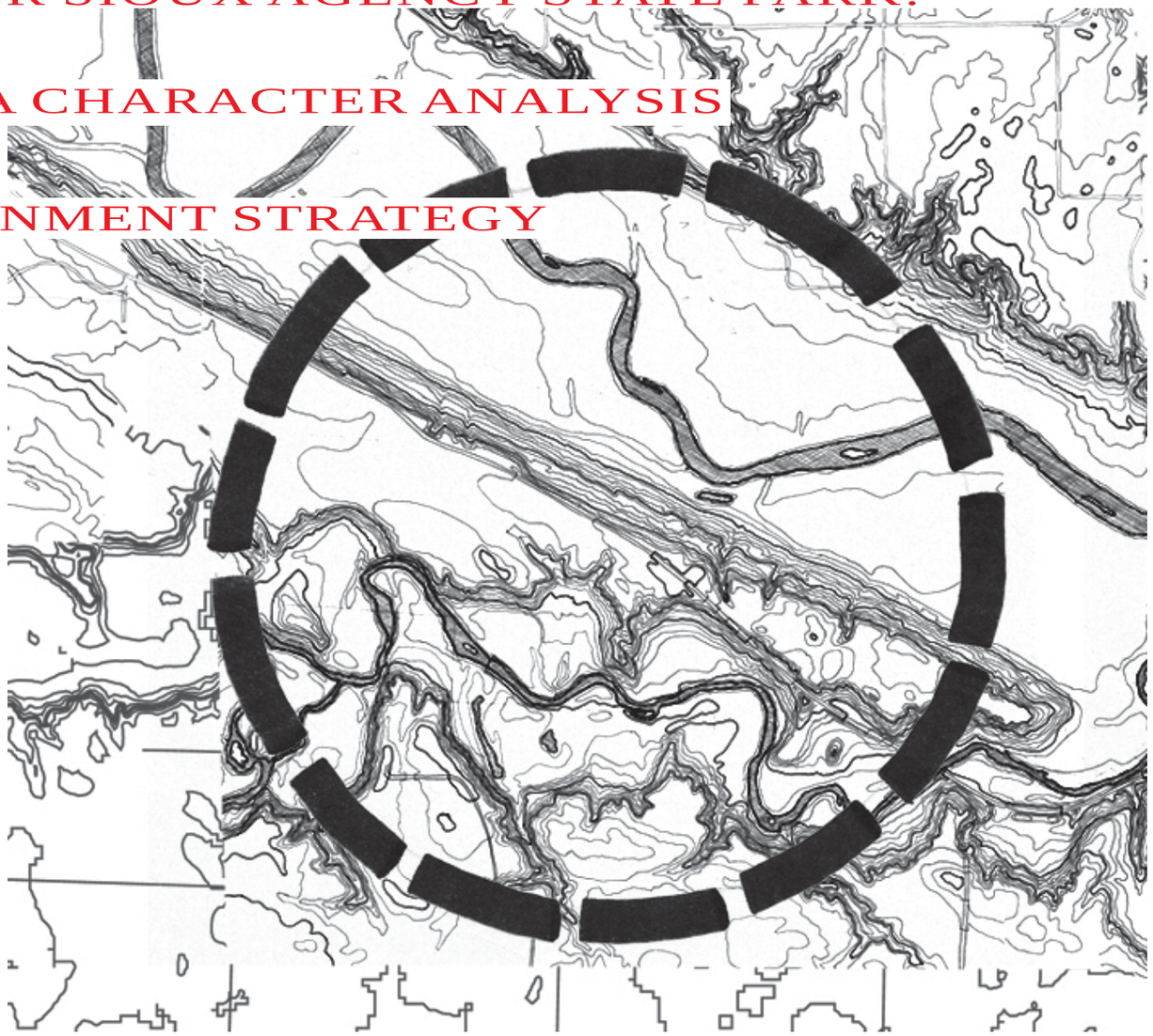
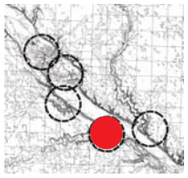


UPPER SIOUX AGENCY STATE PARK:

AREA CHARACTER ANALYSIS

ALIGNMENT STRATEGY





THE BLUFF-TOPS

AREA CHARACTER ANALYSIS:
OPPORTUNITIES & CONSTRAINTS

Upper Sioux Agency State Park is the fourth segment of focus. Consisting of 1280 acres, most of the park is located on top of the bluffs. A substantial portion in the river bottoms at the confluence of the Minnesota and Yellow Medicine Rivers is also within the park boundaries and provides opportunities for experiencing one of the tributaries of the Minnesota River.

EQUESTRIAN CAMPGROUND & POW-WOW SITE:

The campground is a regional attraction to equestrian enthusiasts and a wagon train is held each year. Each summer Native Americans come from all over participate in a pow wow.

OPPORTUNITIES: The park provides an opportunity to see an annual pow-wow. Many opportunities also exist for equestrian patrons of the park including equestrian campsites and trailer parking. It is within close proximity to Skalbakken Park's equestrian trails.

CONSTRAINTS: Bicycles and horses are not compatible; horse and bike trails need to be separate from each other. Steep slopes and flooding make some of this land unusable at times.

INTERPRETIVE CENTER:

Wildlife, plant life, and cultural exhibits are on display at the Interpretive Center. Water, rest rooms, and parking are available. A series of hiking, snowmobiling, and horseback riding trails connect park amenities.

OPPORTUNITIES: A new trailhead and a state trail alignment could connect to the existing park trails and amenities. The new master plan will strengthen the Upper Sioux State Park as a major amenity along the Minnesota River State Trail.

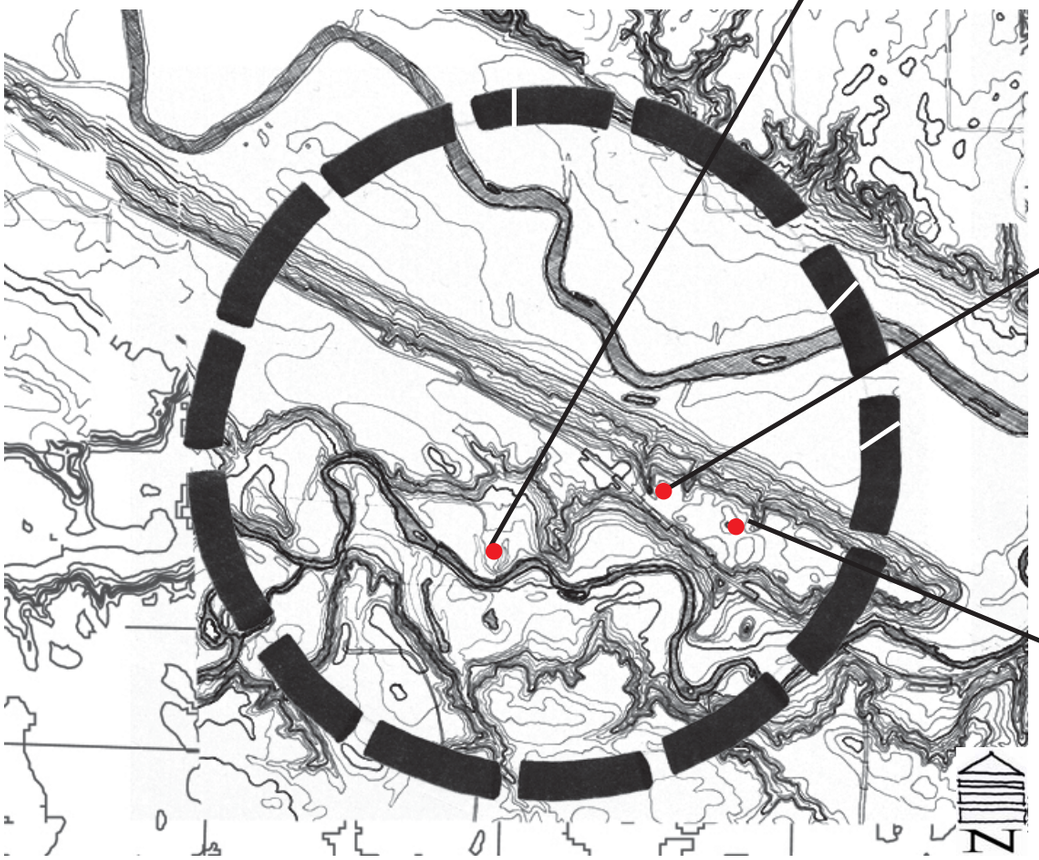
UPPER SIOUX AGENCY CAMPUS:

The Upper Sioux Agency Campus is an important part of Minnesota's cultural landscape. The treaty of Traverse des Sioux in 1851 ceded Indian lands to the United States government and established the Upper and Lower Sioux reservations. The campus is the site of the federal administrative offices for the Upper Sioux Reservation. Burned down during the Dakota War of 1862, the Sioux Agency buildings have been rebuilt by the Minnesota Historical Society.

OPPORTUNITIES: The agency is an important site and appropriate access to it from the trail is desired.

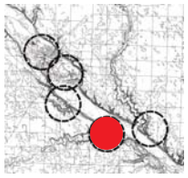
CONSTRAINTS: The integrity of the historic sites needs to be maintained.

EQUESTRIAN CAMPGROUND & POW-WOW SITE



INTERPRETIVE CENTER

UPPER SIOUX AGENCY CAMPUS



THE BLUFF-TOPS

AREA CHARACTER ANALYSIS:
OPPORTUNITIES & CONSTRAINTS

BLUFFS OF THE YELLOW MEDICINE RIVER:

The bluffs and coulee at the mouth of the Yellow Medicine River include a number of cultural sites: a settler's cemetery, stagecoach trail, trader's encampment site, and a fluting hill.

OPPORTUNITIES: A park trail loop off the main trail with a bridge across the Yellow Medicine River could provide access to both the historic sites and the parkland across the river.

CONSTRAINTS: Trail alignments need to respect the integrity of the historic sites. Park visitors have limited access to park land across the the Yellow Medicine River.

MINNESOTA RIVER OVERLOOK:

The overlook offers a breathtaking view to the river valley below. Recently planted prairie communities surround the park trail that connects the site to the interpretive center.

OPPORTUNITIES: The overlook provides the best view of the Minnesota River Valley in the park.

CONSTRAINTS: The overlook is on a point with a single access and is not part of a loop system. The native prairie plant communities need to be respected.

YELLOW MEDICINE RIVER CAMPGROUND:

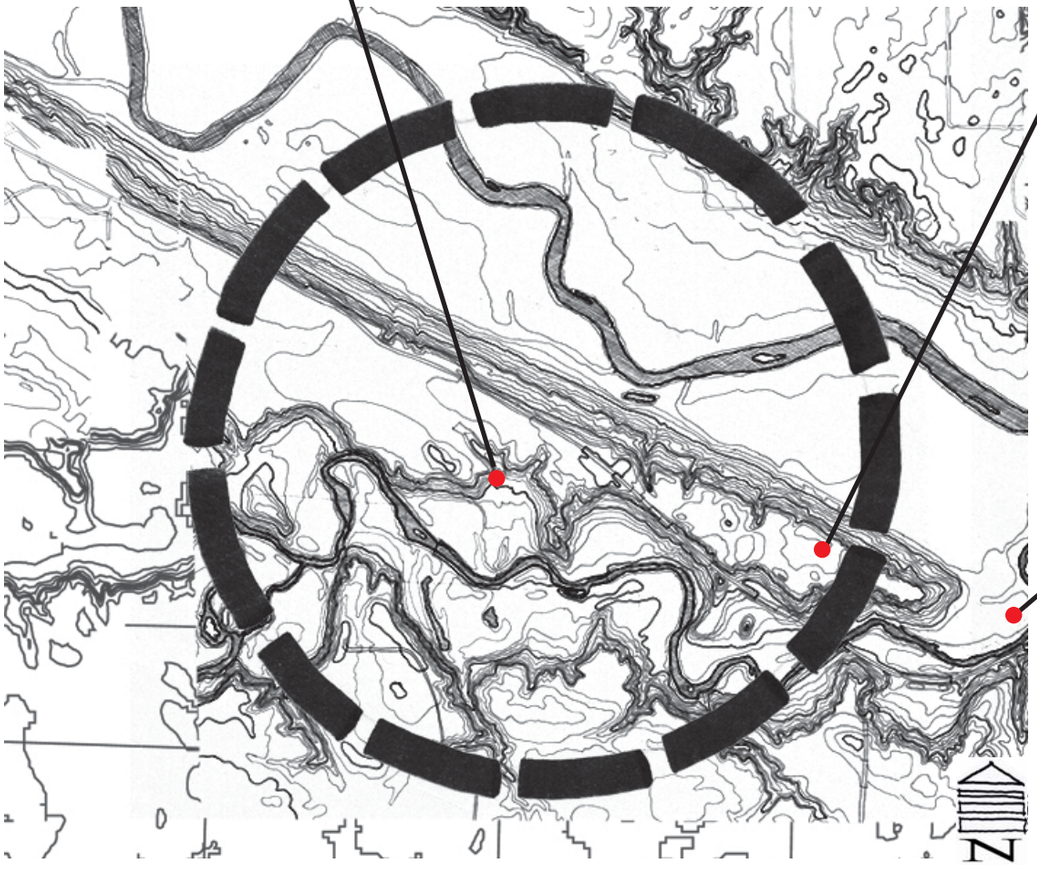
The Yellow Medicine River Campground has ample facilities to provide a memorable river experience for all types of camping. Facilities include parking, walk-in campsites, restrooms/showers, electrical sites, drinking water, hiking, and equestrian trails.

OPPORTUNITIES: The campgrounds location near the confluence of the Yellow Medicine and Minnesota Rivers and at the foot of the bluff make this a truly unique experience.

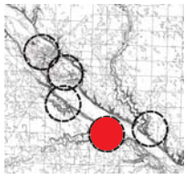
CONSTRAINTS: The campgrounds proximity to the route of the trail.

BLUFFS OF THE YELLOW MEDICINE RIVER

MINNESOTA RIVER OVERLOOK



YELLOW MEDICINE RIVER CAMPGROUND



THE BLUFF-TOPS

TRAIL ALIGNMENT & TRAILHEAD STRATEGY:

Brings trail users into the park,

Provides views of the River Warren Valley, and

Interprets pre-European settlement and contact history.

TRAIL ALIGNMENT POTENTIAL SPINE TRAIL:

Follows along river From Upper Sioux Community #1 Trail to wind between wetlands, agricultural fields, and remnant floodplain forest, through the State Park crossing the Minnesota River at County Hwy. 21. it is a separate bituminous two way trail.

TRAIL ALIGNMENT POTENTIAL SPINE TRAIL:

Following along Minnesota River Scenic Byway, #2 Trail proceeds along the road right of way past the State Park with a separate bituminous two way trail.

TRAILHEAD:

Is located at the Upper Sioux State Park Office and Interpretive Center, and

Utilizes existing parking spaces, provides bicycle racks, and snow mobile parking.

TRAIL RESOURCES:

Thr resources accessed by the two trail alignments are the:

Visitors' center,

Historic agency sites,

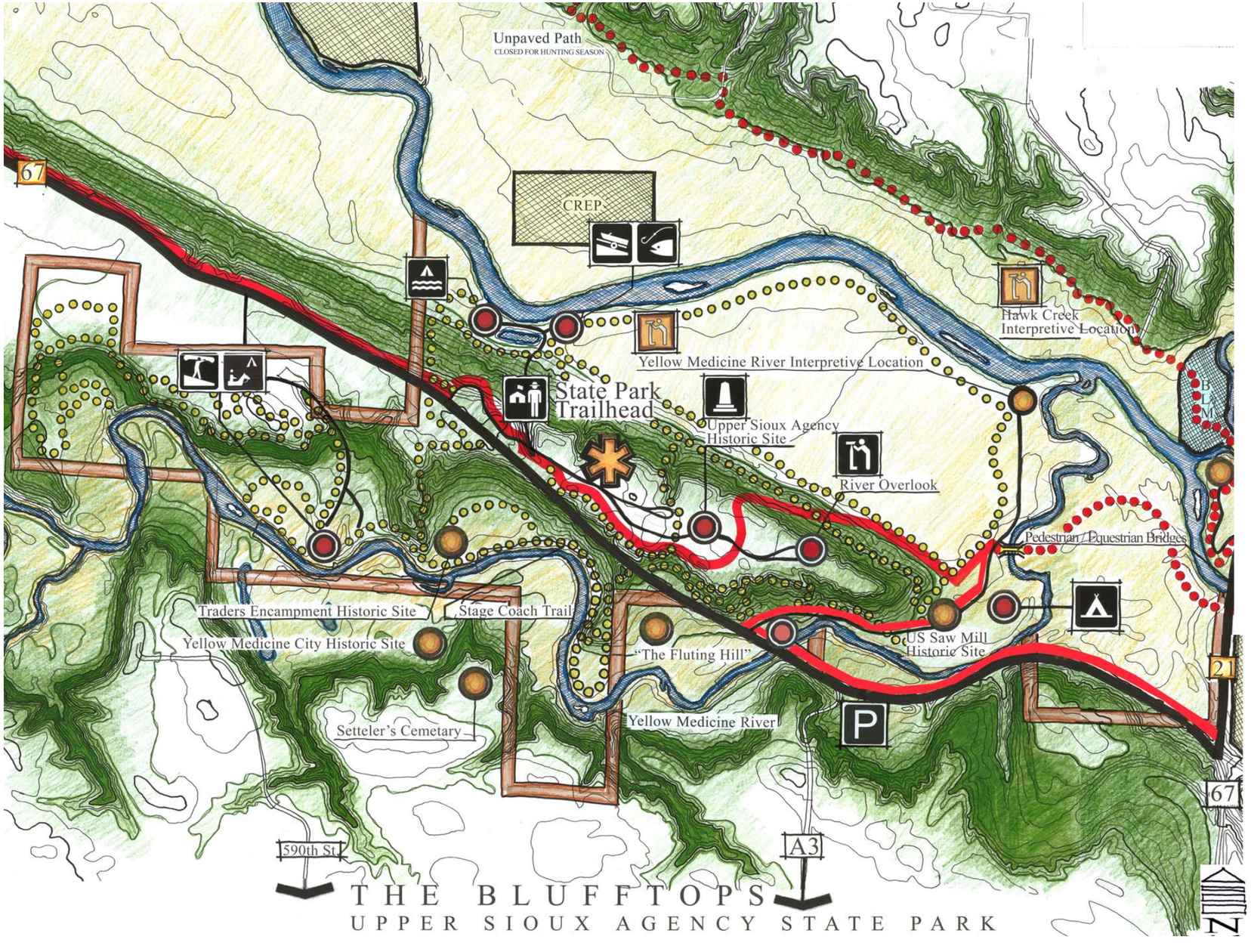
Picnic areas,

Camping areas,

Park trail system,

Scenic overlook, and

Access to MN and Yellow Medicine Rivers



LEGEND

MINNESOTA RIVER TRAIL

- POTENTIAL SPINE TRAIL
- POTENTIAL LOOP TRAIL
- POTENTIAL PRIVATE LAND EASEMENT TRAIL

MN RIVER SCENIC BYWAY

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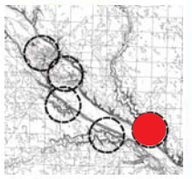
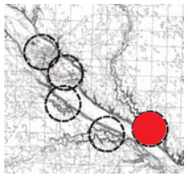
THE RIVER-BOTTOM



SKALBAKKEN COUNTY PARK:

AREA CHARACTER ANALYSIS

ALIGNMENT STRATEGY



THE RIVER-BOTTOM

AREA CHARACTER ANALYSIS:
OPPORTUNITIES & CONSTRAINTS

SKALBAKKEN PARK FACILITIES & PARK ROAD:

The existing facilities at the Skalbakken Park will serve as the base for Minnesota River Trail. Existing restrooms, canoe carry-in, and picnic structures will be accented with a informational/interpretive Kiosk.

OPPORTUNITIES: A key location for its Equestrian use the park is currently used heavily by equine campers. Trails are single track and are used by hikers, mountain bikers, and equestrians. The opportunity exists to increase the parks usage by mountain bikers.

CONSTRAINTS: Steep slopes only allow the trail to skirt the foot of the slope through the park. The roadway width is narrow allowing vehicular traffic in only one direction. Proposed trail would nearly double this.

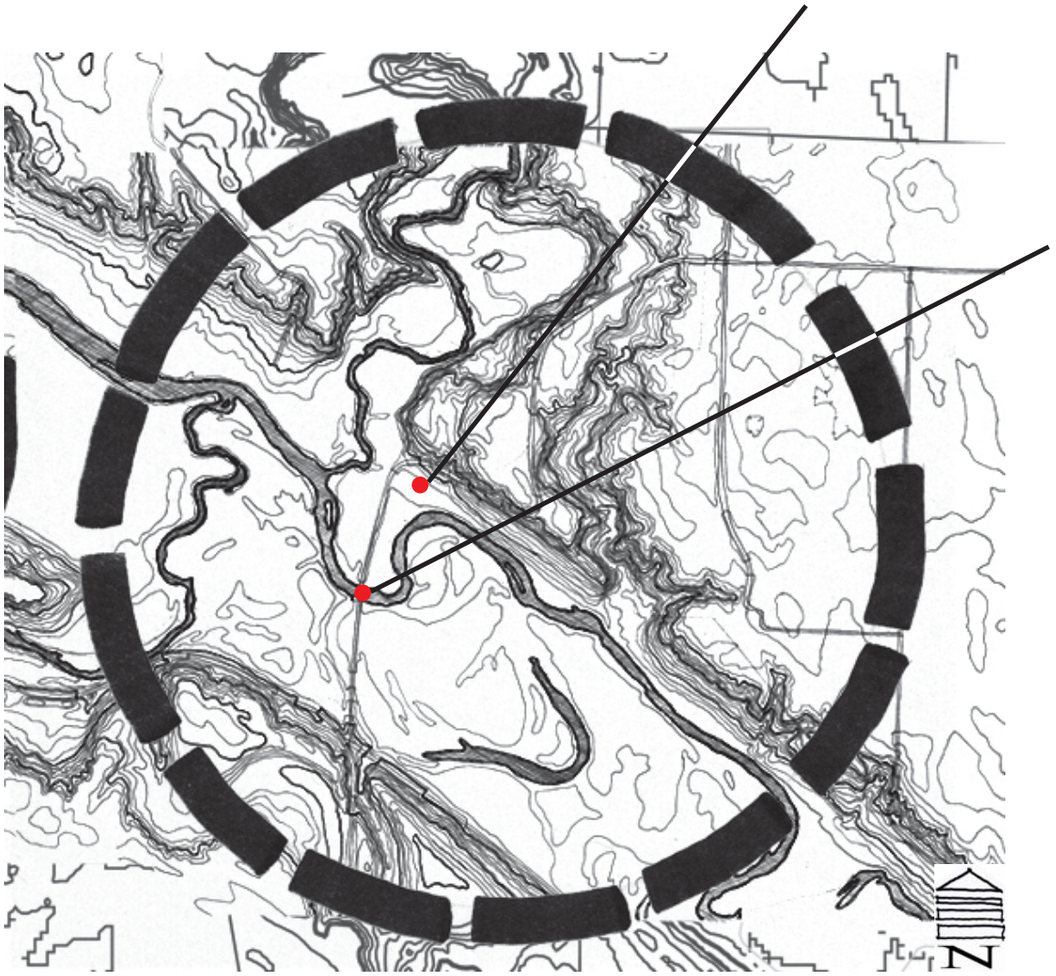
HWY. 21 BRIDGE:

This existing bridge over the Minnesota River may not allow a retrofit for pedestrian traffic. It is utilized as is by equestrians, and the bridge approach is marked with signage for this use. In spring when floods are common in this area, the bridge acts as dam trapping debris and ice pieces.

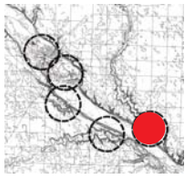
OPPORTUNITIES: This link would be a key element in the equine trail network from Upper Sioux State Park.

CONSTRAINTS: The existing bridge may not be easily modified to accept cantilevered pedestrian lanes. The south side of the bridge is the only option for any modifications, due to spring flooding action.

SKALBAKKEN PARK FACILITIES & PARK ROAD



HWY. 21 BRIDGE



THE RIVER-BOTTOM

TRAIL ALIGNMENT & TRAILHEAD STRATEGY:

TRAIL ALIGNMENT: POTENTIAL SPINE TRAIL

Follows Skalbakken Park road to MN River Scenic Byway main route,

Proceeds through west end of Skalbakken Park to the Hawk Creek bridge, onto a small parcel of federal land, to private property along the state snowmobile trail north back towards Granite Falls, through lower Skalbakken Park road it connect with the Scenic Byway.

Winds up the bluff along agricultural fields and the remnant floodplain forest, through private lands to the Minnesota River Scenic Byway alternate route Hwy. 37, and through lower Skalbakken Park to the Scenic Byway County 81. Its a separate bituminous two-way trail.

TRAIL ALIGNMENT: POTENTIAL ALTERNATE SPINE TRAIL

Follows along the Minnesota River Scenic Byway main and alternate routes.

Proceeds along the road right of way past the county park with separate bituminous two way trail.

TRAILHEAD:

Located at the Skalbakken Park campground,

Utilizes existing parking spaces, and

Provides bicycle and kayak racks, and snow mobile trailer parking on state snowmobile trail.

TRAIL RESOURCES:

Resources close to the proposed trail alignment:

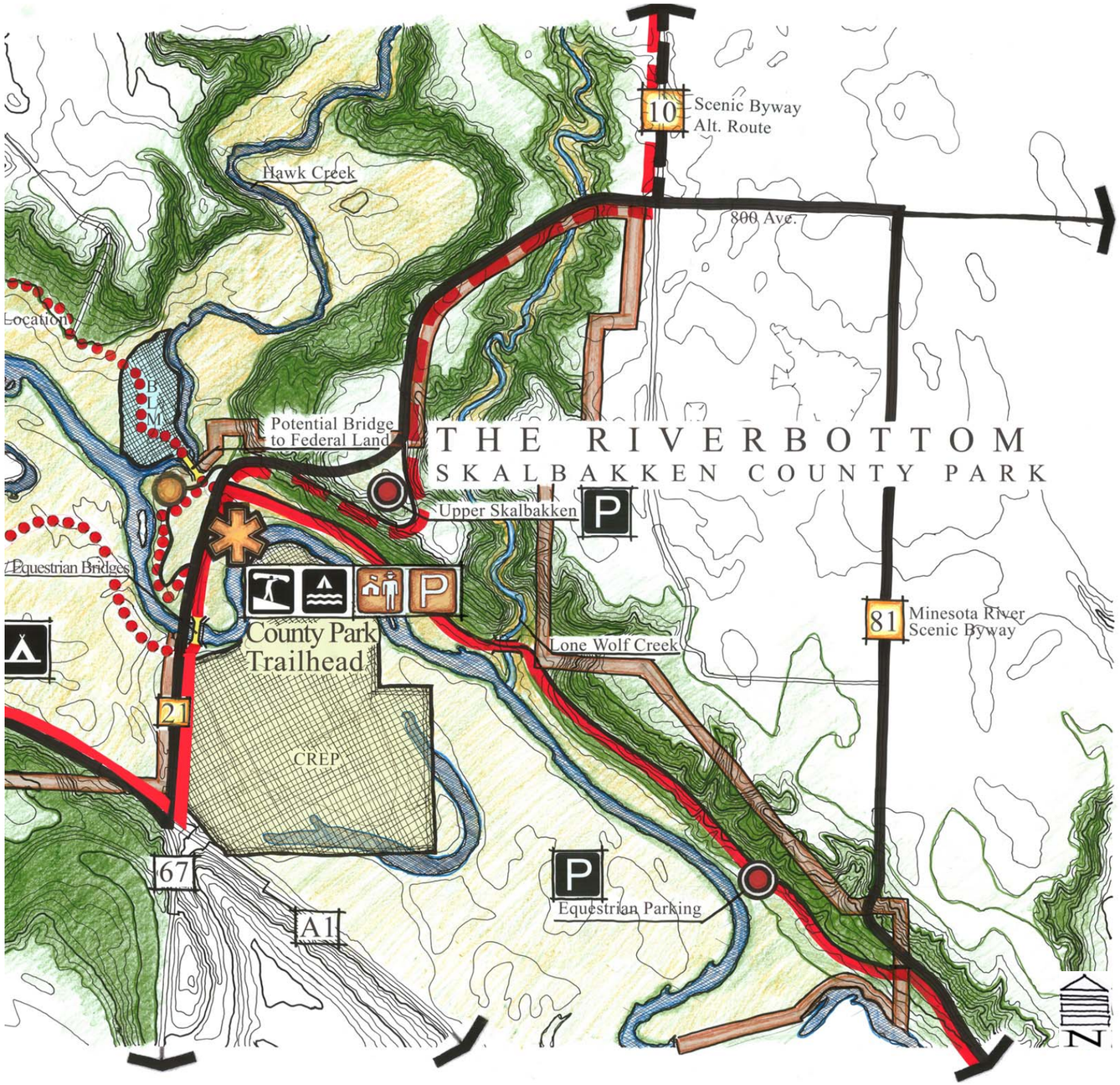
Camping,

Fishing,

Picnic Area,

Potential Mountain Bike trail network,

Located on State Snowmobile Trail.



LEGEND

MINNESOTA RIVER TRAIL

- POTENTIAL SPINE TRAIL
- POTENTIAL LOOP TRAIL OR ALTERNATE SPINE
- POTENTIAL PRIVATE LAND EASEMENT TRAIL

MN RIVER SCENIC BYWAY

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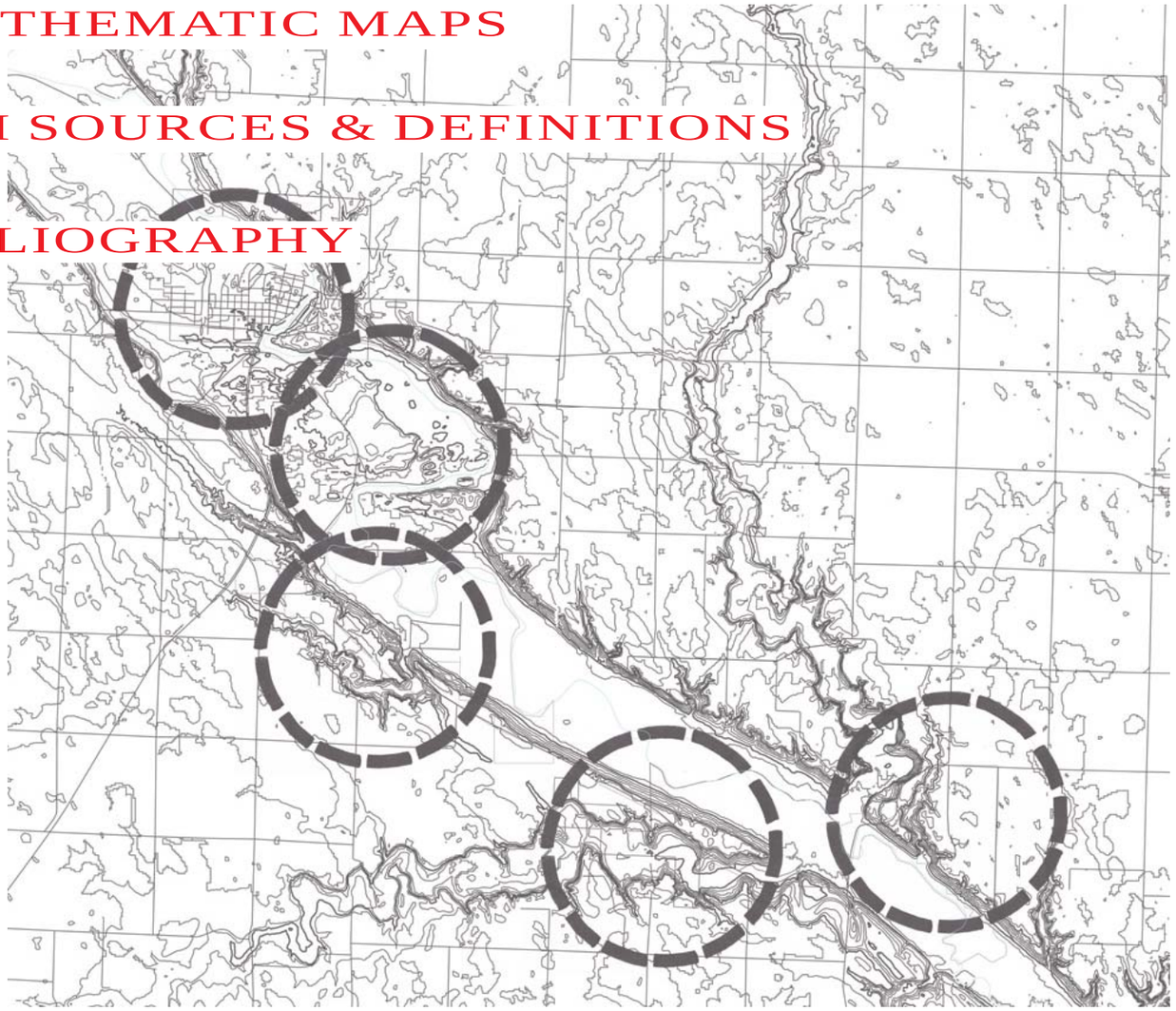
- FISHING ACCESS
- EQUESTRIAN CAMPING
- YELLOW ICONS = PROPOSED FACILITIES

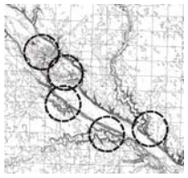
APPENDIX

GIS THEMATIC MAPS

LTM SOURCES & DEFINITIONS

BIBLIOGRAPHY





GIS THEMATIC MAPS

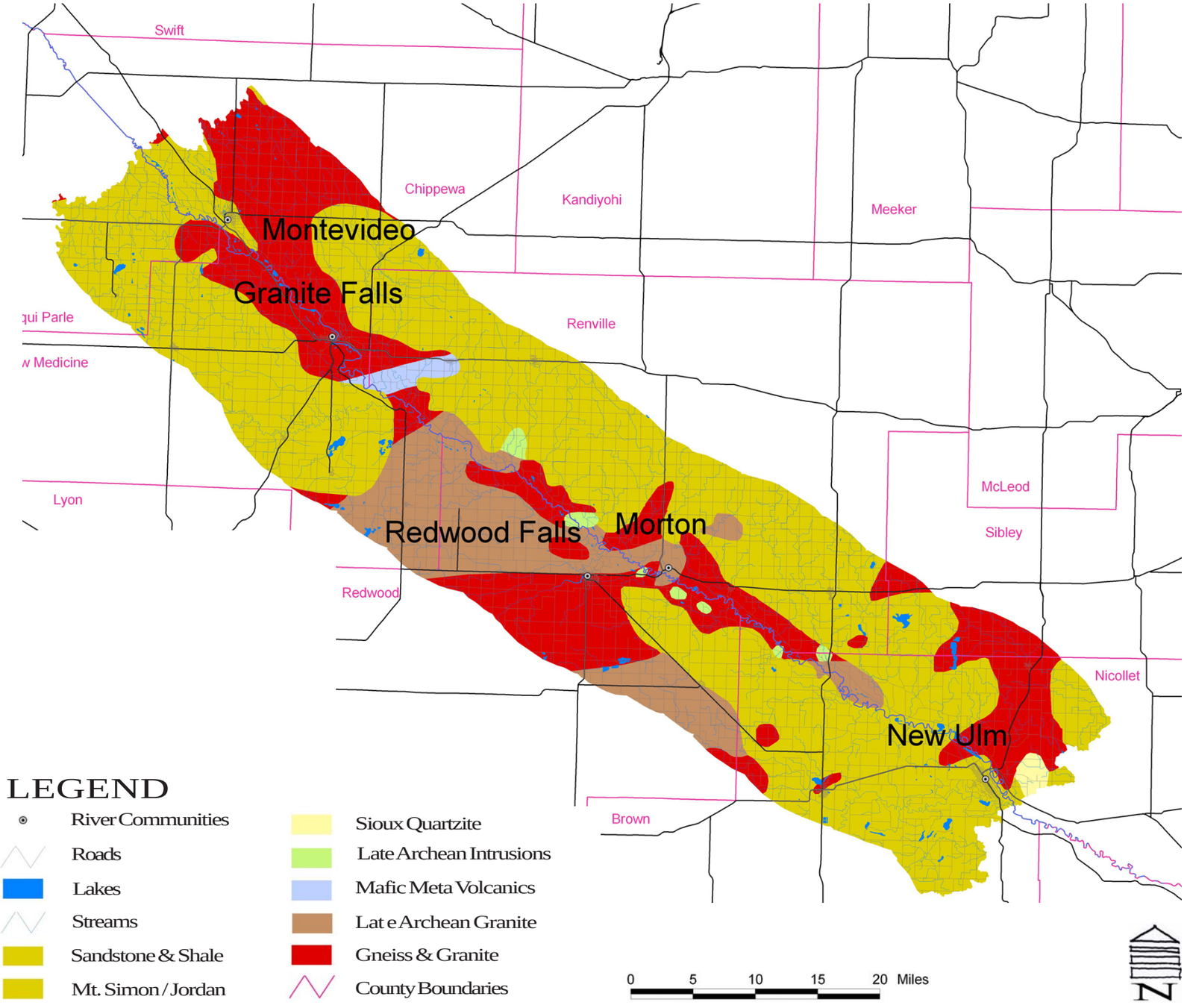
GEOGRAPHIC INFORMATION SYSTEMS THEMATIC MAPS:

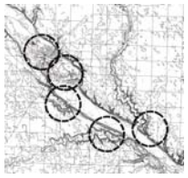
The first step in the design process is analyzing the landscape to understand its complex layers of geology, landform, vegetation, history and culture. In order to perform the analysis, GIS data was collected and then processed into different layers according to themes. The themes each become an individual map. Like laying a transparency over another, these thematic maps are layered over each other to reveal relationships within the complexity of the landscape.

Thirteen data layers were chosen to be combined into the thematic maps: bedrock geology, surficial geology, infrastructure, elevation, hydrology, original vegetation, native plant communities, biodiversity sites, national wetlands inventory, land use, land cover, population change, and land ownership. The thematic maps then produced, at the scale of the GIS study area, are: Bedrock Geology, Surficial Geology, Elevation, Hydrology, Original Vegetation, National Wetlands Inventory, Native Plant Communities, Biodiversity sites, Land Use, Population Change, Land Ownership.

Analyzing the landscape in this layered manner serves as the basis for developing a regional identity through design. Mapping the attributes of a region allows the design to celebrate the uniqueness of the area through use of regional materials, native vegetation, and landform.

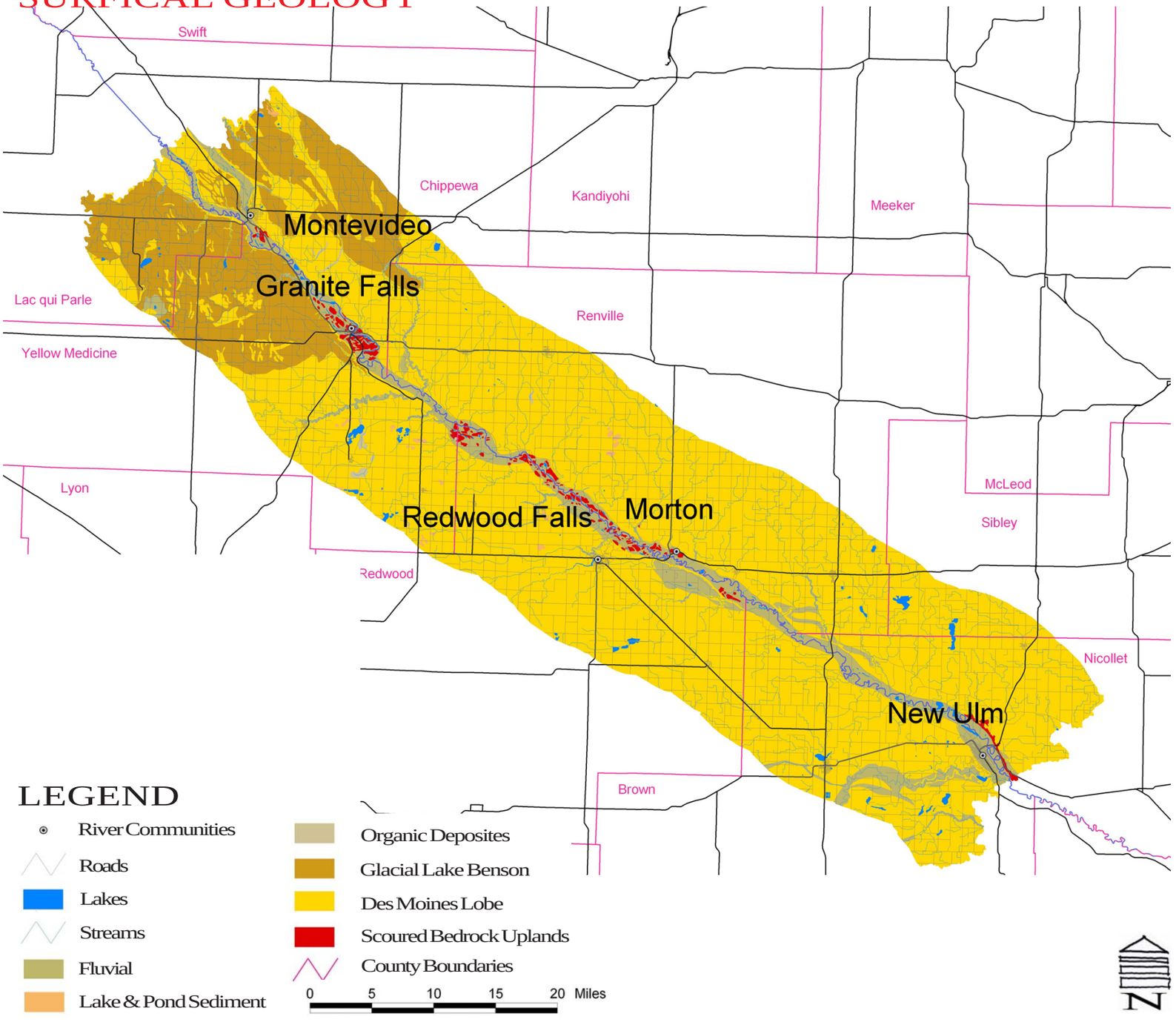
BEDROCK GEOLOGY





APPENDIX

SURFICAL GEOLOGY



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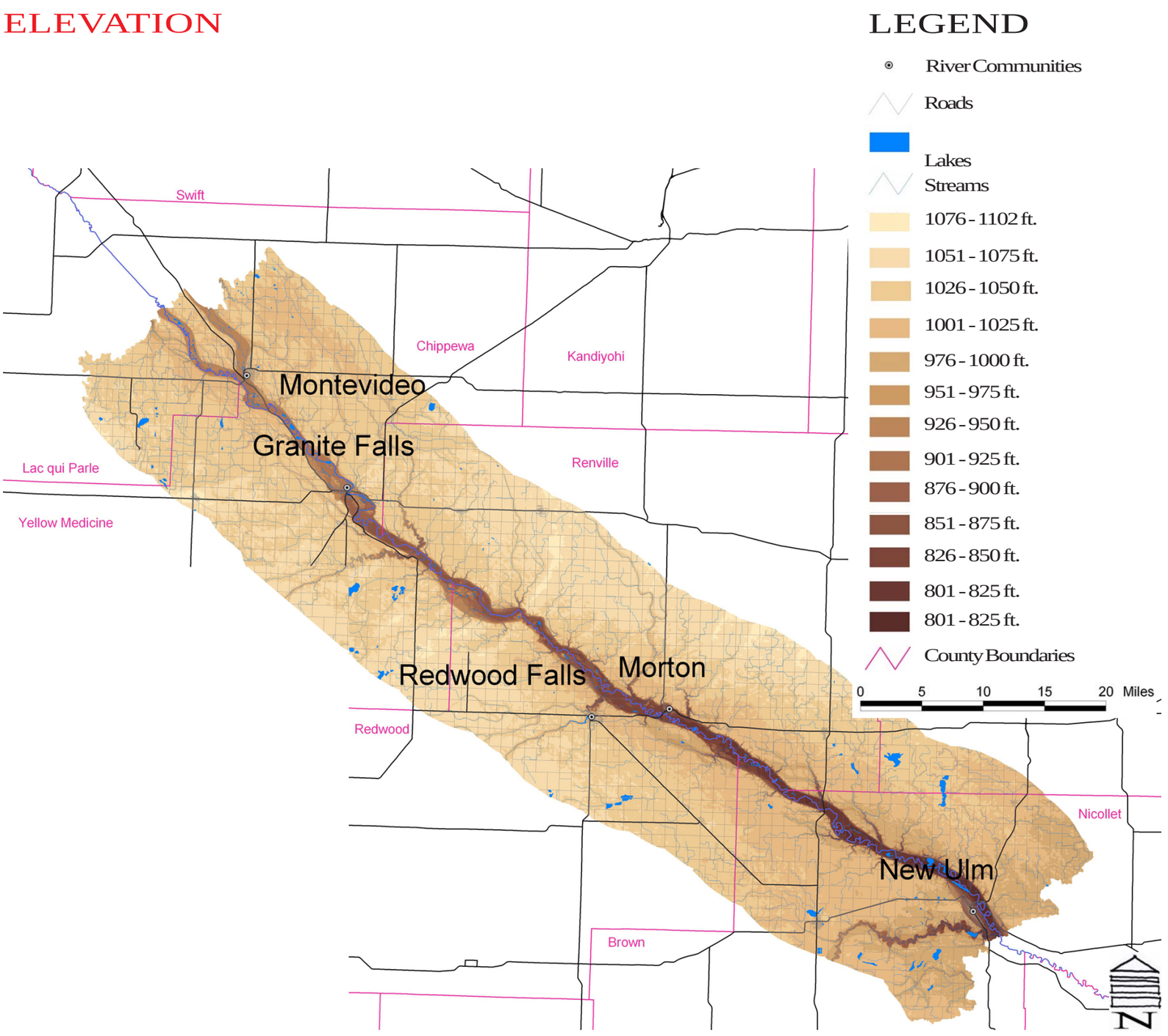
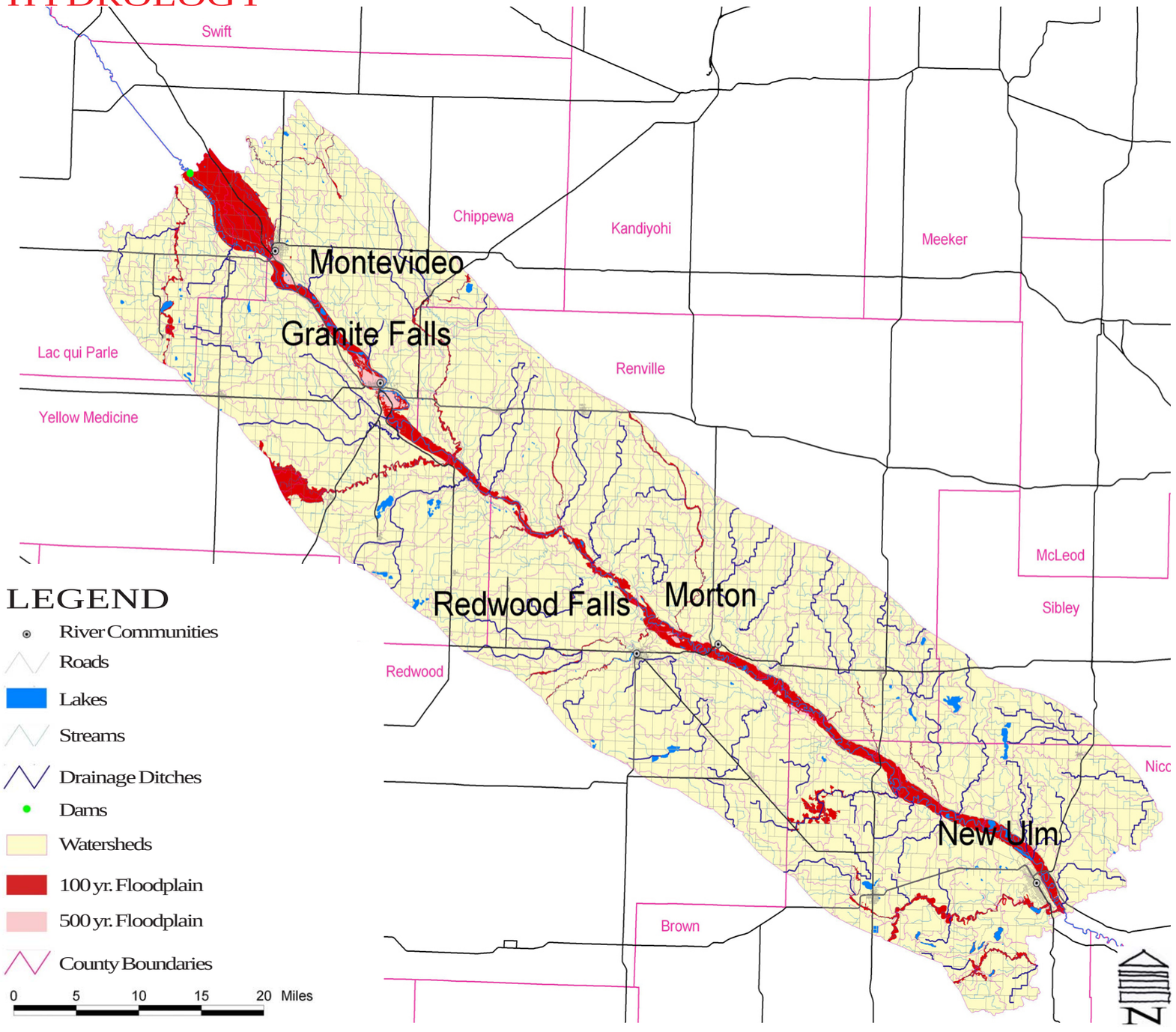
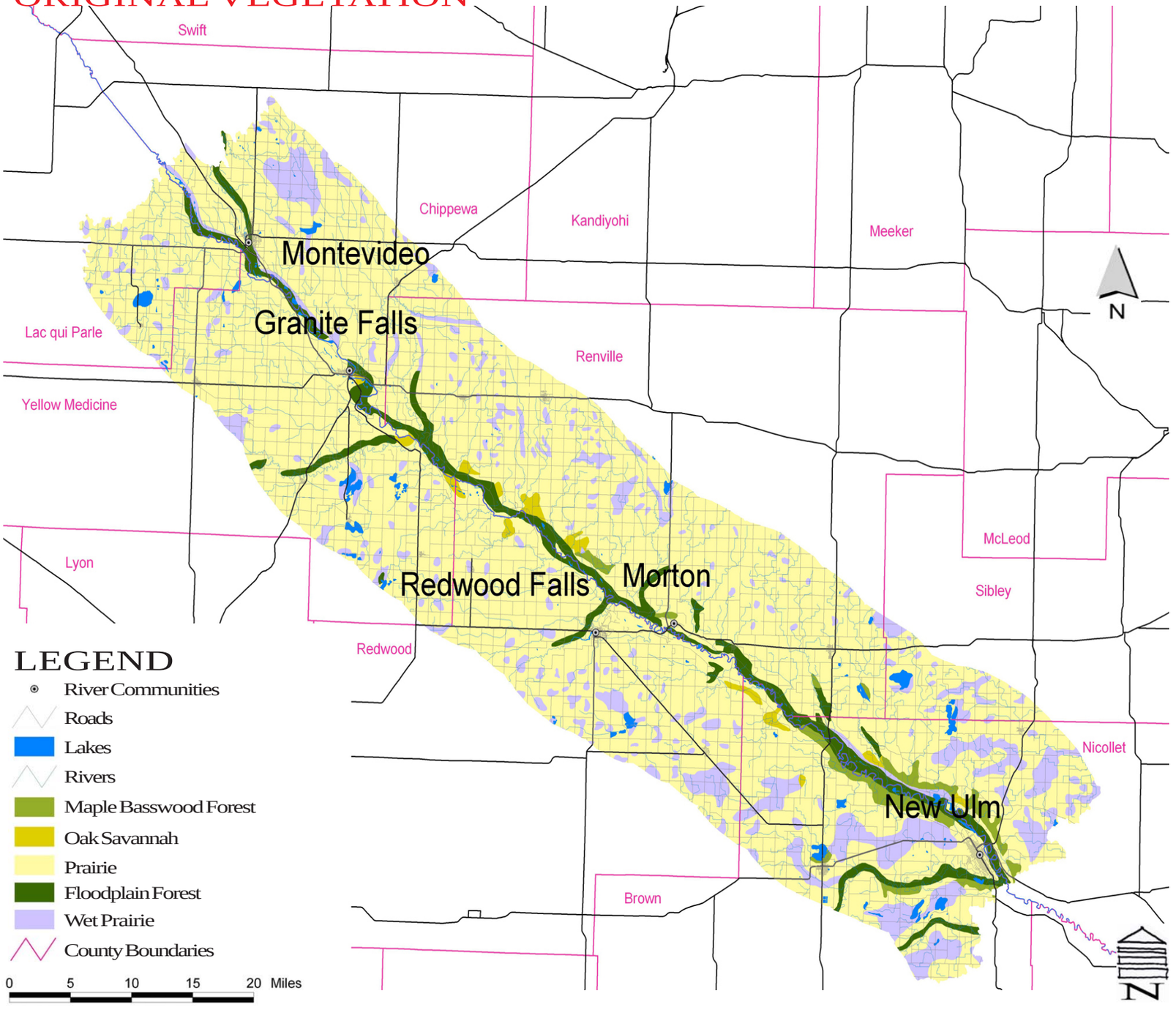
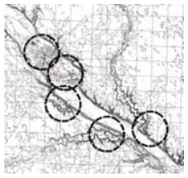

LEGEND
River Communities
Roads
Lakes
Streams
1076 - 1102 ft.
1051 - 1075 ft.
1026 - 1050 ft.
1001 - 1025 ft.
976 - 1000 ft.
951 - 975 ft.
926 - 950 ft.
901 - 925 ft.
876 - 900 ft.
851 - 875 ft.
826 - 850 ft.
801 - 825 ft.
801 - 825 ft.
County Boundaries
0 5 10 15 20 Miles
N
Swift
Chippewa
Kandiyohi
Montevideo
Granite Falls
Renville
Lac qui Parle
Yellow Medicine
Redwood Falls
Morton
Redwood
Nicollet
New Ulm
Brown

HYDROLOGY


Swift
Chippewa
Kandiyohi
Meeker
Montevideo
Granite Falls
Lac qui Parle
Renville
Yellow Medicine
McLeod
Sibley
Redwood Falls
Morton
Redwood
New Ulm
Brown
LEGEND
River Communities
Roads
Lakes
Streams
Drainage Ditches
Dams
Watersheds
100 yr. Floodplain
500 yr. Floodplain
County Boundaries
0 5 10 15 20 Miles
N

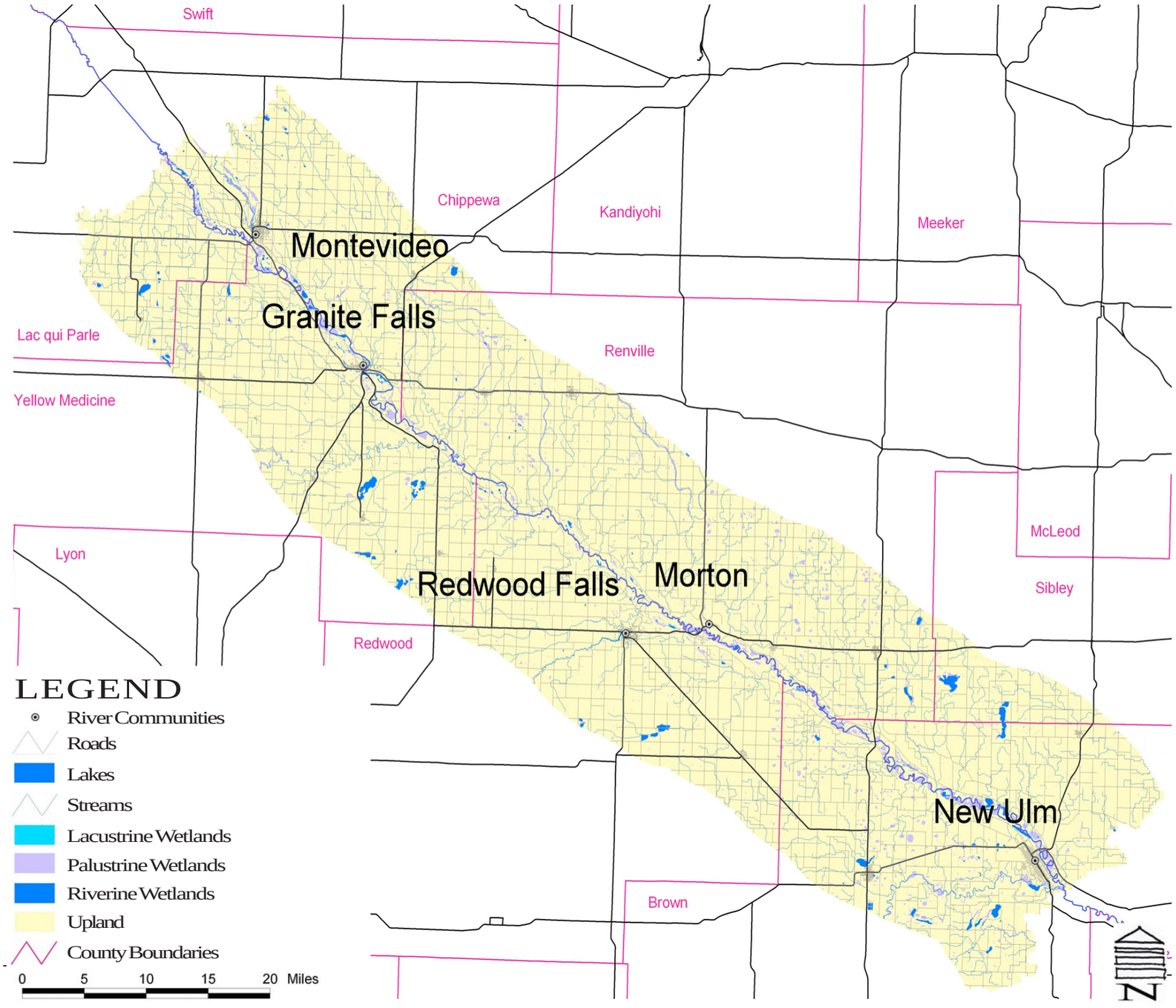
ORIGINAL VEGETATION





APPENDIX

NATIONAL WETLANDS INVENTORY (NWI)



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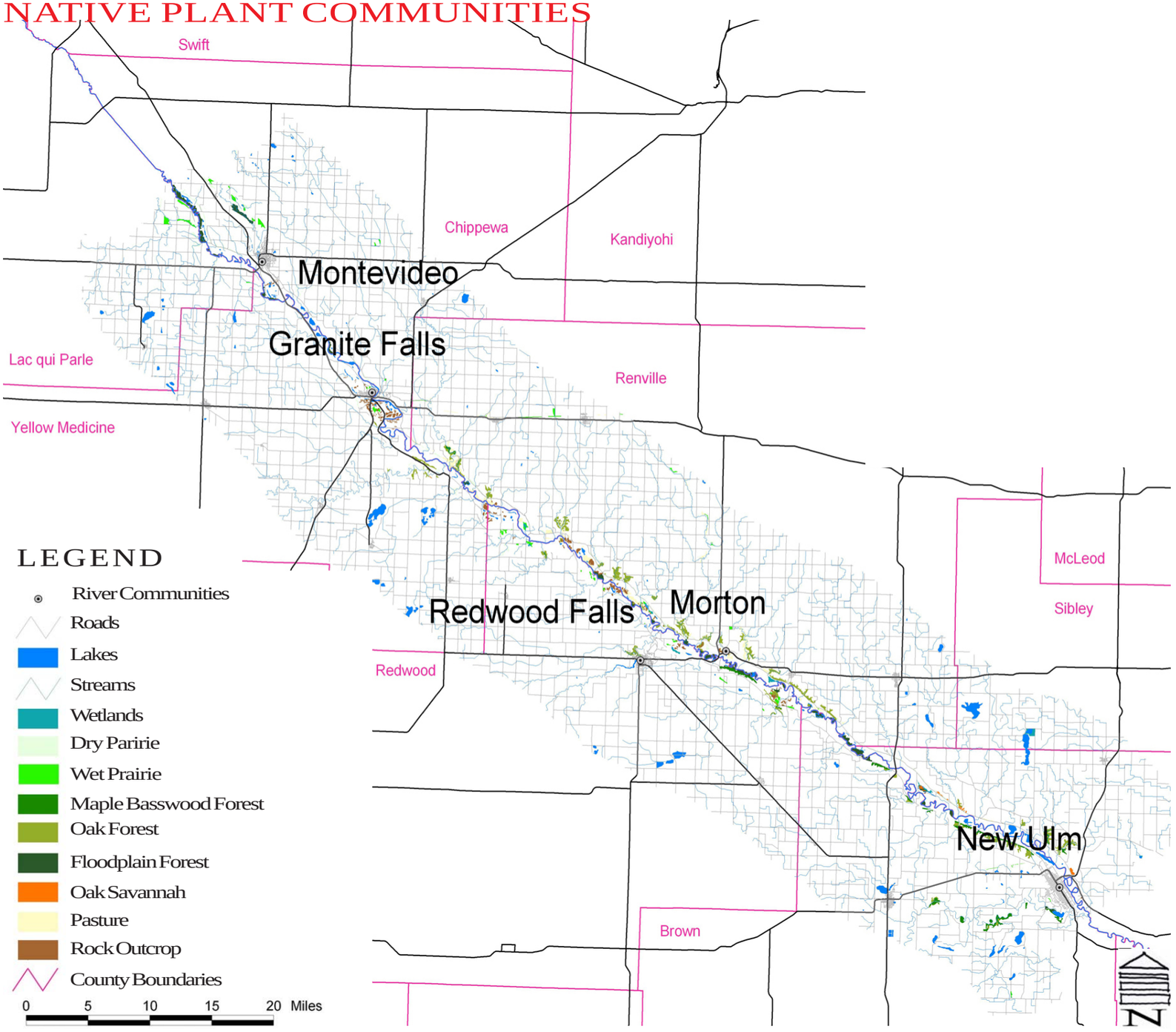
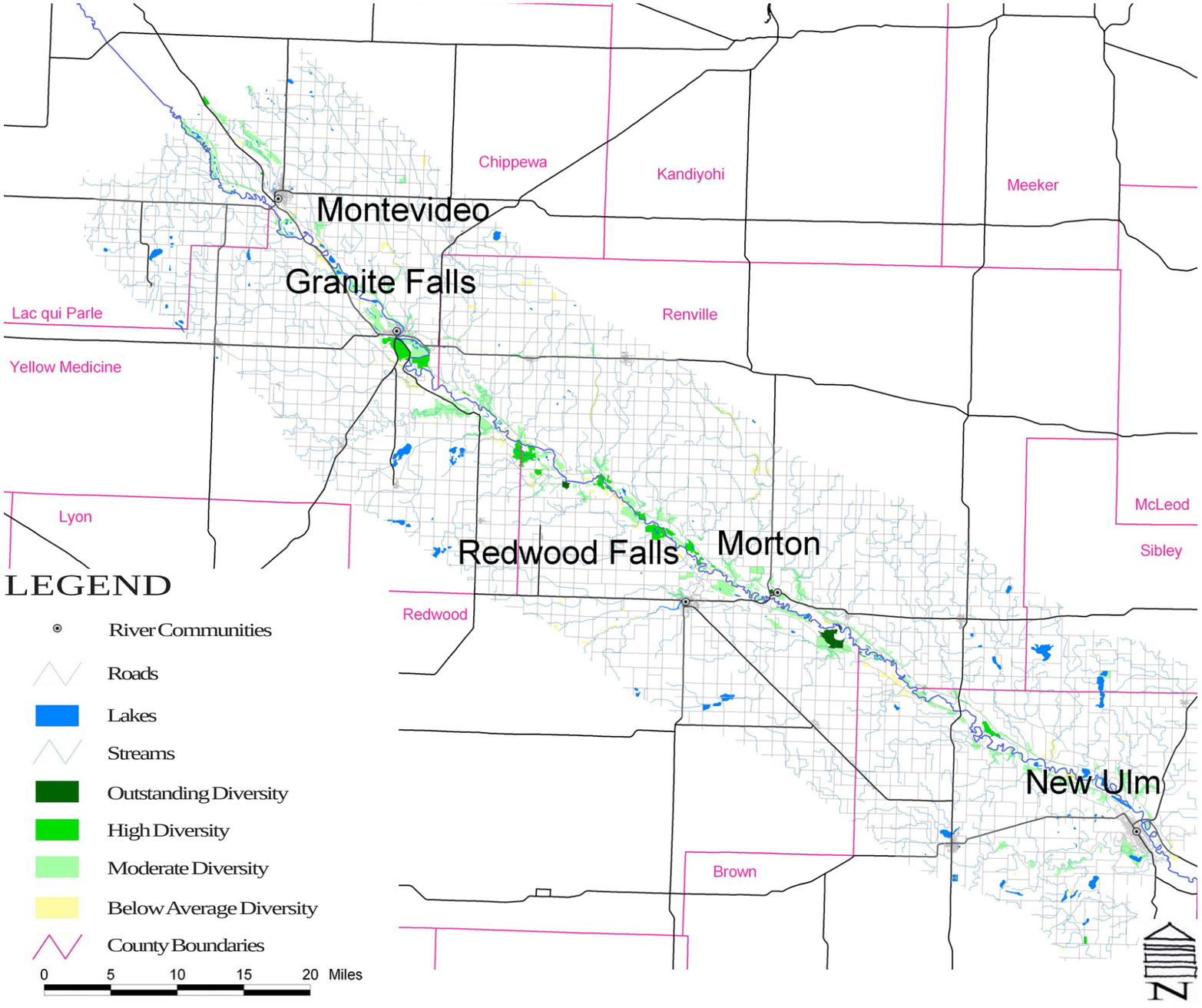
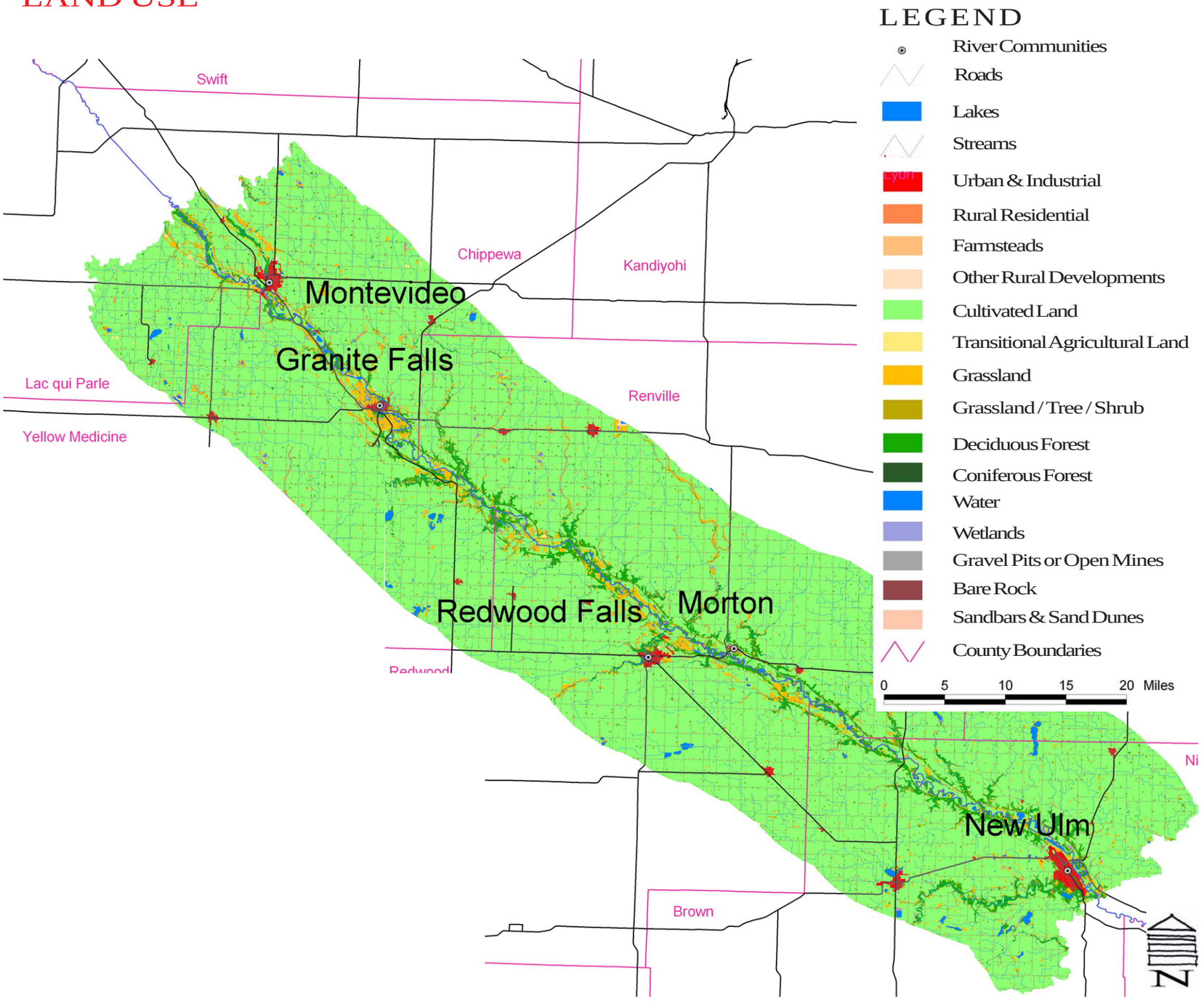
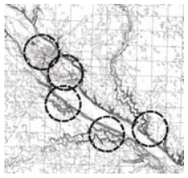


BIODIVERSITY SITES



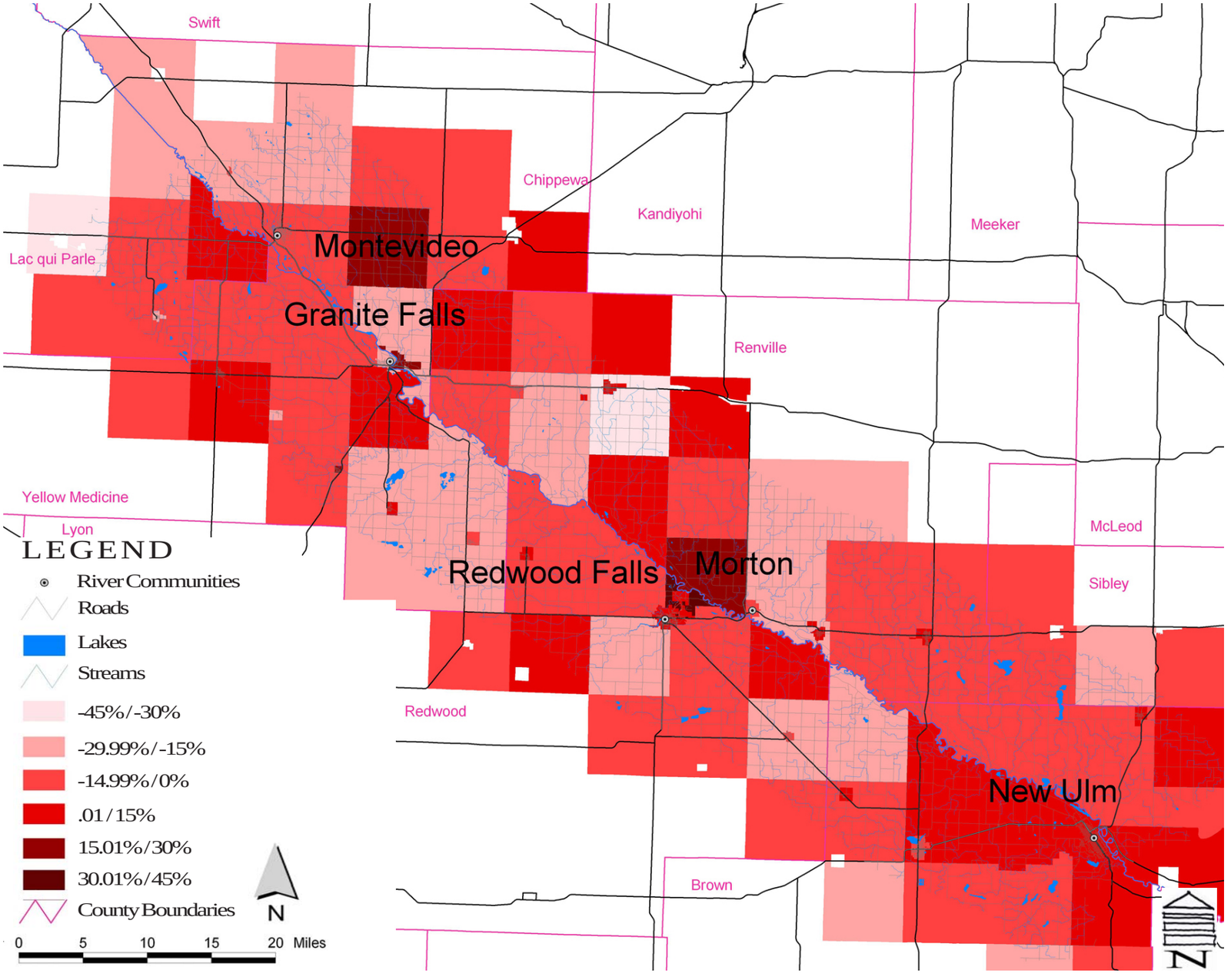
LAND USE


LEGEND
River Communities
Roads
Lakes
Streams
Urban & Industrial
Rural Residential
Farmsteads
Other Rural Developments
Cultivated Land
Transitional Agricultural Land
Grassland
Grassland / Tree / Shrub
Deciduous Forest
Coniferous Forest
Water
Wetlands
Gravel Pits or Open Mines
Bare Rock
Sandbars & Sand Dunes
County Boundaries
0 5 10 15 20 Miles
Swift
Chippewa
Kandiyohi
Montevideo
Granite Falls
Lac qui Parle
Renville
Yellow Medicine
Redwood Falls
Morton
New Ulm
Brown
N

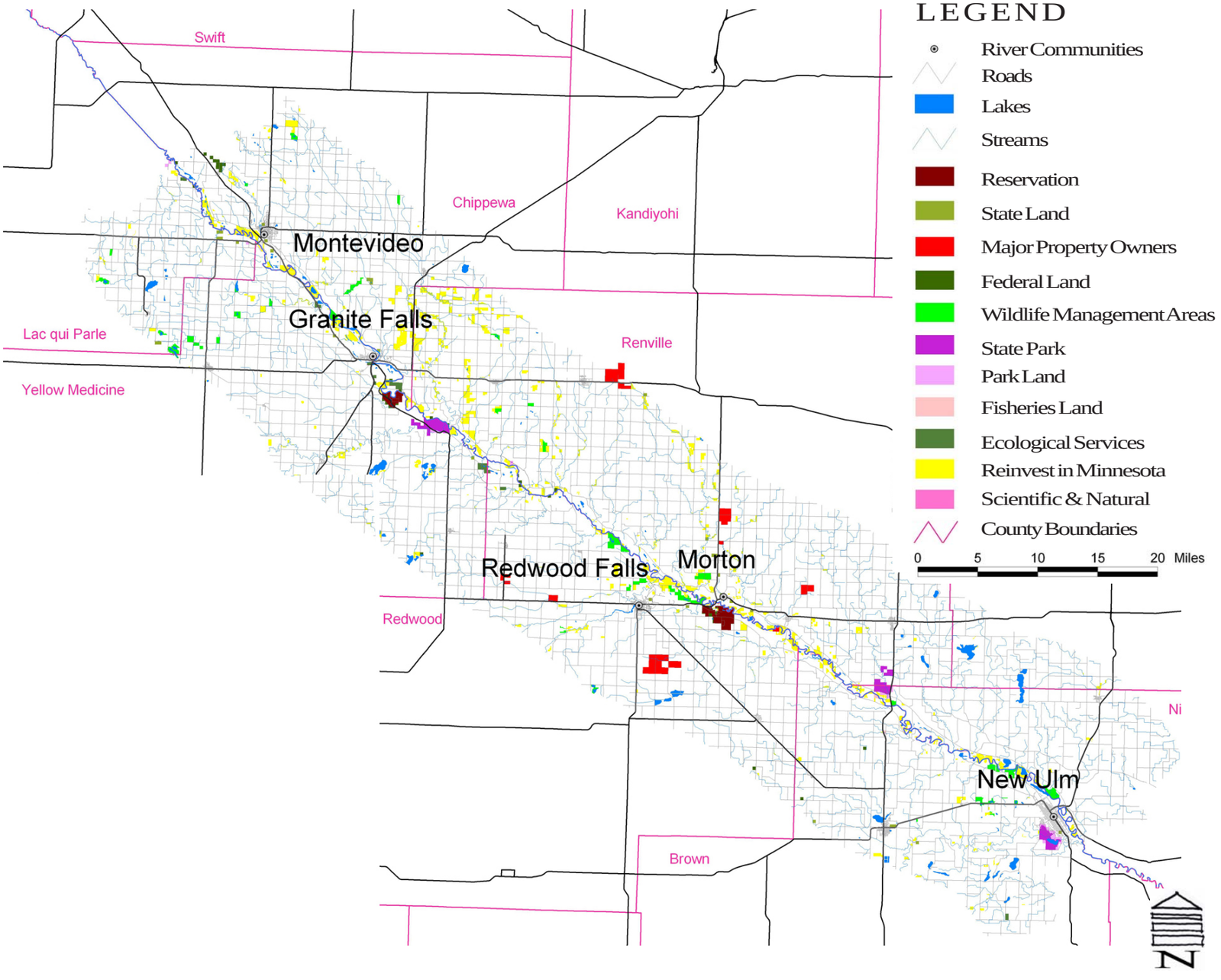


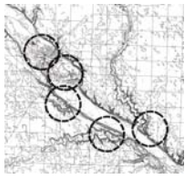
APPENDIX

POPULATION CHANGE 1990-2000



LAND OWNERSHIP





LTM MODELING

LAND TRANSFORMATION MODELING OVERVIEW:

THE LAND TRANSFORMATION MODEL (LTM)

Before analysts could make the 2020 and 2050 urban transformation projections, they first simulated a projection for a year for which they had actual urban transformation data. Using data from the years 1991 and 2000, they projected urban transformation of the Minnesota River Trail area for this 9-year period. To do so, they first obtained raw data including satellite images, road maps, land cover maps, and various geographic data layers of the area from the 1991 and 2000 dates.

DATA FOR LTM MODELLING

Data for input to the LTM model was obtained from a variety of sources noted below.

LANDSAT THEMATIC MAPPER IMAGES: Landsat satellites capture moderate resolution images of the earth from space. For the Minnesota River Trail project, analysts classified Landsat images from 1991 and 2000 to generate land cover/land use maps of the study area. The land cover/land use was classified as: Water and rivers, lowland forest, upland forest, agriculture/grass, urban and lowland non-forest.

GAP ANALYSIS PROGRAM (GAP) VEGETATION MAP: The Minnesota GAP vegetation map is a detailed, hierarchically organized vegetation cover map produced by computer classification of combined two-season pairs of early 1990s Landsat imagery. The GAP vegetation map was used to create a lowland mask to separate lowland forest areas from lowland non-forest areas in the Landsat images noted above. It also served as an aid to the generation of land cover/land use classifications.

U.S. GEOLOGICAL SURVEY DIGITAL ELEVATION MODELS: Digital Elevation Models, commonly referred to as DEMs, are data files that illustrate an area's elevation. Before computers, DEMs were simply a collection of elevation points for an area organized into lists or tables. But today, computer software takes this data and generates three-dimensional views of an area based on these elevation points and allowing for a more thorough analysis. DEMs are available through the U.S. Geological Survey (USGS). from the USGS 1:24,000 mapping series. Those roadways that are interstate, trunk highway,

DIGITAL LINE GRAPHS HYDROLOGICAL WATER AND WETLAND DATA: Digital Line Graphs (DLGs) are datasets that represent cartographic information from USGS maps. For the Minnesota River Trail project, analysts used the hydrological water and wetland data layers.

NATIONAL FOREST: The dataset that represents the location of national forest boundaries within the state is Natforest which was created by the U.S. Forest Service. This data was used in the development of an exclusionary layer for the LTM.

INDIAN RESERVES: The dataset that represents the location of Indian reservation boundaries within the state is Reservtn. This data was used in the development of an exclusionary layer for the LTM.

CENSUS BLOCK: U.S. Census block level data with population information for 1991 and 2000.

Next, these data were processed using ArcGIS, a computer software package. This allowed analysts to identify ten factors, or predictor variables, affecting urban transformation between 1991 and 2000.

Ten Predictor Variables:

Elevation

Slope

Aspect

Distance to interstate highway

Distance to County aid highway

Distance to lakes

Distance to streams

Distance to lowland

Distance to urban

Population density

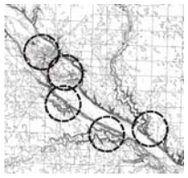
Next, these predictor variables, along with the land cover maps from 1991 and 2000 and an exclusionary layer, were loaded into the LTM. The exclusionary layer, which is a data layer representing land where development is prohibited, included interstate highway, county aid highway in 1991, water and rivers, state and national parks, Indian reservations, and the initial 1991 urban area. To generate the 1991-2000 urban transformation projection, analysts relied on the LTM's Artificial Neural Network (ANN) to sort the predictor variables, land cover/land use maps, and the exclusionary layer. Artificial neural networks serve the LTM the same way that neurons serve the human brain. Both are an information processing hub.

After the LTM ran its course, a map of "change likelihood values" for the Minnesota River Trail was generated illustrating which areas were highly likely to change from non-urban to urban by 2000.

URBAN TRANSFORMATION SIMULATION: 2000

With the "change likelihood values" and the land cover maps from 1991 and 2000, analysts determined that the Minnesota River Trail area experienced a major increase in transformation of non-urban to urban land between 1991 and 2000. In fact, the area classified as urban land increased by 34 percent from 1991 to 2000. To aid the understanding of these changes, we note the area classified as urban land in 1991 was 63,007 acres.

By overlaying this projection on the actual urban transformation between 1991 and 2000, analysts were able to examine the accuracy of the projections. The projection was typically 30-50 percent accurate depending on the part or subregion of the study area considered -– a typical pixel level of accuracy for the LTM. Accuracies exceeding 45-50% are considered very unusual and perhaps due to overfitting of the model. However, accuracy can be judged several ways: Agreement in the actual pixels that changed and/or agreement in the total number of pixels changing to urban.



LTM MODELING

THE LAND TRANSFORMATION MODEL:

The LTM model is a digital tool developed by Michigan State University to assist planners and resource managers to develop improved decisions that affect the environment and local to regional economies. The LTM uses recent land use change, population growth, transportation, proximity or density of important landscape features such as rivers, lakes, recreational sites, and high-quality vantage points as inputs to model future land use change.

The LTM models employs Artificial Neural Networks, similar to the intricate pathways established in the human brain. The Artificial Neural Net is a process that utilizes a machine learning approach to numerically solve relationships between inputs and outputs (Michigan State University 1996). The LTM relies on Geographic Information Systems (GIS), artificial neural network routines, land use data from at least two dates, and customized geospatial analysis tools. Raw GIS data (e.g., thematic layers) is first acquired, then processed, and converted to an ARC/INFO GRID format with cell sizes of 30m x 30m.

INPUTS TO THE LTM MODELLING PROCESS

LandSat Thematic Mapper Images:

LandSat satellites capture moderate resolution images of the earth from space. For this project, analysts classified LandSat TM5 image data from around 1991 and 2000 to generate land cover/land use maps of the study area. Specifically, three Landsat scenes were needed to cover the extent of the Minnesota River Valley; specifically these were path-29 row-29, path-28 row-29, and path-27 row-29. The subsequent land cover classification of the 1991 base layer used one TM image from each scene. The image dates used, in order of path and row given above, were August 19th 1992, August 26th 1991, and September 6th 1992. Images were selected based on their quality (i.e., lack of clouds and haze) and nearness to the base date of 1991. The 2000 land cover classification used images from the ETM+ sensor corresponding to the dates August 4th 2001, July 23ed 1999, and September 18th 1999. Again all images were chosen based on clarity and nearness to the base date 2000. All the images were rectified to the MDOT road layer, with a final rectification error of less than 15 meters.

The ISODATA algorithm was used to classify the images into the following classes: Water and rivers, lowland forest, upland forest, agriculture/grass, urban and lowland non-forest. These classes were established based on the abilities of the sensor, our research requirements, and by referencing Anderson's Land Use / Land Cover classification system. The resulting classes are described in table 1.

Table 1. Description of land cover/land use classes.

Land cover/land use class	**Description**
Water and Rivers	Permanent open water, lakes
Lowland forest	Lowland forested area. Forest defined as a minimum of 70% canopy closure. It includes coniferous, deciduous, and mixed forest.
Upland forest	Upland forest area. Forest defined as a minimum of 70% canopy closure. It includes coniferous, deciduous, and mixed forest.
Agriculture/grass	Includes planted cropland, rangeland, fallow, and natural grassland.
Urban	Includes commercial, industrial, residential, and transportation.
Lowland non-forest	Lands that are sometimes covered with water or have waterlogged soils.

GAP ANALYSIS PROGRAM (GAP) VEGETATION MAP:

The Minnesota GAP vegetation map is a detailed, hierarchically organized vegetation cover map produced by computer classification of combined two-season pairs of early 1990s Landsat imagery. The map was developed as part of the Upper Midwest Gap Analysis Program whose goal it is to maintain biodiversity by identifying those species and plant communities that are not adequately represented in existing conservation lands. There are typically 4 levels or classes in Gap Analysis. The GAP vegetation map was used to create a lowland mask to separate lowland forest areas from lowland non-forest areas in the Landsat images noted above. It also served as an aid to the generation of land cover/land use classifications.

U.S. GEOLOGICAL SURVEY (USGS) DIGITAL ELEVATION MODELS (DEM): The DEMs were standardized to 30-meter grid cells, UTM Zone 15, NAD83, vertical units in feet and were joined into one statewide file. All the DEMs are Level 2 quality. Level 2 DEMs have been processed or smoothed for consistency and edited to remove identifiable systematic errors. A vertical RMSE of one-half of the contour interval, determined by the source map, is the maximum permitted. Systematic errors may not exceed one contour interval specified by the source graphic.

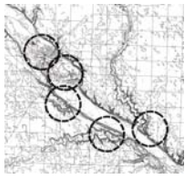
DEPARTMENT OF TRANSPORTATION 2001 ROADS: This data set contains roadway centerlines for roads found on the USGS 1:24,000 mapping series. Those roadways that are Interstate, Trunk Highway, or CSAH (county state/aid Highway) are current through the 2001 construction season. Other roads, if not updated, are depicted as shown on the published quadrangle.

HYDROLOGICAL LAKE AND WETLAND DATA: The 1:100,000 scale hydrography data was derived from USGS Digital Line Graphs (DLG)'s of the same scale. This data contains only the polygon portion of the DLG database. Area features are described as lakes, wetlands, inundated areas, tailings ponds, sewage ponds, fish hatcheries, and other minor water body types.

NATIONAL FOREST: Natforest, which represents national forest boundaries within the state, is a layer of the State of Minnesota BaseMap 2001 which consists of a number of individual data layers or themes digitized from 1:24000 USGS 7.5-minute quadrangles. These data layers fall into the following broad categories: transportation system, civil and political boundaries, and surface water. Natforest originated as a polygon coverage with the U.S. Forest Service. It is available through the Minnesota Department of Transportation.

Indian Reserves: Reservtn, which represents Indian reservation boundaries within the state, is a layer of the State of Minnesota BaseMap 2001, which consists of a number of individual data layers, or themes digitized from 1:24000 USGS 7.5-minute quadrangles. It is available through the Minnesota Department of Transportation.

CENSUS BLOCK : U.S. Census block level data with population information for 1990 and 2000 was obtained from the U.S. Census Bureau.



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