

APPENDIX E

Devil's Lake, North Dakota

**Final
Integrated Planning Report
and
Environmental Impact Statement**

**Devils Lake Infrastructure
General Information**

DEVILS LAKE, NORTH DAKOTA
INTEGRATED PLANNING REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

**APPENDIX E – DEVILS LAKE INFRASTRUCTURE, GENERAL
INFORMATION**

	<u>Page No.</u>
General.....	1
Feature 1: Churchs Ferry	3
Feature 2: City of Devils Lake	6
Feature 3: Fort Totten.....	9
Feature 4: City of Minnewaukan.....	12
Feature 5: St. Michael.....	16
Feature 6: Gilbert C. Grafton Military Reserve.....	19
Feature 7: Grahams Island State Park	22
Feature 8: Rural Features.....	25
Feature 9: Red River Valley and Western Railroad.....	33
Feature 10: Canadian Pacific Railroad.....	35
Feature 11: Burlington Northern Railroad (Along US Highway 2).....	38
Feature 12: Burlington Northern Railroad (Churchs Ferry to Cando)	41
Feature 13: US Highway 2	44
Feature 14: ND Highway 57 (ND Highway 20 to BIA Highway 1)	47
Feature 15: ND Highway 57 (BIA Highway 1 to US Highway 281).....	50
Feature 16: US Highway 281 (South of US Highway 2).....	53
Feature 17: US Highway 281 (North of US Highway 2).....	56
Feature 18: ND Highway 19.....	59
Feature 19: ND Highway 1.....	62
Feature 20: ND Highway 20 (North of City of Devils Lake).....	64

Feature 21: ND Highway 20 (City of Devils Lake Levee to ND Highway 57).....	66
Feature 22: ND Highway 20 (ND Highway 57 to Tokio).....	69
Feature 23: BIA Highway 1	72
Feature 24: BIA Highway 6	75

APPENDIX E

DEVILS LAKE INFRASTRUCTURE GENERAL INFORMATION

GENERAL

This appendix presents general information on the 24 infrastructure features in the Devils Lake Basin that were evaluated as part of the Most Likely Future Without Project. Possible flood protection measures for all of the features has been previously evaluated in studies that were completed in 2001. It was found that sixteen of the 24 features would require flood protection actions before the rising Devils Lake would reach elevation 1454 ft. msl. More detailed studies of these features, particularly the first protection step that would be required, was performed in 2002. Please see the report titled *Devils Lake Infrastructure Protection Study, January 2003* by Barr Engineering for complete information on all of the infrastructure studies that were performed for Devils Lake.

The 24 features are listed below; the 16 features for which more detailed analysis was performed are shown in bold text. The Features are shown in Figure 1.01.

1. **Churchs Ferry**
2. **City of Devils Lake**
3. **Fort Totten**
4. **City of Minnewaukan**
5. **St. Michael**
6. **Gilbert C. Grafton Military Reservation**
7. **Grahams Island State Park**
8. **Rural Areas**
9. Red River Valley and Western Railroad
10. **Canadian Pacific Railroad**
11. **Burlington Northern Railroad (Along US Highway 2)**
12. Burlington Northern Railroad (Churchs Ferry to Cando)
13. US Highway 2
14. ND Highway 57 (between ND Highway 20 and BIA Highway 1)
15. ND Highway 57 (between BIA Highway 1 and US Highway 281)
16. **US Highway 281 (South of US Highway 2)**
17. **US Highway 281 (North of US Highway 2)**
18. ND Highway 19
19. **ND Highway 1**
20. ND Highway 20 (North of City of Devils Lake)
21. ND Highway 20 (City of Devils Lake Dike to ND Highway 57)
22. **ND Highway 20 (ND Highway 57 to Tokio)**
23. **BIA Highway 1**
24. **BIA Highway 6**

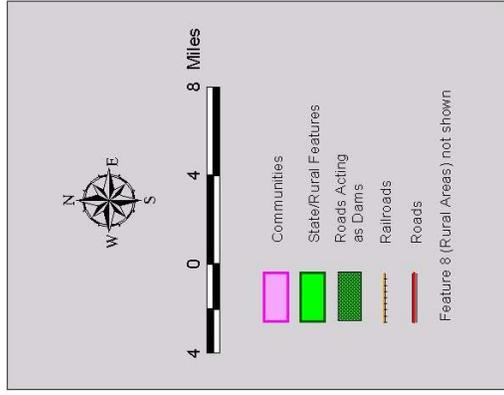
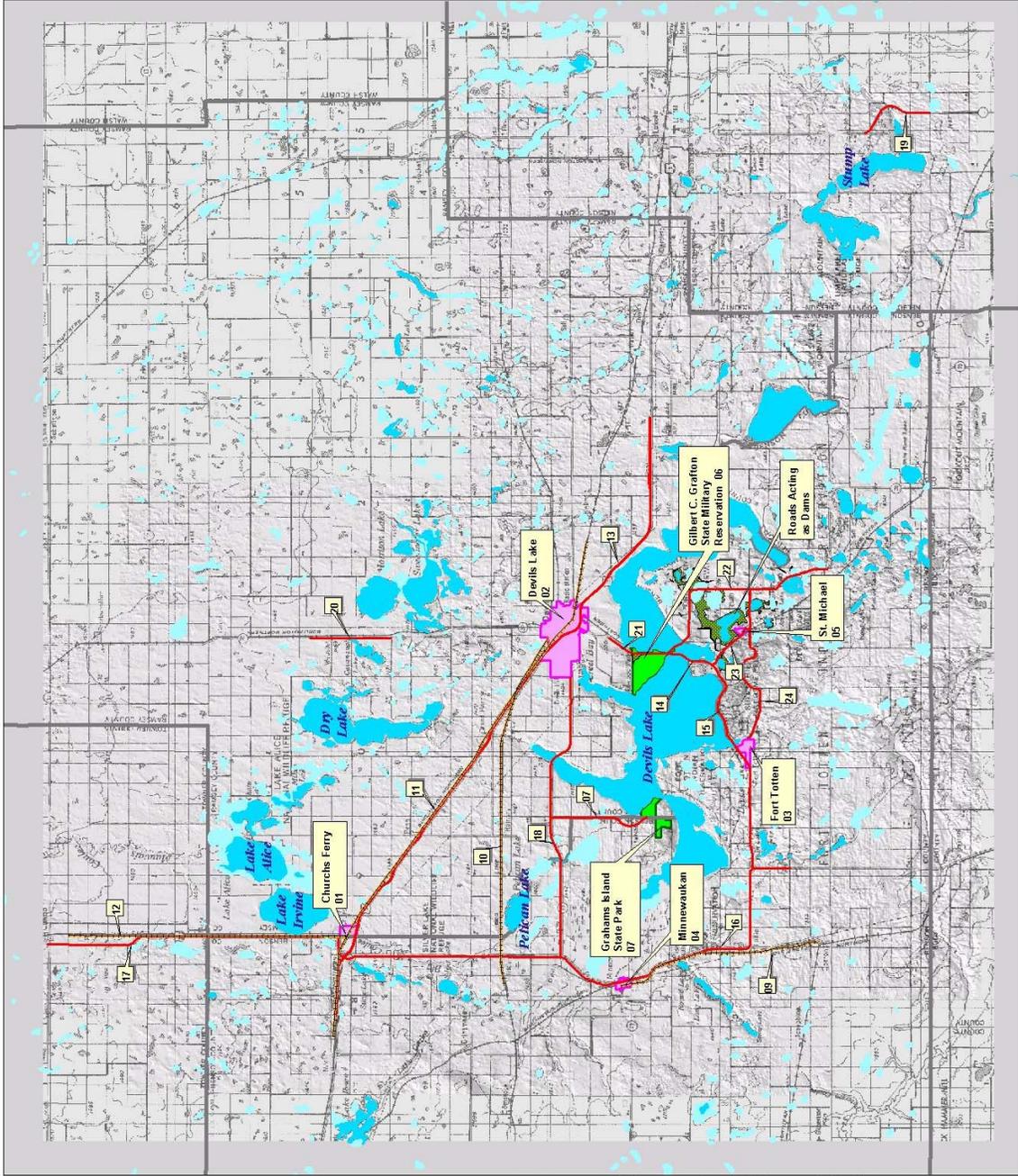


Figure 1.01
 LOCATION MAP
 DEVILS LAKE FEATURES
 Devils Lake Infrastructure
 Protection Study

FEATURE 1: CHURCHS FERRY

General Information

Most Recent Study: 2002

Feature Type: Community

Location: Churchs Ferry is located approximately 23 miles northwest of Devils Lake, ND on US Highway 2. The accompanying Figure 4.1-1 shows the feature's location and approximate extents, and the inundation extents at the three reference lake levels (1447, 1454, and 1463).

Description: Churchs Ferry was a community of approximately 77 people (based on 2000 census) prior to the FEMA buyout. Based on a recent phone conversation with the mayor of Churchs Ferry (Paul Christenson), the current population of Churchs Ferry is 7 (after the FEMA buyout program).

Significance: Churchs Ferry is important because of its proximity along Burlington Northern Railroad and adjacent grain elevators. The rising lake level has affected Churchs Ferry over the last few years, and more structures could be affected by rising lake levels. The businesses remaining in Churchs Ferry provide services to the surrounding rural community.

Damages: The flooding of Churchs Ferry would result in the following damages: loss of 3 homes, a church, firehall, City Hall, post office, automobile repair shop, bar, school buildings, Masonic Lodge, a City shop, a railroad maintenance building, and 3 other miscellaneous buildings, sewage lagoons

Owner/Sponsor: Churchs Ferry city council is responsible for managing and maintaining Churchs Ferry.

Lead Federal Agency: The U.S. Army Corps of Engineers would take the lead for Churchs Ferry for any flood protection work that may take place. Federal Emergency Management Agency (FEMA) would coordinate relocation of structures.

History of Flood Protection: In the past, flood protection for Churchs Ferry has consisted of constructing a temporary levee to elevation 1451.5 and conducting a buyout program that was implemented in 2000. Only 3 residents decided to forego the buyout offer, all of which are located between 1456 and 1464. The other remaining buildings listed were not part of the buyout program. It was assumed that the existing temporary levee would not be raised because the cost of raising it would exceed the value of the structures that it would protect.

Based on a phone conversation with BTR Farmers Coop staff on October 24, 2002, the grain elevator in Churchs Ferry is scheduled to be relocated. The new elevator is currently under construction and will be complete during the summer of 2003. The elevator will be located along the Burlington Northern Sante Fe (BNSF) mainline about 6

miles west of the current elevator. Grain operation will be moved during 2003 when the new elevator is complete.

General Protection Strategy: The Infrastructure Protection Study's analysis for Church's Ferry considered one incremental flood protection strategy. At the first action level, relocation was the only strategy that was feasible both from an economic and a constructability standpoint. The strategy involved relocation of 3 residences, a church, firehall, City Hall, post office, repair shop, bar, school buildings, Masonic Lodge, a City shop, and a railroad maintenance building.

The existing sewage lagoons serve the 3 residences and the remaining buildings. The cost to protect or relocate the sewage lagoons or abandon the sewage lagoons and construct individual septic systems was not analyzed as part of this study.

Selected Flood Protection Strategy

The flood protection strategy that was analyzed for Church's Ferry was relocation of the affected structures.

Drawing

Figure 4.1-1 shows this feature and flood protection alternatives that were analyzed. It also shows utilities, potential HTRW sites, and potential cultural resource sites that are in the area of the project. The identified sites may or may not be of concern to potential projects. They would need to be field investigated during further development of the project

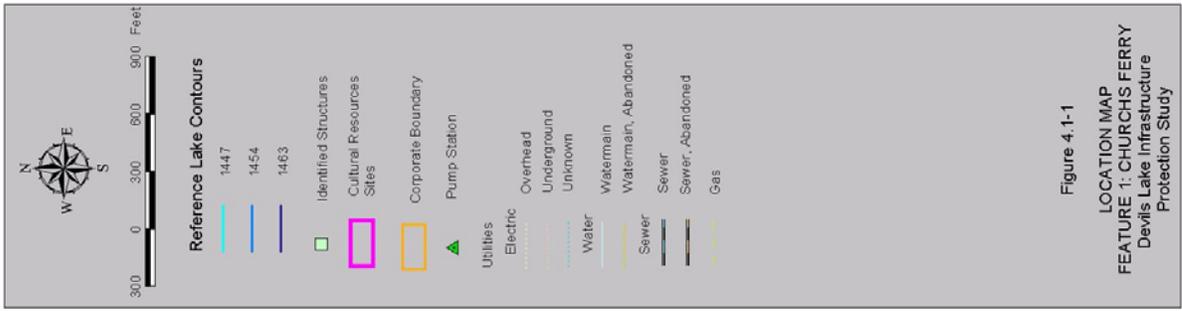
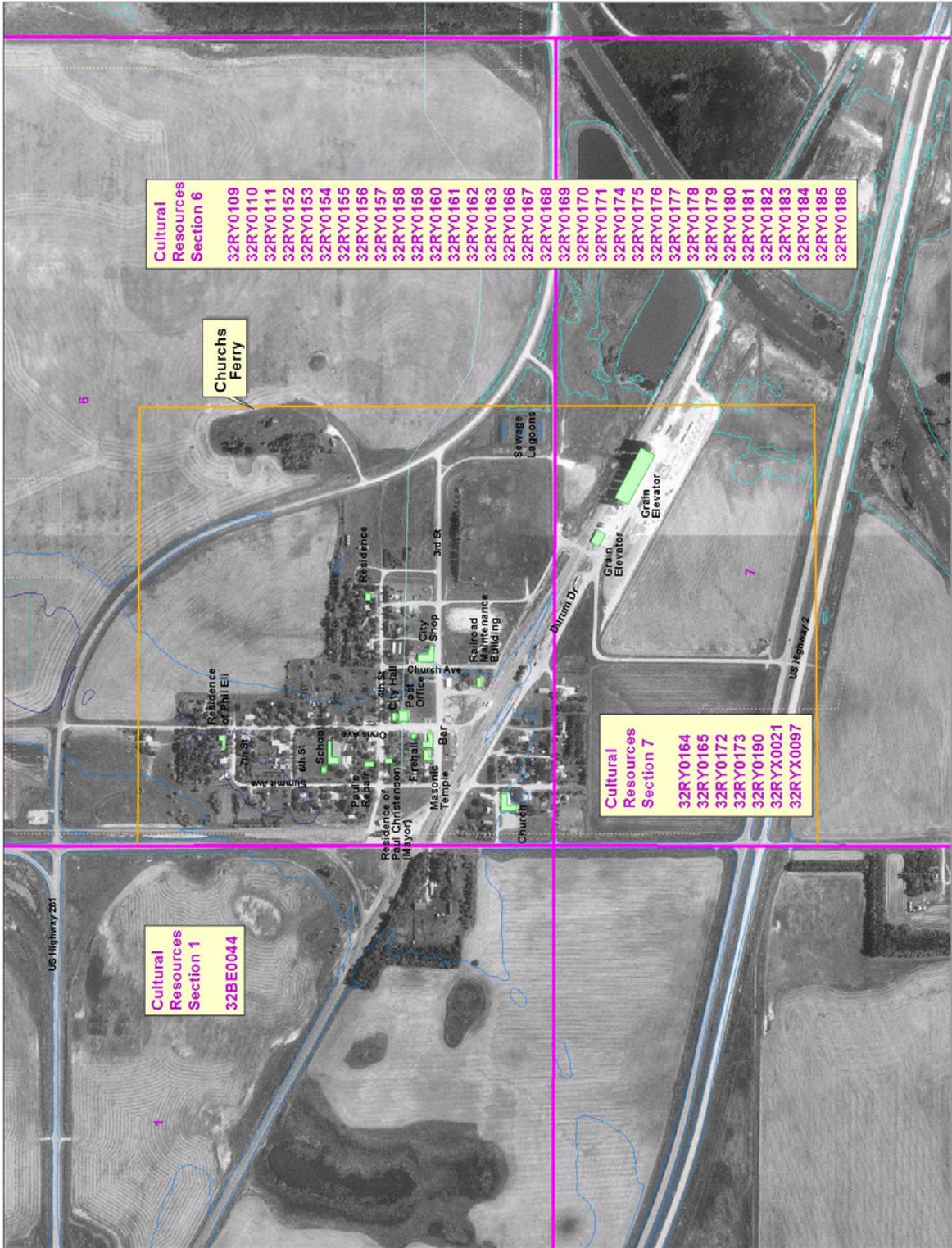


Figure 4.1-1
 LOCATION MAP
 FEATURE 1: CHURCHS FERRY
 Devils Lake Infrastructure
 Protection Study



- Cultural Resources Section 6**
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 - 32RY0186

- Cultural Resources Section 7**
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 - 32RY0165
 - 32RY0172
 - 32RY0173
 - 32RY0190
 - 32RYX0021
 - 32RYX0097

- Cultural Resources Section 1**
- 32BE0044

Bar: ArcView 3.1 (07/25/15, 1:K14rCp4k4e4r4C4r4P4e4r4C4m4u4r4e4D4) Chr4r4c4r4s4F4e4r4r4y4L4a4c4e4M4a4p4 (11-22-2002)

Data: 1997 USGS Digital Ortho Quad

FEATURE 2: CITY OF DEVILS LAKE

General Information

Most Recent Study: 2002

Feature Type: Community

Location: The City of Devils Lake is located in north central North Dakota 89 miles west of Grand Forks and 121 miles east of Minot on US Highway 2. It is the county seat for Ramsey County. The city is located along a portion of the north shore of Devils Lake and is currently protected by a levee that was constructed by the U.S. Army Corps of Engineers. The accompanying Figure 4.2-1 shows the feature's location and approximate extents, and the inundation extents at the three reference lake levels (1447, 1454, and 1463).

Description: The City of Devils Lake is a community of 7,222 people (based on 2000 census).

Significance: The City of Devils Lake is important because it is the largest city between Grand Forks and Minot and ranks as the 11th largest city in North Dakota.

Damages: The flooding of the City of Devils Lake would result in the following damages:

- loss of homes
- loss of historical buildings
- loss of commercial properties
- loss of public property including parks and land owned by Ramsey County and City of Devils Lake
- loss of Devils Lake Cemetery
- loss of schools including Minnie H Elementary School; Sweetwater Elementary; Prairieview Elementary School, Central Middle School, Harmony House, Lake Area Vo-Tech Center, North Dakota School for the Deaf
- loss of churches including Assembly of God Church, Christ Free Lutheran Church, St. Joseph Catholic Church, Lakewood Bible Camp Assembly of God
- loss of tax revenues
- loss of Devils Lake Airport

Owner/Sponsor: The Devils Lake City Commission is responsible for managing and maintaining the City of Devils Lake.

Lead Federal Agency: The U.S. Army Corps of Engineers would take the lead for any flood protection work that may take place for the City of Devils Lake. Federal Emergency Management Agency (FEMA) would coordinate relocation of structures.

History of Flood Protection: In the past, flood protection for the City of Devils Lake has consisted of levee construction and incremental levee raises, road raises, and relocations. The rising water level has caused flooding of roadways and other

infrastructure adjacent to the lake. Levees have been raised on several occasions to protect the City of Devils Lake from flooding because of the rising lake levels. Levees were most recently raised in 1998, with a design lake level of 1450. More recent evaluations indicate that the design level of protection for the existing levee is 1452. The *Alternative Alignment Study* (Barr, January 2002) summarizes an analysis of extensions that are required for the Devils Lake levee system to provide continued protection against flooding of the city, and several alternatives for these extensions. That report should be referred to for the detailed analysis of these extensions. The analysis assumes the levees will be raised to 1460 to provide flood protection for the lake to 1454. The following discussion of the City of Devils Lake feature was primarily excerpted from the *Alternative Alignment Study*, 2002.

General Protection Strategy: For the incremental levee raise strategy, the existing Stage 1A and Stage 2A levees need to be raised to provide continued protection of the City of Devils Lake against flooding. There are several locations where it will also be necessary to build smaller levees to connect high ground and maintain the integrity of the levee that protects the City of Devils Lake. The minimum levee additions that will provide such protection, designated the baseline alignments, are:

- Lakewood Segment 2,
- Acorn Ridge Segments 2 and 3,
- Highway 2 Segment 1, and
- Six tieback levees (three at the Golf Course, North Creel Bay, Highway 2, and Acorn Ridge).

Selected Flood Protection Strategy

The Economics Analysis indicated that the flood protection strategy with the largest net benefits for the City of Devils Lake was incremental raise of the existing levee. This strategy is currently being implemented.

Drawing

Figure 4.2-1 shows this feature and flood protection alternatives that were analyzed. It also shows utilities, potential HTRW sites, and potential cultural resource sites that are in the area of the project. The identified sites may or may not be of concern to potential projects. They would need to be field investigated during further development of the project

FEATURE 3: FORT TOTTEN

General Information

Most Recent Study: 2002

Feature Type: Community

Location: Fort Totten is located along the south side of Devils Lake on the Spirit Lake Nation Reservation in Benson County. The majority of the town is adjacent to Highway 57 just northeast of the intersection of Highway 57 and BIA Highway 1. The accompanying Figure 4.3-1 shows the feature's location, location of structures, approximate extents, and the inundation extents at the three reference lake levels (1447, 1454, and 1463).

Description: Fort Totten is an unincorporated community of 952 people (based on 2000 census).

Significance: The value of all communities is high because of the density of infrastructure in this primarily rural section of North Dakota. Although Fort Totten has not been significantly affected by the rising lake level to date, it is a relatively large community and a major center of activity for the Spirit Lake Nation.

Damages: The flooding of Fort Totten would result in the following damages:

- Loss of the Siaka Pump (sanitary lift) Station.
- Loss of the Veterans Memorial.
- Loss of seven (7) residences.
- Access to the Sullys Hill National Game Preserve (Sullys Hill) facility located immediately east of Fort Totten. Flooding would result in loss of the access road to the facility and the loss of several structures including the visitor center, maintenance shops and houses.

Owner/Sponsor: The Spirit Lake Nation is responsible for managing and maintaining Fort Totten.

Lead Federal Agency: The U.S. Army Corps of Engineers would take the lead for any flood protection work that may take place to protect Fort Totten. Federal Emergency Management Agency (FEMA) would coordinate relocation of structures.

History of Flood Protection:

Sewage Lagoons: In the past, flood protection for Fort Totten has consisted of relocating the sewage lagoons. Sioux Utility operates two sewage lagoons consisting of seven cells. The west sewage lagoon, consisting of four new cells, was constructed on higher ground west of Fort Totten. The east sewage lagoon, consisting of three cells near the lake, had a majority of the wastewater removed by pumping into the new west sewage lagoon, according to Neil Austin of the Spirit Lake Nation Indian Health Service. A direct pipeline still exists from the east sewage lagoon to the new west sewage lagoon. The pipeline serves two purposes:

To pump the remaining wastewater from the old east lagoons to the new west lagoons To be used in case of an emergency where the new west lagoons would be unusable Carolyn Greene of the Sioux Utility confirmed that the large cell (eastern lagoon) is currently used for emergency operation about two to three times per year. The two smaller cells have been out of service for three years. Therefore, it was assumed that the east sewage lagoon will not be needed during flooding events and can be abandoned if necessary.

Sullys Hill National Game Preserve (Sullys Hill): According to Joe Maxwell, Refuge Manager, two structures located near Sweetwater Lake have been abandoned or relocated. One of these buildings was moved to higher ground during October 2002. The USFW Service pumps Sweetwater Lake to minimize potential flooding. Sweetwater Lake, located immediately north of the visitor center, is important for managing the elk and bison herd. Some of the FWS maintenance facilities have been moved from Sullys Hill to Lake Alice National Wildlife Refuge. According to Roger Hollevoet, FWS, the current dike/access road at Sullys Hill has been raised on two different occasions for a total of 13 feet of vertical rise. Their engineers recommended that the FWS no longer raise the Sullys Hill dike as it would become a high hazard dam versus a dike. As a result, it was recommended that the FWS relocate the entrance to the Sullys Hill facilities and all of the structures.

General Protection Strategy: The Infrastructure Protection Study's analysis for Fort Totten allowed for reconsideration of flood mitigation options at each of several action levels. In general, at each of these levels, a choice would be made whether to protect the feature or abandon it. Flood protection options for Fort Totten included:

- Construction of levees to protect structures along the northeast side of Fort Totten. Construction of the levees would also include relocation of one isolated structure. Extending the levee to protect this house would require an additional 500 feet of levee.
- Relocation of the affected residences.
- Relocation of the Sullys Hill National Game Preserve structures.

Selected Flood Protection Strategy

The Infrastructure Protection Study indicates that the flood protection strategy with the largest net benefits for Fort Totten was incremental relocations.

Drawing

Figure 4.3-1 shows this feature and flood protection alternatives that were analyzed. It also shows utilities, potential HTRW sites, and potential cultural resource sites that are in the area of the project. The identified sites may or may not be of concern to potential projects. They would need to be field investigated during further development of the project. The drawing also shows an estimate of natural resource lands that may be affected by a flood control project.

FEATURE 4: CITY OF MINNEWAUKAN

General Information

Most Recent Study: 2002

Feature Type: Community

Location: The City of Minnewaukan is located on the west side Devils Lake in Benson County, ND, Section 15, Township 153N, Range 67W. Currently, US Highway 281 (South of US Highway 2) passes through the city limits. The accompanying Figure 4.4-1 shows the feature's location and approximate extents, and the inundation extents at the reference lake levels (1447, 1454, 1463).

Description: Minnewaukan is a city with a current population of 318, and is the county seat of Benson County. The city covers approximately 250 acres and includes residential and commercial development, municipal facilities (public library, courthouse, fairgrounds, etc.), utility infrastructure (roads, sewers, electrical, telephone, etc.), and transportation infrastructure (US Hwy 281 [South of US Highway 2]).

Significance: The value of all communities is high because of the density of infrastructure in this primarily rural section of North Dakota. Minnewaukan is important because it is a densely populated area that contains property of value and historical significance. The surrounding infrastructure includes major transportation routes for population and industry. The city contains county seat facilities including the county fairgrounds and courthouse.

Damages: There are numerous commercial and residential properties that would be affected by rising lake levels, particularly for lake levels above 1455. The flooding of the City of Minnewaukan would result in the following damages:

- Loss of residences – The majority of the property at risk in the city is located between 1456 and 1463.
- Loss of historical buildings – The Benson County Courthouse and Grace Episcopal Church are listed in the National Register of Historic Places.
- Loss of commercial and municipal properties – As with homes in the city, the majority of commercial and municipal properties at risk are between elevations 1456 and 1463.
- There are also several structures above 1463 that would be severed from the main land during high lake levels.
- Loss of access to the City.

Owner/Sponsor: The City of Minnewaukan City Council is responsible for managing and maintaining day-to-day administration of the city.

Lead Federal Agency: U.S. Army Corps of Engineers would take the lead for the City of Minnewaukan for any flood protection work that may take place. Federal Emergency Management Agency (FEMA) would coordinate relocation of structures.

History of Flood Protection: In the past, flood protection for the City of Minnewaukan has consisted of the following:

- Moving the sewage treatment ponds to higher ground (in 1995). The top of the dike around the sewage treatment ponds is believed to be above 1463.
- Installation of a back-up water supply line from the water plant north of town, extending south from the water plant to the west of the city, then extending east through the city to the water tower.
- Installation of drainage features to prevent flooding from the unnamed coulee on the northwest side of the city, including enlarging culverts under the railroad and highways on the north end of town.
- Abandoning certain portions of the county fairgrounds, and abandoning parts of the park and athletic fields on the east side of the school. Currently, the football field is not useable because part of the field is under water.
- Moving structures to higher ground, or plans to move structures within the next year. According to information provided during the site reconnaissance trip, this year structures planned for relocation include Trinity Church, and structures west of West Avenue on D Street.
- The Red River Valley and Western Railroad that previously passed through town was abandoned.

General Protection Strategy: The Infrastructure Protection Study's analysis for the City of Minnewaukan allowed for reconsideration of flood mitigation options at each of several action levels. In general, at each of these levels, a choice would be made as to whether to protect the feature or abandon it. Flood protection options for the City of Minnewaukan included:

- Construction of levees to protect the City of Minnewaukan. The levees would tie into high ground near the reroute location for US Highway 281 (South of US Highway 2), and would allow access to the city through the existing roadway system. Construction of the levees would also include relocation of isolated structures, such as the county fairground buildings and a few isolated structures in the levee footprint.
- Relocation of all affected structures (including the homes severed from the main land).

Selected Flood Protection Strategy

The Infrastructure Protection Study indicates that the flood protection strategy with the largest net benefits for the City of Minnewaukan would be incremental levee raises.

Drawing

Figure 4.4-1 shows this feature and flood protection alternatives that were analyzed. It also shows utilities, potential HTRW sites, and potential cultural resource sites that are in the area of the project. The identified sites may or may not be of concern to potential projects. They would need to be field investigated during further development of the project. The drawing also shows an estimate of natural resource lands that may be affected by a flood control project.

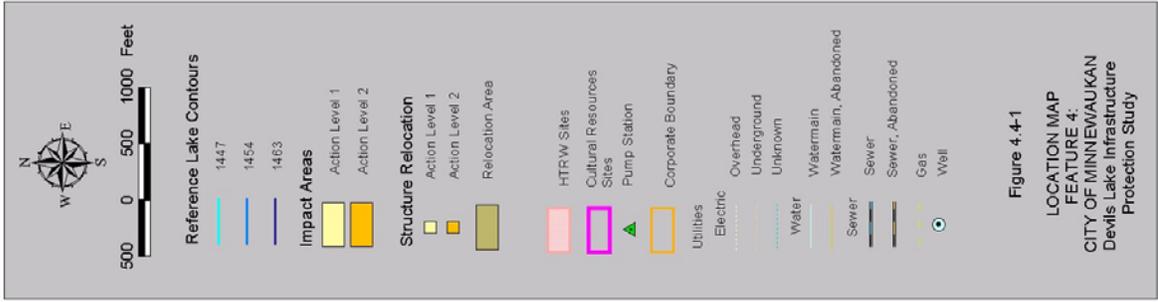
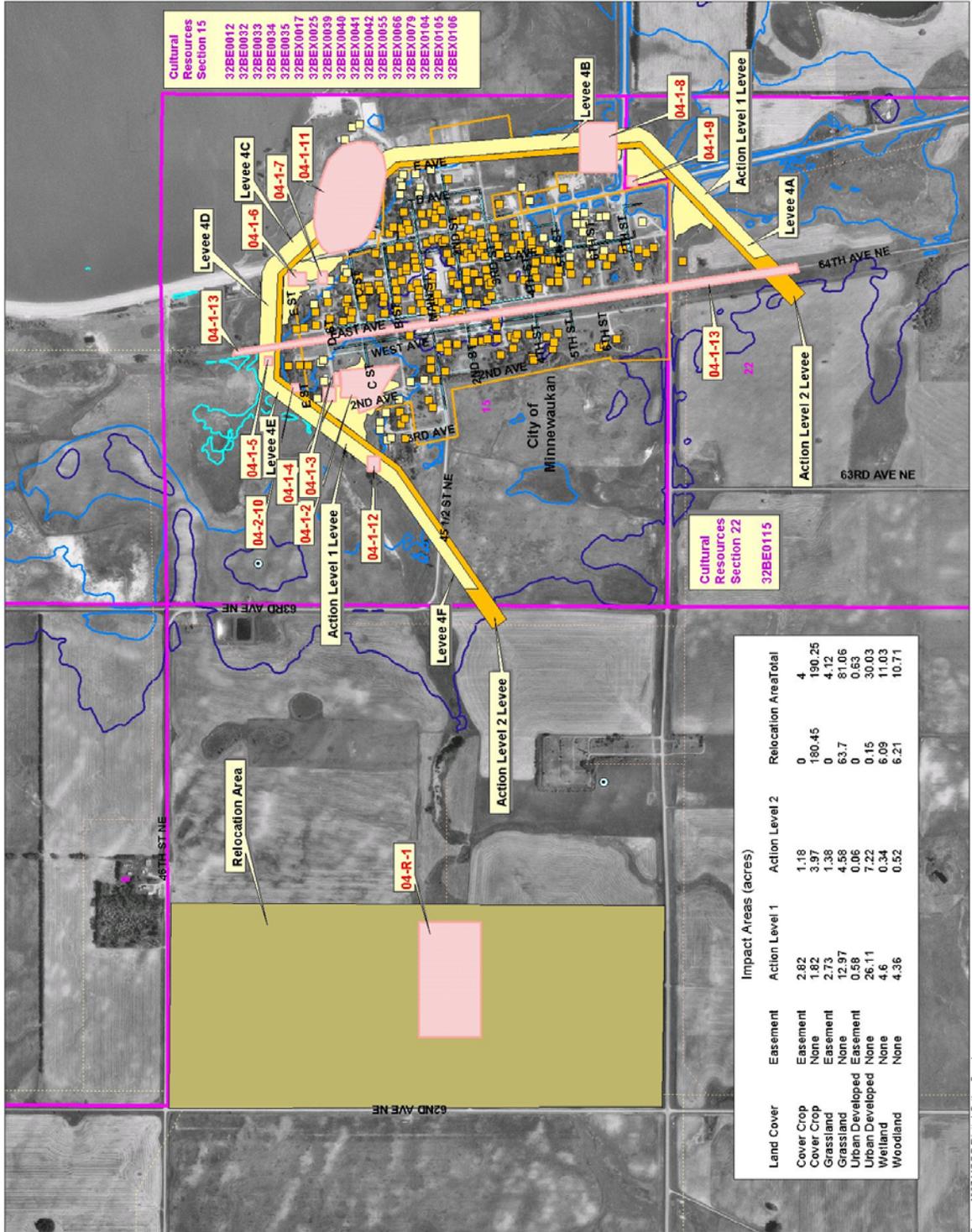


Figure 4.4-1
LOCATION MAP
FEATURE 4:
CITY OF MINNEWAUKAN
Devils Lake Infrastructure
Protection Study



Data: 1997 USGS Digital Ortho-Quad

FEATURE 5: ST. MICHAEL

General Information

Most Recent Study: 2002

Feature Type: Community

Location: St. Michael is located along the south side of Devils Lake in Benson County. The majority of the town is adjacent to BIA Highway 1 just north of the intersection of BIA Highway 1 and BIA Highway 6. The accompanying Figure 4.5-1 shows the feature's location and approximate extents, and the inundation extents at the three reference lake levels (1447, 1454, and 1463).

Description: St. Michael is an unincorporated town.

Significance: St. Michael is important because of the density of infrastructure. Although St. Michael has not been significantly affected by the rising lake level to date, several homes and a sewage lagoon could be affected by rising lake levels. St. Michael is a primary community for the Spirit Lake Nation.

Damages: The flooding of St. Michael would result in the following damages:

- Loss of residences
- Loss of access for 16 residences at 1460
- Loss of two sewage lagoons (the north sewage lagoon at 1451 and the south sewage lagoon at 1455).

Owner/Sponsor: The Spirit Lake Nation is responsible for managing and maintaining St. Michael.

Lead Federal Agency: U.S. Army Corps of Engineers would take the lead for St. Michael for any flood protection work that may take place. Federal Emergency Management Agency (FEMA) would coordinate relocation of structures.

History of Flood Protection: St. Michael is located in the area that is currently being protected by roads that are acting as dams. Therefore, the flood level at St. Michael is much lower than the level of Devils Lake. In the past, flood protection for St. Michael has consisted of raising berms around the sewage lagoons.

General Protection Strategy: The Infrastructure Protection Study's analysis for St. Michael allowed for reconsideration of flood mitigation options at each of several action levels. In general, at each of these levels, a choice would be made as to whether to protect the feature or abandon it. Flood protection options for St. Michael included:

- Construction of a levee to protect the most vulnerable (north) part of town. The levee would protect 10 residences and access to 16 other homes. The sewage lagoons would still need to be relocated along with construction of a lift station (for the north sewage lagoon) to maintain service to the existing homes.
- Relocation of the town's sewage lagoons and the affected residences.

Protection Strategy by Action Level: A variety of flood-protection strategies were analyzed for St. Michael. These strategies are represented on Figure 4.5-2 as separate branches of the decision tree. Further investigations showed that the original decision tree for St. Michael needed to be updated. These updates have been included on Figure 4.5-2. The updates included: adding multiple levee raises and relocating the two sewage lagoons.

- The stepwise approach to flood protection for the St. Michael consisted of the following:
- At Action Level 1 (AL1), the North Sewage Lagoons would be relocated. A decision would also be made as to whether a levee would be constructed to protect the residences that are located at higher elevations.
- At Action Level 2 (AL2), the South Sewage Lagoons would be relocated. If a levee were constructed at AL1, at Action Level 2 (AL2), a decision would be made as to whether to raise the levee or relocate all structures.
- If a levee were constructed at AL2, at Action Level 3 (AL3), a decision would be made as to whether to raise the levee or relocate all structures.

Selected Flood Protection Strategy

The Infrastructure Protection Study indicates that the flood protection strategy with the largest net benefits for St. Michael was relocation of all structures (residences and sewage lagoons).

Drawing

Figure 4.5-1 shows this feature and flood protection alternatives that were analyzed. It also shows utilities, potential HTRW sites, and potential cultural resource sites that are in the area of the project. The identified sites may or may not be of concern to potential projects. They would need to be field investigated during further development of the project. The drawing also shows an estimate of natural resource lands that may be affected by a flood control project.

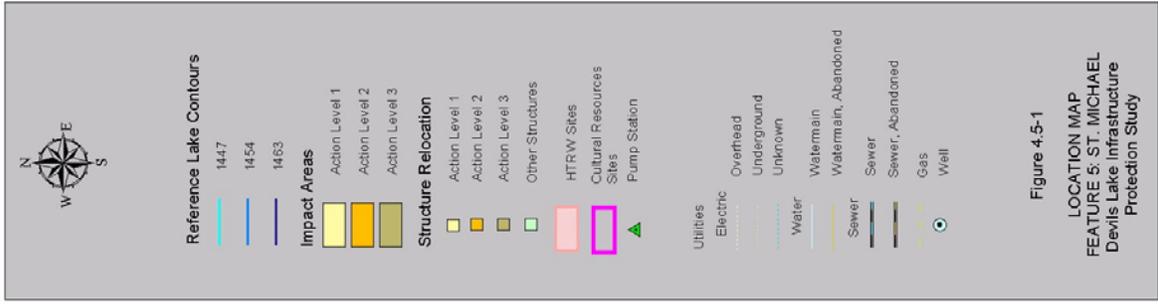
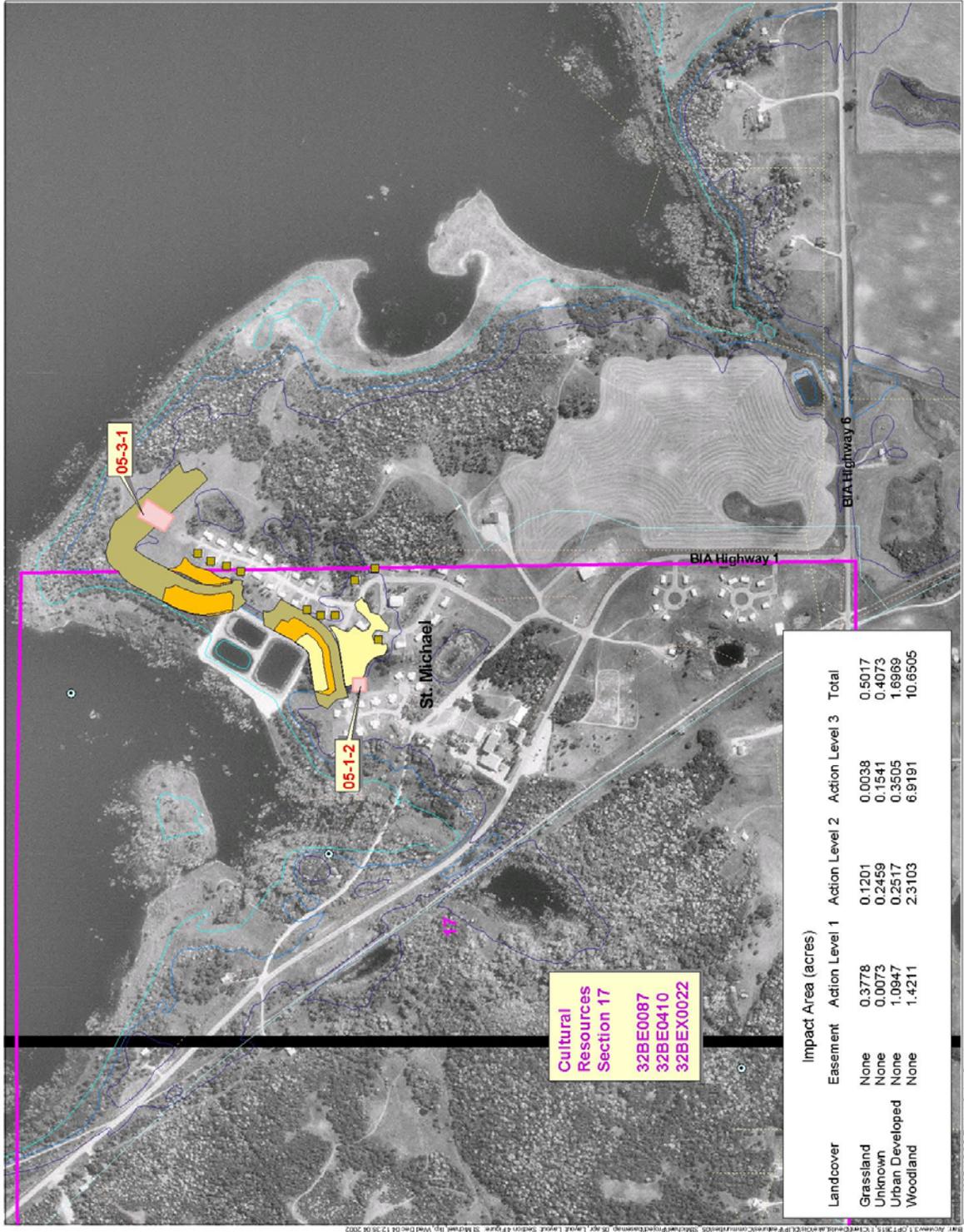


Figure 4.5-1
 LOCATION MAP
 FEATURE 5: ST. MICHAEL
 Devils Lake Infrastructure
 Protection Study



Cultural Resources Section 17
 32BE0087
 32BE0410
 32BEX0022

Landcover	Impact Area (acres)					Total
	Easement	Action Level 1	Action Level 2	Action Level 3		
Grassland	None	0.3778	0.1201	0.0038	0.5017	0.5017
Unknown	None	0.0073	0.2459	0.1541	0.4073	0.4073
Urban Developed	None	1.0947	0.2517	0.3505	1.6969	1.6969
Woodland	None	1.4211	2.3103	6.9191	10.6505	10.6505

FEATURE 6: GILBERT C. GRAFTON MILITARY RESERVE

General Information

Most Recent Study: 2002

Feature Type: State Facility

Location: Gilbert C. Grafton Military Reservation is located approximately 6 miles south southwest of the City of Devils Lake along the west side of ND Highway 20. The accompanying Figure 4.6-1 shows the feature's location and approximate extents, and the inundation extents at the three reference lake levels (1447, 1454, and 1463).

Description: Gilbert C. Grafton Military Reservation (Camp Grafton) is the main training site for the North Dakota Army National Guard. It is a 1,600-acre camp, accommodating up to 3,000 soldiers with housing, dining hall facilities, field, and classroom training facilities. This main camp facility is also associated with the 10,000 Camp Grafton South training area, located 35 miles to the south.

Significance: Camp Grafton is important because it is the major training facility for the North Dakota Army National Guard, and its operation has a major economic impact on the community.

Damages: The flooding of Camp Grafton would result in the following damages:

- loss of access to this important training facility
- loss of training facilities
- loss of commerce associated with Camp operation, visitors

Owner/Sponsor: The State of North Dakota, or North Dakota Army National Guard is responsible for managing and maintaining Camp Grafton.

Lead Federal Agency: The State of North Dakota would take the lead for Camp Grafton for any flood protection work that may take place.

History of Flood Protection: The northeastern portion of Camp Grafton lands are located in the area that is currently being protected by roads that are acting as dams (ND Highway 20). Therefore, the flood level at the munitions facility is much lower than the level of Devils Lake. In the past, flood protection for Camp Grafton has consisted of:

- Access road raises, with the top currently at 1455.
- Pumping seepage water from the munitions training area located in the northeast corner of the facility, adjacent to Highway 20.
- Converting the sewer system to Ramsey County Rural Utility Service.
- Initial construction of the Avenue A levee to a top of 1460.
- The camp does have plans to relocate the munitions storage area, instead of the previous plan to protect this area with a levee.

General Protection Strategy: The Economic Analysis identified and evaluated several different approaches for protecting Camp Grafton. This strategy has changed since the Economic Analysis was completed. The current strategy includes:

- ND Highway 20 is assumed to be raised to provide access to the camp
- Camp Grafton will not close, even if water surfaces reach maximum level, because a significant portion of the facility property is above Elevation 1475.
- The main access road is likely to be raised at the same time (or immediately after) ND Highway 20 is raised.
- The main gate is the only gate that will be maintained and raised.
- The existing levee along Avenue A will be raised to provide protection to ultimate lake level.
- The only buildings to be moved will be those associated with the munitions storage area.

Selected Flood Protection Strategy

The first level of incremental flood protection that was analyzed for Gilbert C. Grafton Military Reservation (Camp Grafton) was to relocate the munitions training facility.

Drawing

Figure 4.6-1 shows this feature and flood protection alternatives that were analyzed. It also shows utilities, potential HTRW sites, and potential cultural resource sites that are in the area of the project. The identified sites may or may not be of concern to potential projects. They would need to be field investigated during further development of the project.

FEATURE 7: GRAHAMS ISLAND STATE PARK

General Information

Most Recent Study: 2002

Feature Type: State Facility

Location: Grahams Island State Park is located 10 miles west of the City of Devils Lake, 5 miles south of ND Highway 19 along the border between Benson and Ramsey counties. The accompanying Figure 4.7-1 shows the feature's location and approximate extents, and the inundation extents at the three reference lake levels (1447, 1454, and 1463).

Description: Grahams Island State Park is the largest and most developed state park facility on Devils Lake, with campground, beach, harbor, ranger and manager facilities, activity center, and trails. The campground covers 1,100 acres, and has space for 100 campers, as well as 4 sleeping cabins. The park has potable water and sewer lines, with an on-site treatment facility.

In addition to the State Park facility, there are several farmsteads located on Grahams Island that would be stranded if access to the island were lost. The Infrastructure Protection Study evaluation included these farmsteads in the damage assessment of the Grahams Island feature.

Significance: Grahams Island is important because it is considered a major tourist attraction in the area. It is the largest and most used state park facility around Devils Lake. Park staff estimate that a total of 72,800 visitors used the park in 1995. Access to the park is affected by rising water levels; the Park was closed in 1997 when the access road was under water. During 1997, approximately \$2.2 million was invested in raising the access road to the park. In 1999, the Park had 73,770 visitors.

Damages: The flooding of Grahams Island would result in the following damages:

- Loss to utility infrastructure
- Loss of residential buildings
- Loss of recreational buildings and facilities
- Loss of facility access
- Loss of user fees
- Loss of usable land
- Loss of farmstead and farm operations buildings

Owner/Sponsor: The North Dakota Parks and Recreation Department, is responsible for operating and maintaining the Grahams Island State Park.

Lead Federal Agency: The State of North Dakota would take the lead for Feature 7 for any flood protection work that may take place.

History of Flood Protection: In the past, flood protection for Grahams Island has consisted of raising the access road from ND Highway 19 to the park and relocating buildings and other facilities to higher ground.

General Protection Strategy: The Infrastructure Protection Study analysis re-evaluated the Economic Analysis Alternatives approach, and also considered an additional options not considered in the previous effort. Strategies considered in this 2002 evaluation included:

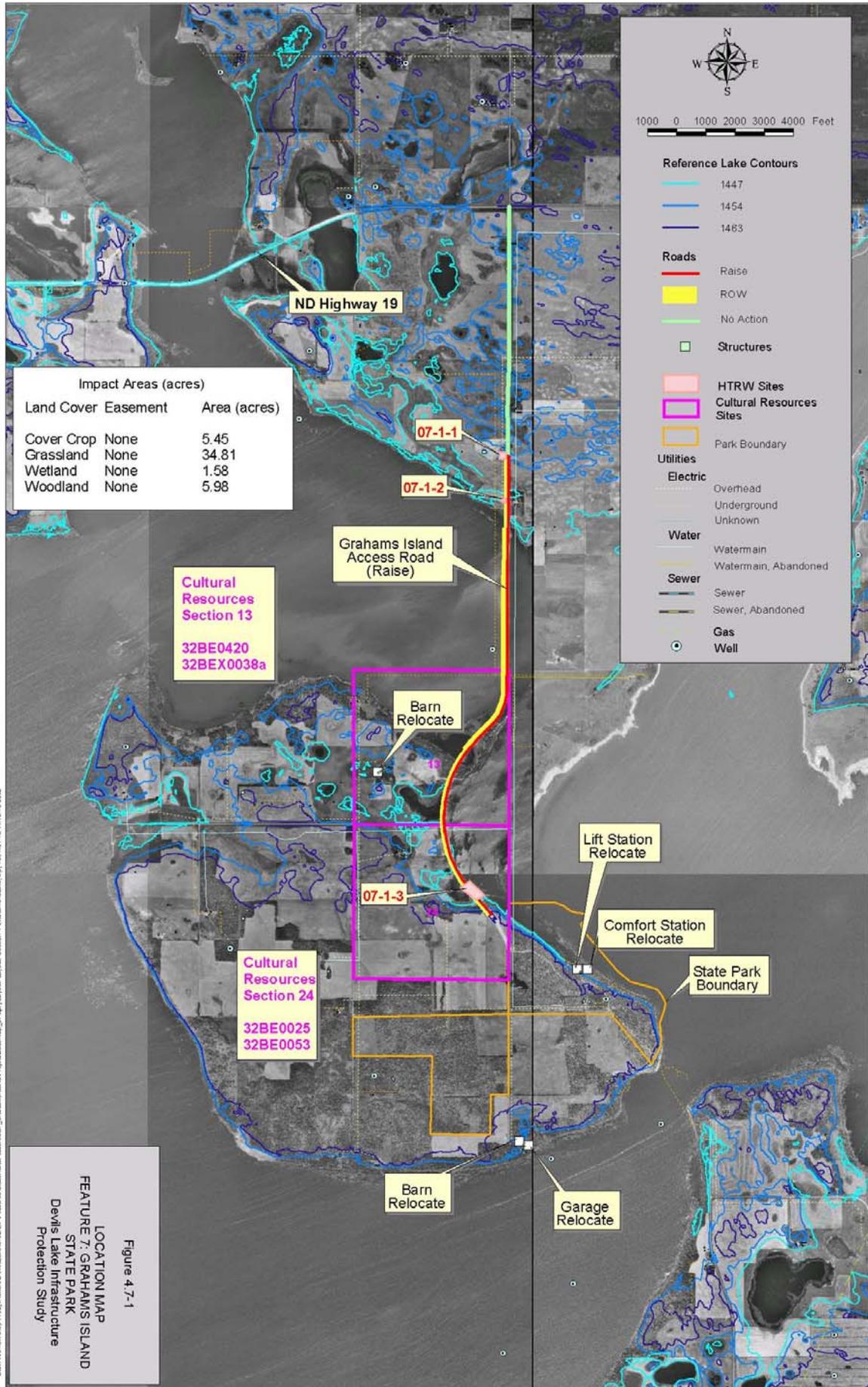
- Relocation of buildings
- Relocation / replacement of comfort station and lift station
- Relocation / replacement of a picnic area
- Road raise on access road from ND Highway 19
- Other options considered included developing an alternate access road to the south of Grahams Island across Ziebach Pass. However, the costs of this option were far greater than raising the existing access from Highway 19, and were therefore not considered further.

Selected Flood Protection Strategy

The first level of incremental flood protection that was analyzed for Grahams Island State Park (Grahams Island) was to raise the access road.

Drawing

Figure 4.7-1 shows this feature and flood protection alternatives that were analyzed. It also shows utilities, potential HTRW sites, and potential cultural resource sites that are in the area of the project. The identified sites may or may not be of concern to potential projects. They would need to be field investigated during further development of the project. The drawing also shows an estimate of natural resource lands that may be affected by a flood control project.



DATA: 1997 USGS Digital Ortho Quad

FEATURE 8: RURAL FEATURES

General Information

Most Recent Study: 2002

Feature Type: Rural

Location: Rural structures are located throughout Ramsey, Benson, Nelson, and Towner counties surrounding Devils Lake and Stump Lake. The accompanying Figure 4.8-1 shows the overall coverage of the rural features. Figures 4.8-1a, 4.8-1b, 4.8-1c, 4.8-1d, and 4.8-1e show more detailed areas.

Description: The Rural feature consist of land and rural structures adjacent to the lake, including farmsteads and farmland, residences, state and regional parks, and communities not already covered as separate features. The rural areas were divided into two areas for the Infrastructure Protection study, as follows:

- Devils Lake Rural Areas, including Ramsey, Benson, and Towner counties (except the communities of Devils Lake, Churchs Ferry, Minnewaukan, Fort Totten; and state features Camp Grafton and Grahams Island)
- Stump Lake Rural Areas, including Nelson County

Significance: Although the cost of individual infrastructure and land components in these rural areas is not high, the total impact of rising lake levels on rural areas is significant.

Damages: The flooding of Rural Features would result in the following damages:

- Loss of homes and farmstead buildings and structures
- Loss of crop and pasture land
- Loss of parks, park buildings, and park infrastructure
- Loss or relocation of utilities

Owner/Sponsor: Counties and communities would likely be responsible for managing and maintaining these Rural features.

Lead Federal Agency: Federal Emergency Management Agency (FEMA) would coordinate relocation of structures.

History of Flood Protection: Flood protection for Rural features has generally consisted of relocation of homes and structures. Some of the Rural features have benefited from protection by roads acting as dams in the Mission Township area and the area west of ND Highway 20 near Acorn Ridge in combination with temporary levees built by the Corps in the Mission Township area.

General Protection Strategy: The only strategy considered in this Infrastructure Protection Study evaluation included relocation of structures. Structures included in the analysis included:

- Houses (on-reservation)

- Houses (off-reservation)
- Barns (including larger prefabricated metal buildings as well as timber barns)
- Sheds (including machine and tractor storage buildings and smaller pre-fabricated structures)
- Silos (including grain storage bins and silos)
- Churches
- Commercial and Industrial buildings (stores, commercial, and public buildings)

In addition, land damages and costs were considered in this investigation.

Drawing

Figure 4.8-1 and accompanying figures show the location of structures included in the analysis of rural features and contours of flooded areas for lake elevations of 1447, 1454, and 1463 feet msl.

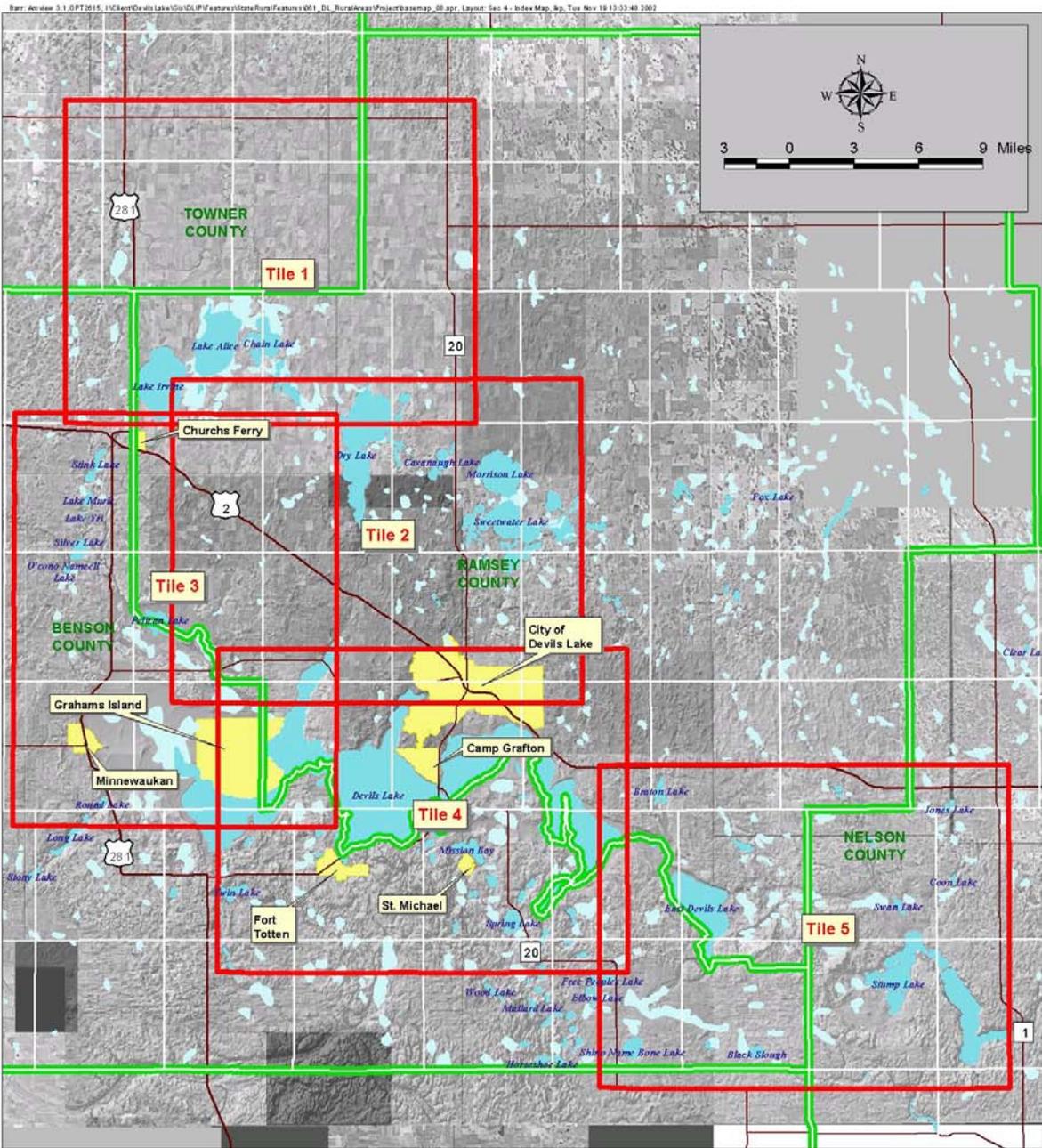


Figure 4-8-1
 LOCATION MAP
 FEATURE & RURAL AREAS
 FIGURE INDEX MAP
 Devils Lake Infrastructure
 Protection Study

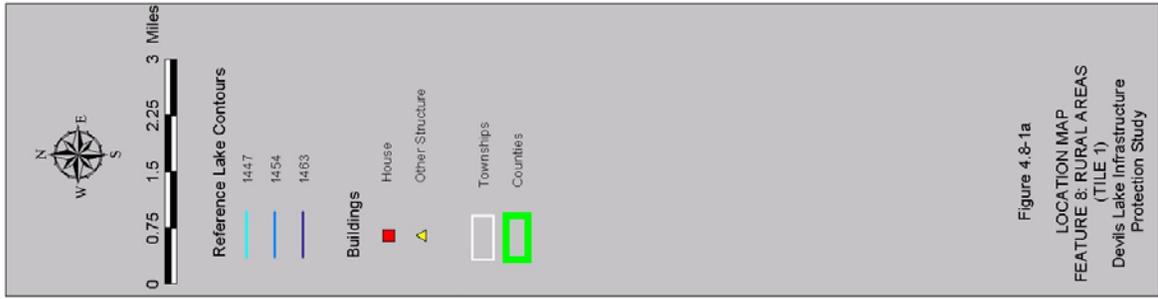
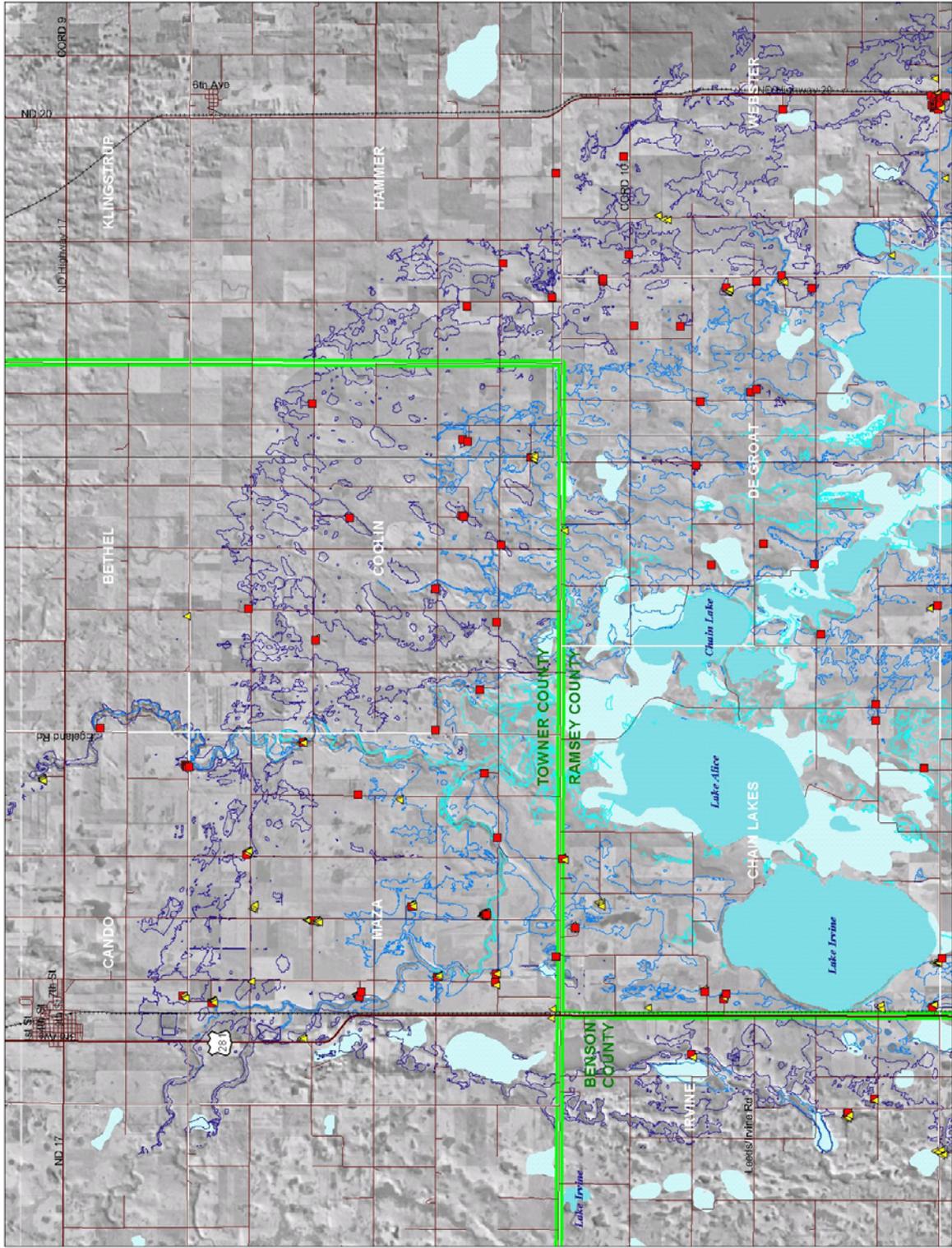
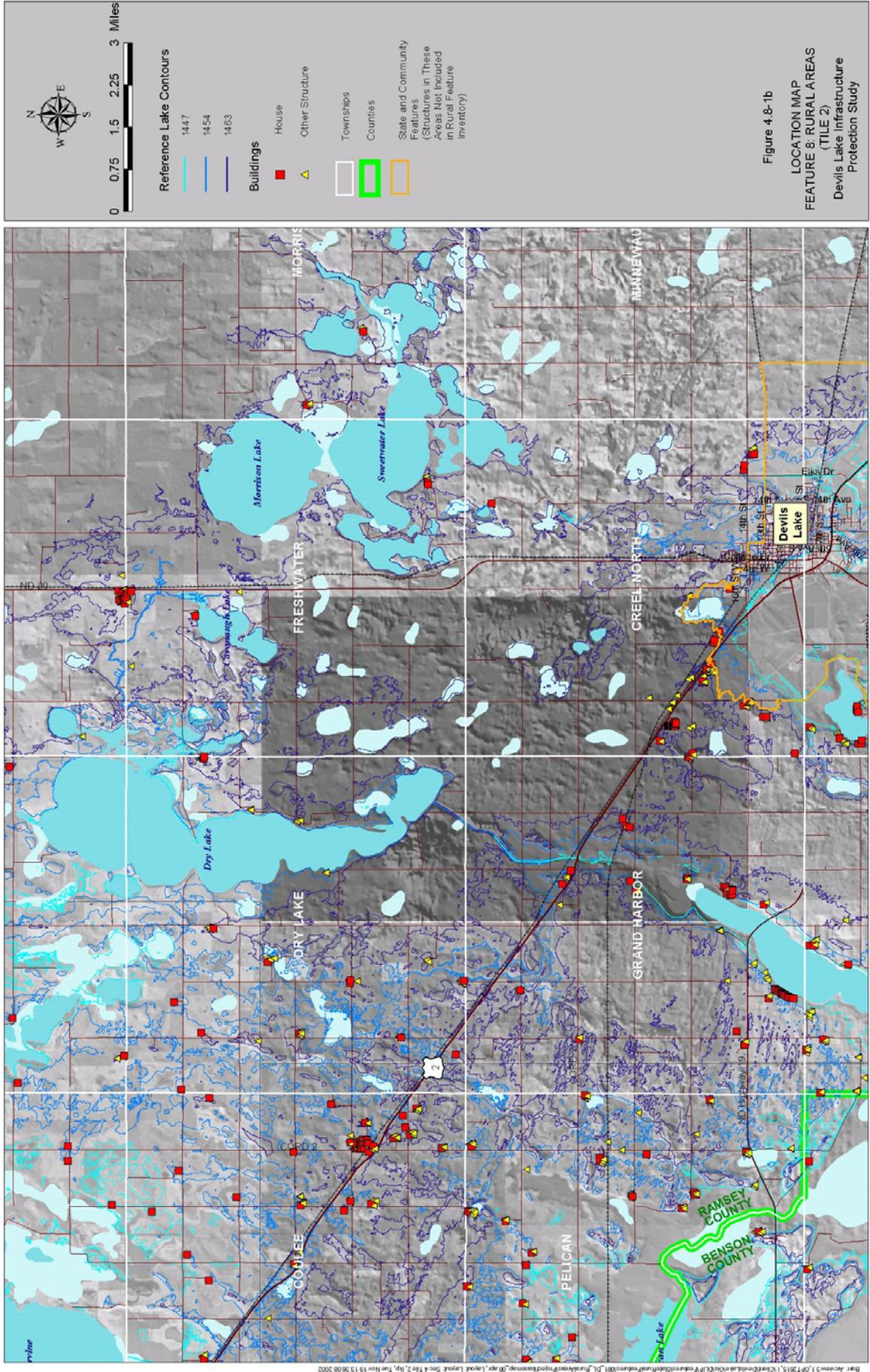
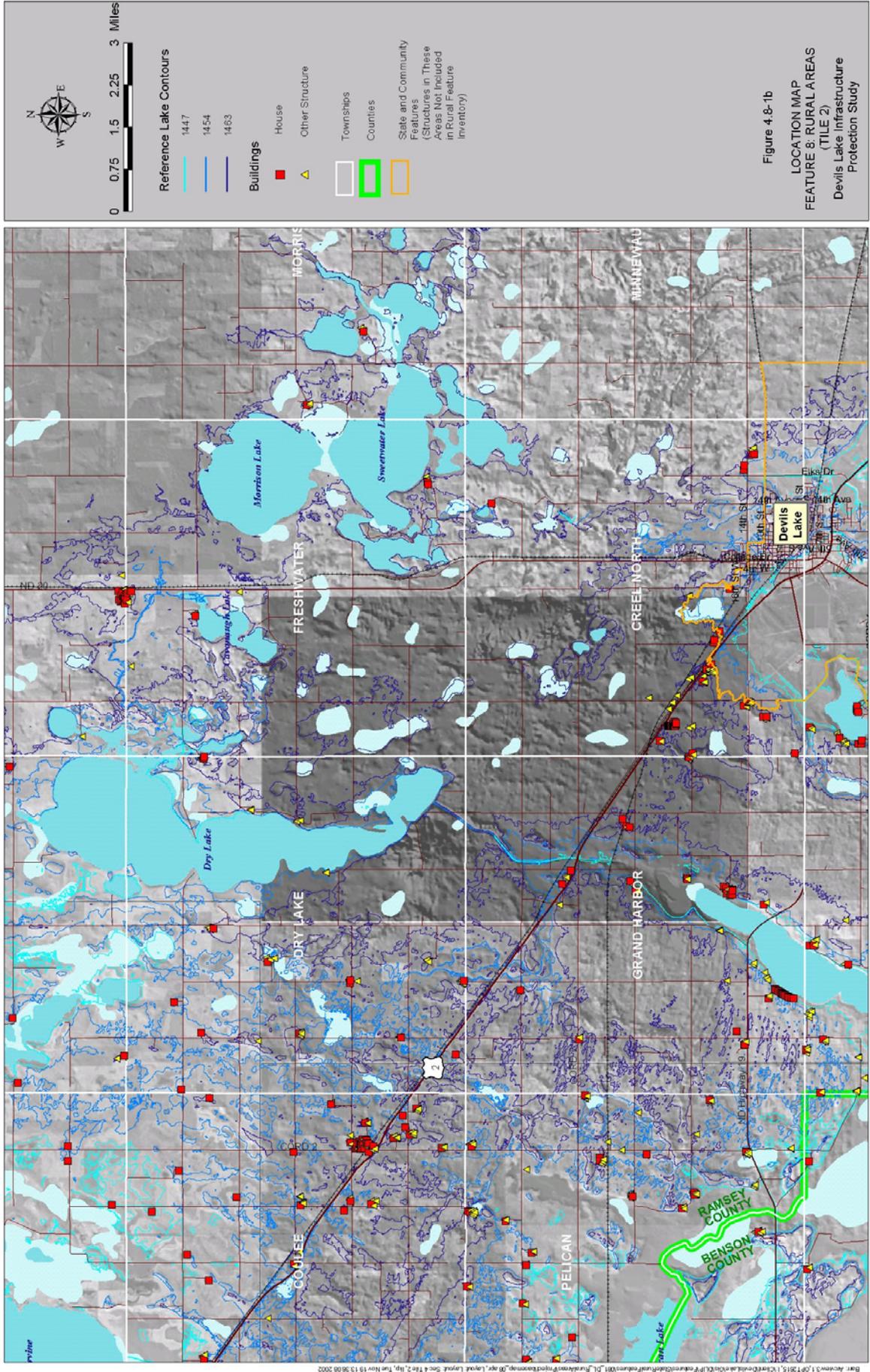


Figure 4.8-1a
 LOCATION MAP
 FEATURE 8: RURAL AREAS
 (TILE 1)
 Devils Lake Infrastructure
 Protection Study







FEATURE 9: RED RIVER VALLEY AND WESTERN RAILROAD

General Information

Most Recent Study: 2001

Feature Type: Railroad

Location: Feature 9 is the portion of the Red River Valley and Western Railroad from the City of Minnewaukan extending south approximately 10 miles. The accompanying Figure 2.9-1 shows the feature's location and approximate extents, and the inundation extents at the three reference lake levels (1447, 1454, and 1463).

Description: Feature 9 is a railroad. It has been permanently abandoned.

Significance: The Red River Valley and Western Railroad south from Minnewaukan has been permanently abandoned with no plans for future restoration.

Damages: The flooding of the Red River Valley Railroad would not result in any damages. No cost analyses were completed as part of the Economic Analysis of Devils Lake Alternative for this feature.

Owner/Sponsor: Red River Valley and Western Railroad.

FEATURE 10: CANADIAN PACIFIC RAILROAD

General Information

Most Recent Study: 2002

Feature Type: Rail Line

Location: Feature 10 is the portion of the Canadian Pacific Railroad from the City of Devils Lake west to US Highway 281 near Harlowe. It extends approximately 18 miles from the City of Devils Lake to US Highway 281. The accompanying Figure 4.10-1 shows the feature's location and approximate extents, and the inundation extents at the three reference lake levels (1447, 1454, and 1463).

Description: The rail line was constructed on raised embankments. It currently has approximately 3 miles near the west end of the line that is impacted, but not submerged, by a portion of Devils Lake at its current lake level. There are culverts under the rail line for water passage at Mauvais Coulee and Six Mile Bay.

Significance: The tracks between the City of Devils Lake and Harlowe were predominantly used for grain shipments. This rail line has been temporarily closed since 1998 due to erosion of the embankment. The current lake level (1447) is about 3 feet below the lowest elevation of the tracks (1450); however, wave action has caused erosion damage to the sides of the rail bed, making the rail line too dangerous to use. Grain is now trucked to a BNSF line instead of being shipped by rail. Northern Plains Railroad, lessee of Canadian Pacific Railroad tracks, does not consider the railroad "abandoned" because they intend to reopen the tracks if they receive funding from the US Congress for repair and raises. Instead the railroad is considered "embargoed".

Damages: The flooding of the Canadian Pacific Railroad would result in the following damages:

- Restoration damages resulting from repairs that would be necessary to bring the rail line back to a useable condition after a period of inundation.
- Alternate shipping/detour damages when the rail line is closed.

Owner/Sponsor: Canadian Pacific Railroad is responsible for managing and maintaining Feature 10: Canadian Pacific Railroad.

Lead Federal Agency: The U.S Army Corps of Engineers would most likely be the lead agency for the Canadian Pacific Railroad for any flood protection work that may take place.

History of Flood Protection: In the past, flood protection for the Canadian Pacific Railroad between Devils Lake and Harlowe has consisted of abandoning the rail line until funding is received to raise the rail line for future use.

General Protection Strategy: The Infrastructure Protection Study's analysis for the Canadian Pacific Railroad considered the only available incremental flood protection

strategy, apart from abandonment. That flood protection strategy involved incremental raises of the rail line. The current low rail elevation is 1450; however, the railroad is currently out of service due to damage that has already occurred.

Selected Flood Protection Strategy

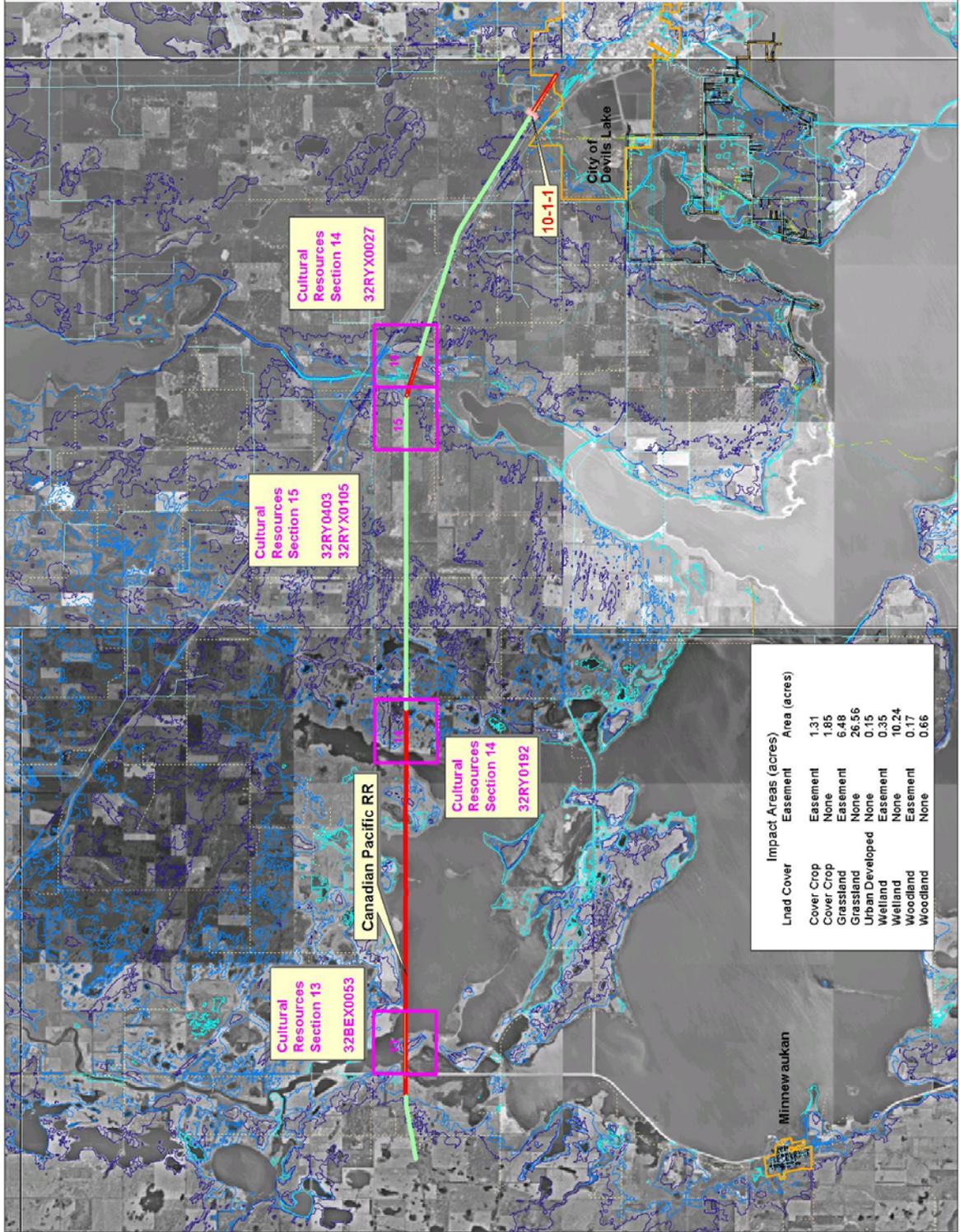
The first level of incremental flood protection that was analyzed for US Highway 281 (North of US Highway 2) was an incremental rail raise to 1458.

Drawing

Figure 4.10-1 shows this feature and flood protection alternatives that were analyzed. It also shows utilities, potential HTRW sites, and potential cultural resource sites that are in the area of the project. The identified sites may or may not be of concern to potential projects. They would need to be field investigated during further development of the project. The drawing also shows an estimate of natural resource lands that may be affected by a flood control project.



Figure 4.10-1
 LOCATION MAP
 FEATURE 10: CANADIAN
 PACIFIC RAILROAD
 Devils Lake Infrastructure
 Protection Study



FEATURE 11: BURLINGTON NORTHERN RAILROAD (ALONG US HIGHWAY 2)

General Information

Most Recent Study: 2002

Feature Type: Rail Line

Location: Feature 11 is the portion of the Burlington Northern Railroad (along US Highway 2) from the City of Devils Lake northwest to Churchs Ferry. The accompanying Figure 4.11-1 shows the feature's location and approximate extents, and the inundation extents at the three reference lake levels (1447, 1454, and 1463).

Description: The rail line was constructed on raised embankments. Two concrete bridges are located along this stretch of rail. One bridge spans Channel "A" and a second bridge spans the Mauvais Coulee near Churchs Ferry.

Significance: The Burlington Northern Railroad (along US Highway 2) is important because the track is a transcontinental freight route that extends from the State of New York to the State of Washington (through Devils Lake). Amtrak passenger routes use the track and many other companies use the track for shipping a variety of products across the country.

Damages: The flooding of the Burlington Northern Railroad (along US Highway 2) would result in the following damages:

- Restoration damages resulting from repairs that would be necessary to bring the rail line back to a useable condition after a period of inundation.
- Alternate shipping/detour damages when the rail line is closed.

Owner/Sponsor: The Burlington Northern and Santa Fe Railway Company (BNSF) is responsible for managing and maintaining Feature 11.

Lead Federal Agency: The U.S. Army Corps of Engineers would most likely be the lead agency for any flood protection projects that might take place.

History of Flood Protection: Flood protection for the Burlington Northern Railroad (along US Highway 2) between Devils Lake and Churchs Ferry consisted of a track raise in the vicinity of the Mauvais Coulee near Churchs Ferry. BNSF raised the track up 3 feet at various reaches of the track to maintain the track at 1456 or higher.

General Protection Strategy: The Infrastructure Protection Study's analysis for the Burlington Northern Railroad (along US Highway 2) considered one flood protection strategy (apart from abandonment). At the first action level, that flood protection strategy was the only strategy that was feasible both from an economic and a constructability standpoint. The strategy involved raising the rail line to 1467. This would allow for a maximum lake elevation of 1463 with four feet of freeboard. Incremental raises of this

rail line were not feasible due to the high cost of raising the two bridges and the impacts of repeated closures of this line

Selected Flood Protection Strategy

The flood protection strategy that was analyzed for Burlington Northern Railroad (Along US Highway 2) was a raise to 1467.

Drawing

Figure 4.11-1 shows this feature and flood protection alternatives that were analyzed. It also shows utilities, potential HTRW sites, and potential cultural resource sites that are in the area of the project. The identified sites may or may not be of concern to potential projects. They would need to be field investigated during further development of the project. The drawing also shows an estimate of natural resource lands that may be affected by a flood control project.

FEATURE 12: BURLINGTON NORTHERN RAILROAD (CHURCHS FERRY TO CANDO)

General Information

Most Recent Study: 2001

Feature Type: Rail Line

Location: Feature 12 is the portion of the Burlington Northern Railroad from Churchs Ferry to Cando. The accompanying Figure 2.12-1 shows the feature's location and approximate extents, and the inundation extents at the three reference lake levels (1447, 1454, and 1463).

Description: Feature 12 is a railroad. The rail line is constructed on raised embankments traversing overland. There are two bridges and two road crossings in this stretch of track.

Significance: The Burlington Northern Railroad (Churchs Ferry to Cando) is important because the track carries an average of approximately 100 cars per month and the cars transport primarily grain and fertilizer. If the track were closed, the freight would require another means of shipping such as trucking which is more expensive.

Damages: The flooding of the Burlington Northern Railroad (Churchs Ferry to Cando) would result in the following damages:

- restoration cost
- alternate shipping/detour costs

Owner/Sponsor: The Burlington Northern and Sante Fe Railway Company (BNSF) is responsible for managing and maintaining Feature 12. For consistency with the Economic Analysis of Devils Lake Alternatives, the name of Feature 12 will remain Burlington Northern Railroad (Churchs Ferry to Cando).

Lead Federal Agency: The U.S. Army Corps of Engineers would most likely be the lead agency for any flood protection projects that might take place.

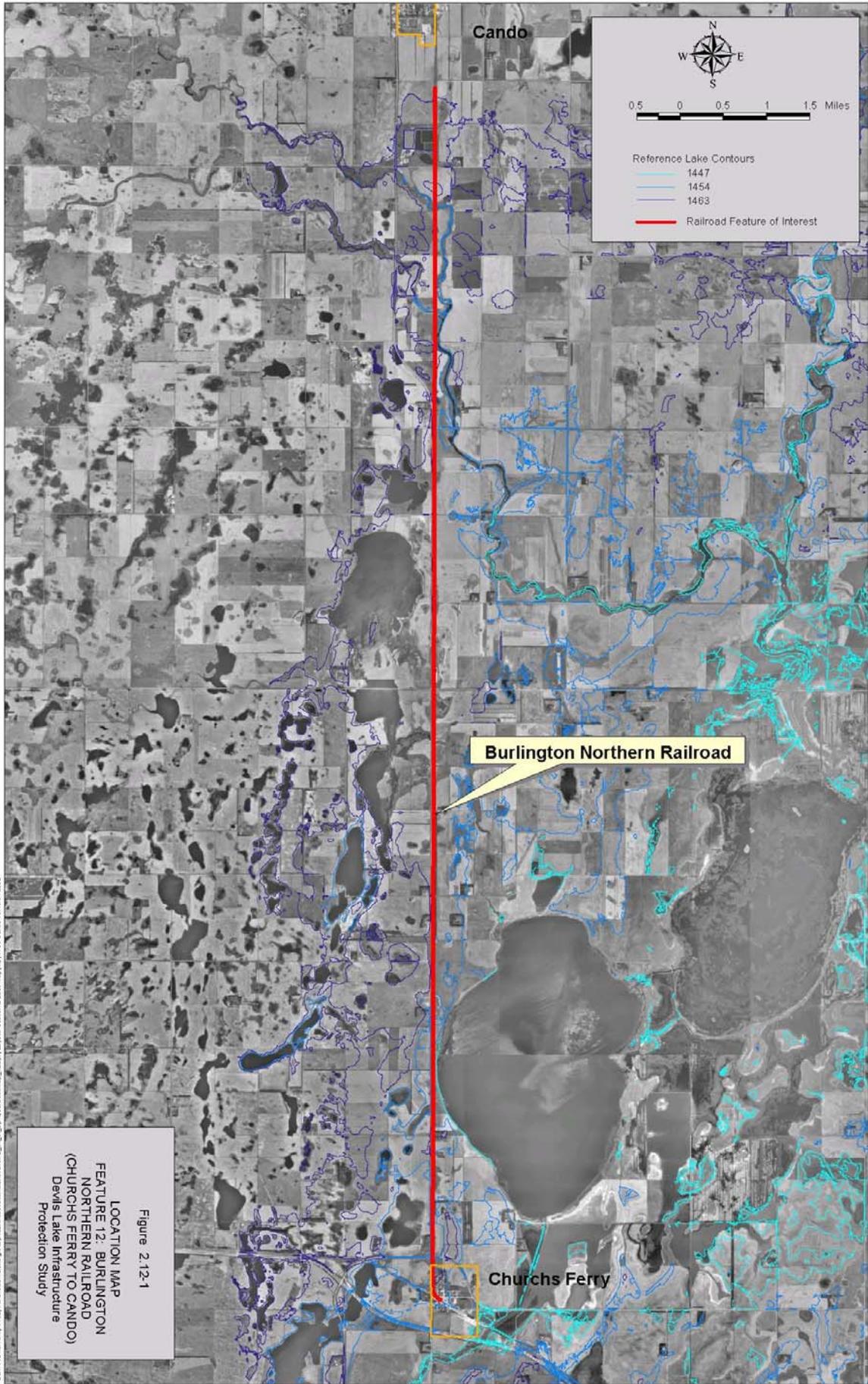
History of Flood Protection: In the past, flood protection for the Burlington Northern Railroad (Churchs Ferry to Cando) has not been an issue. Previous or current lake levels have not affected the track.

General Protection Strategy: The Economic Analysis of Devils Lake Alternatives analysis identified and evaluated several different approaches for protecting the Burlington Northern Railroad (Churchs Ferry to Cando). These included:

- rerouting railroad to higher ground
- abandoning tracks and using alternate shipping methods and detours
- raising the tracks

Selected Flood Protection Strategy

The Economic Analysis of Devils Lake Alternatives indicated that the flood protection strategy with the highest net benefits for Burlington Northern Railroad (Churchs Ferry to Cando) was incremental raises.



FEATURE 13: US HIGHWAY 2

General Information

Most Recent Study: 2001

Feature Type: Road

Location: Feature 13 is the portion of US Highway 2 that extends from 4 miles west of Churchs Ferry through the City of Devils Lake, to a location south of Crary. This stretch is approximately 35 miles long and passes through the townships of Coulee, Dry Lake, Grand Harbor, Creel North, South Minnewaukan and Stevens. The accompanying Figure 2.13-1 shows the feature's location and approximate extents, and the inundation extents at the three reference lake levels (1447, 1454, and 1463).

Description: US Highway 2 is a four-lane bituminous National Highway. The highway route spans nearly every state across the northern portion of the US from Washington to Michigan and on to Maine.

Significance: This portion of US Highway 2 is important because it is a major traffic route in the area, including the main route between Churchs Ferry and Devils Lake. It is vital to serving local transportation, agricultural needs, and moving products through the area.

Damages: The flooding of Feature 13 would result in the following damages:

- Detour damages resulting from the added travel time and miles traveled when US Highway 2 is closed and traffic is detoured.
- Restoration damages resulting from repairs that would be necessary to bring the highway back to a useable condition after a period of inundation.

Owner/Sponsor: North Dakota Department of Transportation

Lead Federal Agency: The Federal Highway Administration would take the lead for any road raises that may take place.

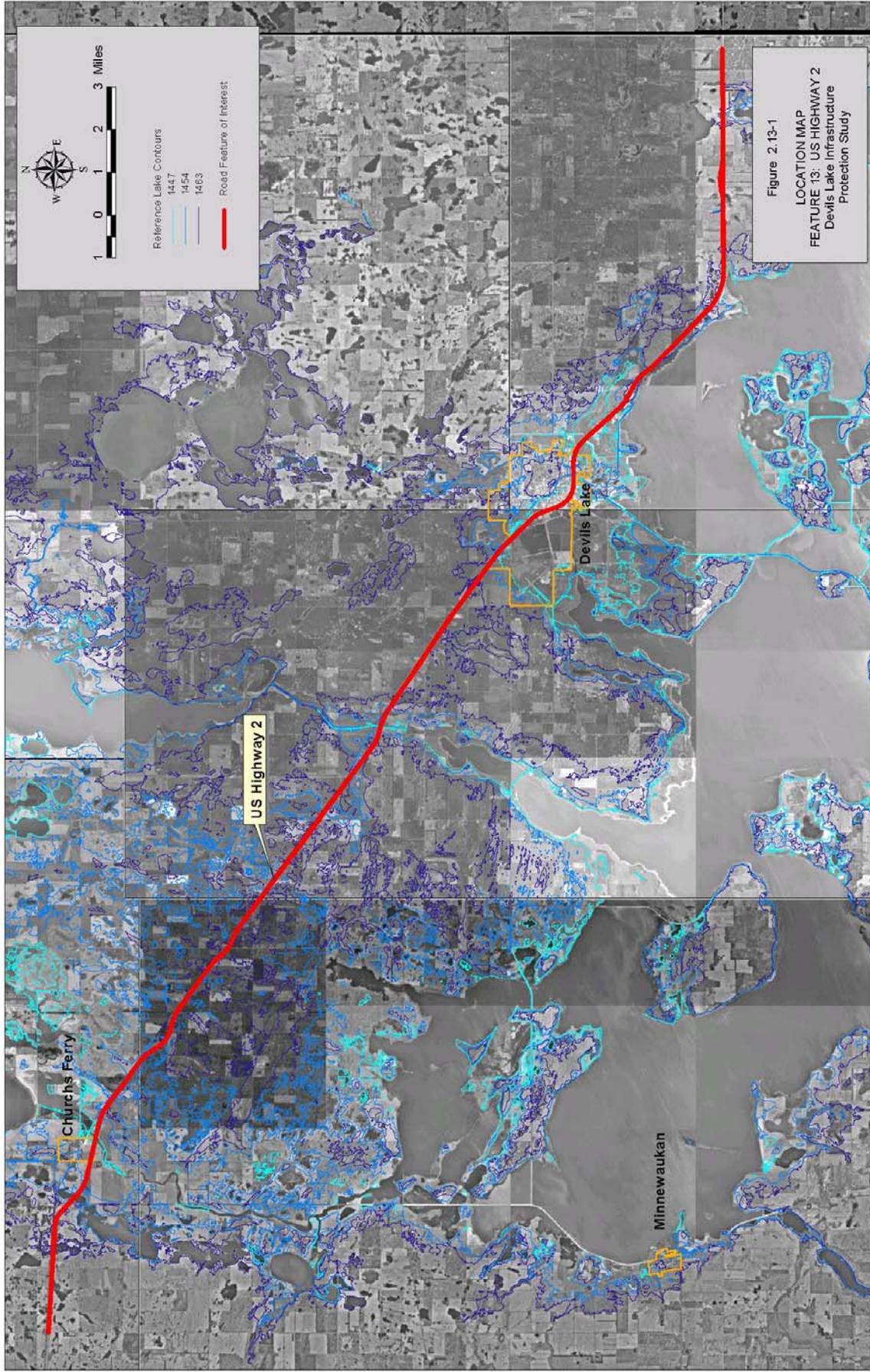
History of Flood Protection: Flood protection for US Highway 2 has not been an issue yet. Currently all of this section of road has been outside of the extents of the rising water.

General Protection Strategy: The analysis identified and evaluated several different approaches for protecting US Highway 2. These included:

- Temporary highway closure
- Raising the road immediately to 1468
- Incremental road raises, triggered by rising lake levels
- Hybrid strategies that involved raising the road, and then allowing temporary closure

Selected Flood Protection Strategy

The Economic Analysis of Devils Lake Alternatives indicated that the flood protection strategy with the highest net benefits for US Highway 2 was incremental raises.



FEATURE 14: ND HIGHWAY 57 (ND HIGHWAY 20 TO BIA HIGHWAY 1)

General Information

Most Recent Study: 2001

Feature Type: Road

Location: ND Highway 57 (ND Highway 20 to BIA Highway 1) is located in the Third Commissioner District Township, Benson County and on the Spirit Lake Nation Reservation. The feature extends approximately 3.5 miles from ND Highway 20 at the north to BIA Highway 1 to the south. The accompanying Figure 2.14-1 shows the feature's location and extents, and the inundation extents at the three reference lake levels (1447, 1454, and 1463).

Description: ND Highway 57 (ND Highway 20 to BIA Highway 1) is a two-lane bituminous-surfaced state highway. The centerline elevation is at 1455 over the entire feature.

Significance: ND Highway 57 (ND Highway 20 to BIA Highway 1) is important because it is the major north/south arterial route through the Devils Lake region between Fort Totten, St. Michael and the City of Devils Lake. It also provides primary access from the north and south within Mission Township and the eastern portion of the Spirit Lake Nation Reservation.

Damages: The flooding of ND Highway 57 (ND Highway 20 to BIA Highway 1) would result in the following damages:

- Detour damages resulting from the added travel time and miles traveled when the highway is closed and traffic is detoured.
- Restoration damages resulting from repairs that would be necessary to bring the highway back to a useable condition after a period of inundation.

Owner/Sponsor: The North Dakota Department of Transportation is responsible for managing and maintaining ND Highway 57.

Lead Federal Agency: The Federal Highway Administration would take the lead for ND Highway 57 in any road raises or relocations that may take place.

History of Flood Protection: In the past, flood protection for ND Highway 57 (ND Highway 20 to BIA Highway 1) has consisted of raising the road to keep it from being overtopped. The most recent raise of ND Highway 57 occurred in 1999 when the road was raised to 1455 for 3.7 miles. A previous raise was completed in 1997 when 0.74 miles of the road was raised to 1447.5.

General Protection Strategy: The analysis identified and evaluated several different approaches for protecting ND Highway 57 (ND Highway 20 to BIA Highway 1). These included:

- Temporary highway closure.

- Incremental road raises, triggered by rising lake levels.
- Raising the road immediately to elevation 1468.
- Hybrid strategies that involved raising the road along with allowing temporary closure.

Selected Flood Protection Strategy

The Economic Analysis of Devils Lake Alternatives indicated that the flood protection strategy with the highest net benefits for ND Highway 57 (ND Highway 20 to BIA Highway 1) were incremental raises.

FEATURE 15: ND HIGHWAY 57 (BIA HIGHWAY 1 TO US HIGHWAY 281)

General Information

Most Recent Study: 2001

Feature Type: Road

Location: ND Highway 57 (BIA Highway 1 to US Highway 281) is located in the Third Commissioner District, Lallie East and Lallie West Townships in Benson County, on the Spirit Lake Nation Reservation. The feature extends approximately 9 miles between US Highway 281 at the west to BIA Highway 1 at the east. The accompanying Figure 2.15-1 shows the feature's location and extents, and the inundation extents at the three reference lake levels (1447, 1454, and 1463).

Description: ND Highway 57 (BIA Highway 1 to US Highway 281) is a two-lane bituminous-surfaced state highway. The centerline elevation is 1455 from BIA 1 to Ski Jump Road, while the rest of the road's elevation varies, most of it being above elevation 1450.

Significance: ND Highway 57 (BIA Highway 1 to US Highway 281) is important because it is the major east/west arterial route through the Spirit Lake Nation Reservation and provides the most direct route between the cities of Devils Lake and Fort Totten.

Damages: The flooding of ND Highway 57 (BIA Highway 1 to US Highway 281) would result in the following damages:

- Detour damages resulting from the added travel time and miles traveled when ND Highway 57 (BIA Highway 1 to US Highway 281) is closed and traffic is detoured.
- Restoration damages resulting from repairs that would be necessary to bring the highway back to a useable condition after a period of inundation.

Owner/Sponsor: The North Dakota Department of Transportation is responsible for managing and maintaining ND Highway 57 (BIA Highway 1 to US Highway 281).

Lead Federal Agency: The Federal Highway Administration would take the lead for ND Highway 57 (BIA Highway 1 to US Highway 281) for any road raises or relocations that may take place.

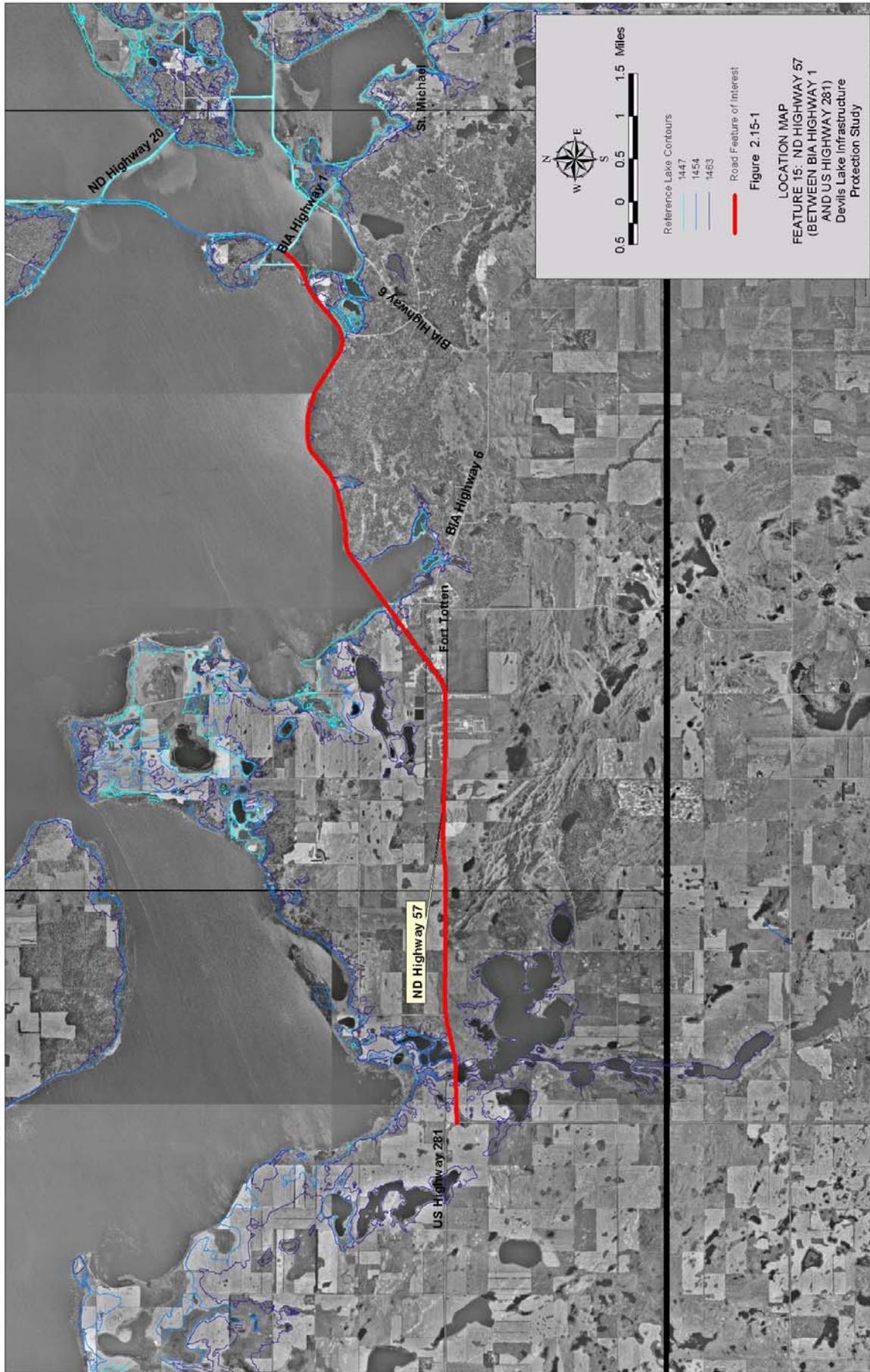
History of Flood Protection: In the past, flood protection for ND Highway 57 (BIA Highway 1 to US Highway 281) has consisted of raising the road to keep it from being overtopped. The most recent raise of ND Highway 57 (BIA Highway 1 to US Highway 281) occurred in 1999 when the road elevation was raised to 1455 for 3.5 miles between BIA 1 and Ski Jump Road. A previous raise was completed in 1997, when a 0.74-mile portion of the road was raised to 1447.5.

General Protection Strategy: The analysis identified and evaluated several different approaches for protecting ND Highway 57 (BIA Highway 1 to US Highway 281). These included:

- Temporary highway closure.
- Incremental road raises, triggered by rising lake levels.
- Raising the road immediately to elevation 1468.
- Hybrid strategies that involved raising the road along with allowing temporary closure.

Selected Flood Protection Strategy

The Economic Analysis of Devils Lake Alternatives indicated that the flood protection strategy with the highest net benefits for ND Highway 57 (BIA Highway 1 to US Highway 281) were incremental raises.



DATA: 1937 USGS Digital Ortho Quad

FEATURE 16: US HIGHWAY 281 (SOUTH OF US HIGHWAY 2)

General Information

Most Recent Study: 2002

Feature Type: Road

Location: Feature 16 is the 25.5 mile portion of US Highway 281 extending from its intersection with ND Highway 57 at the south end to its intersection with US Highway 2 near Churchs Ferry at the north end. US Highway 281 (South of US Highway 2) passes through the town of Minnewaukan, and the Townships of Normania, Riggin, West Bay, Oberon, and Lallie. All of Feature 16 is located in Benson County. The accompanying Figure 4.16-1 shows the feature's current and realigned locations and approximate extents, and the inundation extents at the three reference lake levels (1447, 1454, and 1463).

Description: US Highway 281 (South of US Highway 2) is a two lane bituminous National Highway. The entire highway route spans the U.S.A. from Canada to Texas. It is classified as a principal arterial highway and National Highway System route. Average daily traffic counts for this feature were 659 in 1994 and 946 in 2002.

Significance: This portion of US Highway 281 is important because it is a major traffic route in the area, including the main route between Minnewaukan and Churchs Ferry. It is vital to serving local transportation, agricultural needs, and moving products through the area.

Damages: The flooding of Feature 16 would result in the following damages:

- Detour damages resulting from the added travel time and miles traveled when US Highway 281 (South of US Highway 2) is closed and traffic is detoured.
- Restoration damages resulting from repairs that would be necessary to bring the highway back to a useable condition after a period of inundation.

Owner/Sponsor: North Dakota Department of Transportation

Lead Federal Agency: Federal Highway Department would take the lead for US Highway 281 (South of US Highway 2) for any road relocations or raises that may take place.

History of Flood Protection: Flood protection for US Highway 281 (South of US Highway 2) has thus far consisted of road raises. The most recent raise occurred in 2001, with 0.37 miles being raised to elevation 1452. This segment is located 2 miles south of US Highway 2. Other raises occurred in 1997 and 1998, raising a total of 9.2 miles of Highway to elevation 1452.

General Protection Strategy: The ND DOT is currently planning to realign US Highway 281 (South of US Highway 2) to provide protection to this feature up to lake level 1463. The realignment will place most US Highway 281 (South of US Highway 2)

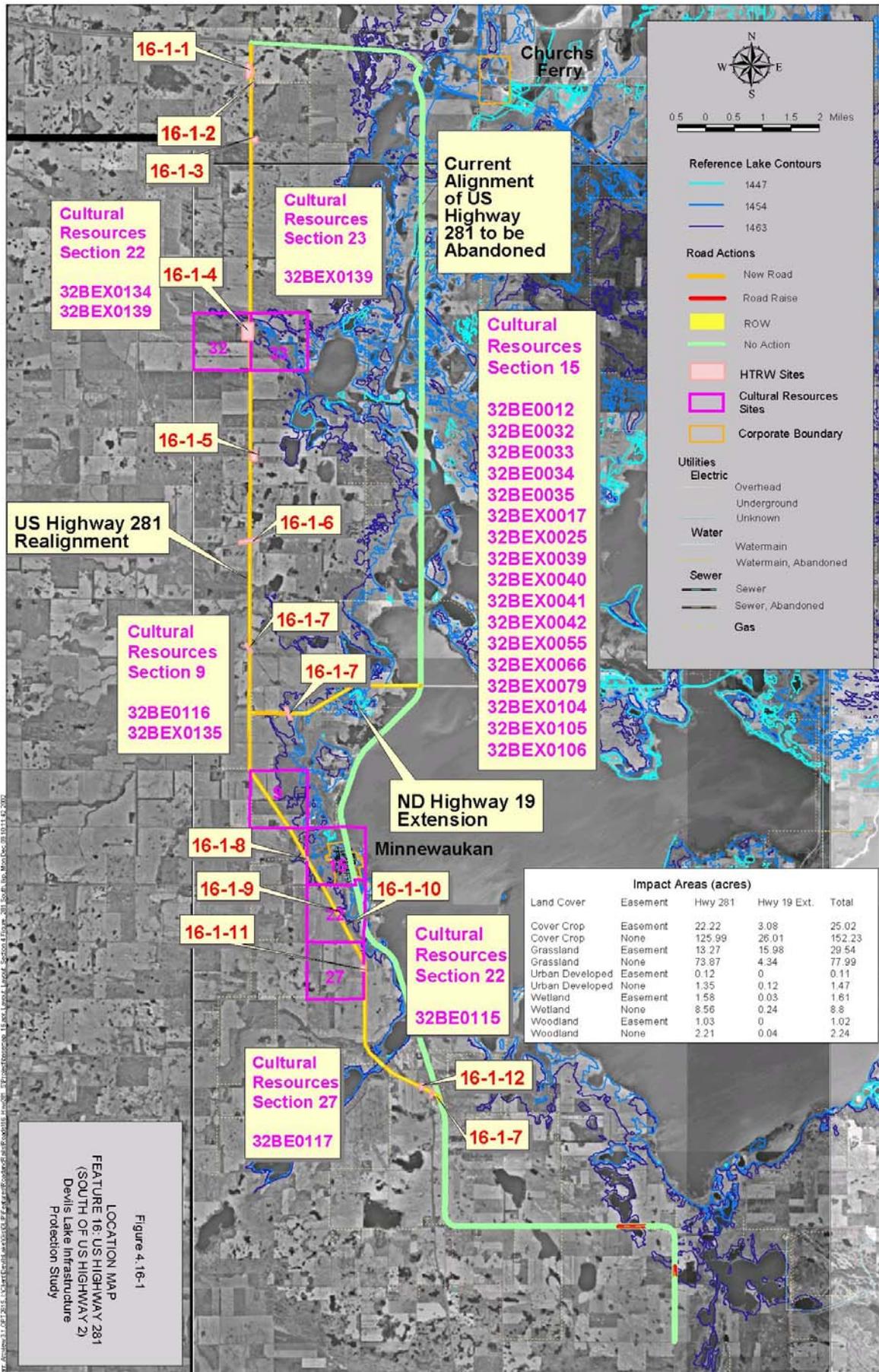
outside of the maximum flood extents of the lake. In the areas where the existing ground is below 1465, the highway will be constructed to a minimum elevation of 1465.

Selected Flood Protection Strategy

The flood protection strategy evaluated for US Highway 281 (South of US Highway 2) was realignment with a minimum road surface elevation of 1465.

Drawing

Figure 4.16-1 shows this feature and flood protection alternatives that were analyzed. It also shows utilities, potential HTRW sites, and potential cultural resource sites that are in the area of the project. The identified sites may or may not be of concern to potential projects. They would need to be field investigated during further development of the project. The drawing also shows an estimate of natural resource lands that may be affected by a flood control project.



DATA: 1997 USGS Digital Ortho Quad

FEATURE 17: US HIGHWAY 281 (NORTH OF US HIGHWAY 2)

General Information

Most Recent Study: 2002

Feature Type: Road

Location: Feature 17 is the portion of US Highway 281 north of US Highway 2 located in Towner County and along the borders of Ramsey and Benson Counties. It extends 16.5 miles from its intersection with US Highway 2 outside of Churchs Ferry at the south to the City of Cando at the north. Feature 17 passes through the Townships of Olson, Cando, Atkins, Maza, Irvine, Chain Lakes, Normania, and Coulee. The accompanying Figure 4.17-1 shows the feature's location and approximate extents, and the inundation extents at the three reference lake levels (1447, 1454, and 1463).

Description: US Highway 281 north of US Highway 2 is a two lane bituminous National Highway. The entire highway route spans the U.S.A. from Canada to Texas. It is classified as a principal arterial highway and National Highway System route. Average daily traffic counts for this feature were 1,250 in 1994 and 1,075 in 2002.

Significance: This portion of US Highway 281 is important because it is a major traffic route in the area, including the main route between Cando and Churchs Ferry. It is vital to serving local transportation, agricultural needs, and moving products through the area.

Damages: The flooding of Feature 17 would result in the following damages:

- Detour damages resulting from the added travel time and miles traveled when US Highway 281 (North of US Highway 2) is closed and traffic is detoured.
- Restoration damages resulting from repairs that would be necessary to bring the highway back to a useable condition after a period of inundation.

Owner/Sponsor: North Dakota Department of Transportation

Lead Federal Agency: Federal Highway Administration would take the lead for US Highway 281 (North of US Highway 2) for any road raises or relocations that may take place.

History of Flood Protection: Flood protection for US Highway 281 (North of US Highway 2) has not been an issue yet. Currently all of this section of road has been outside of the extents of the rising water.

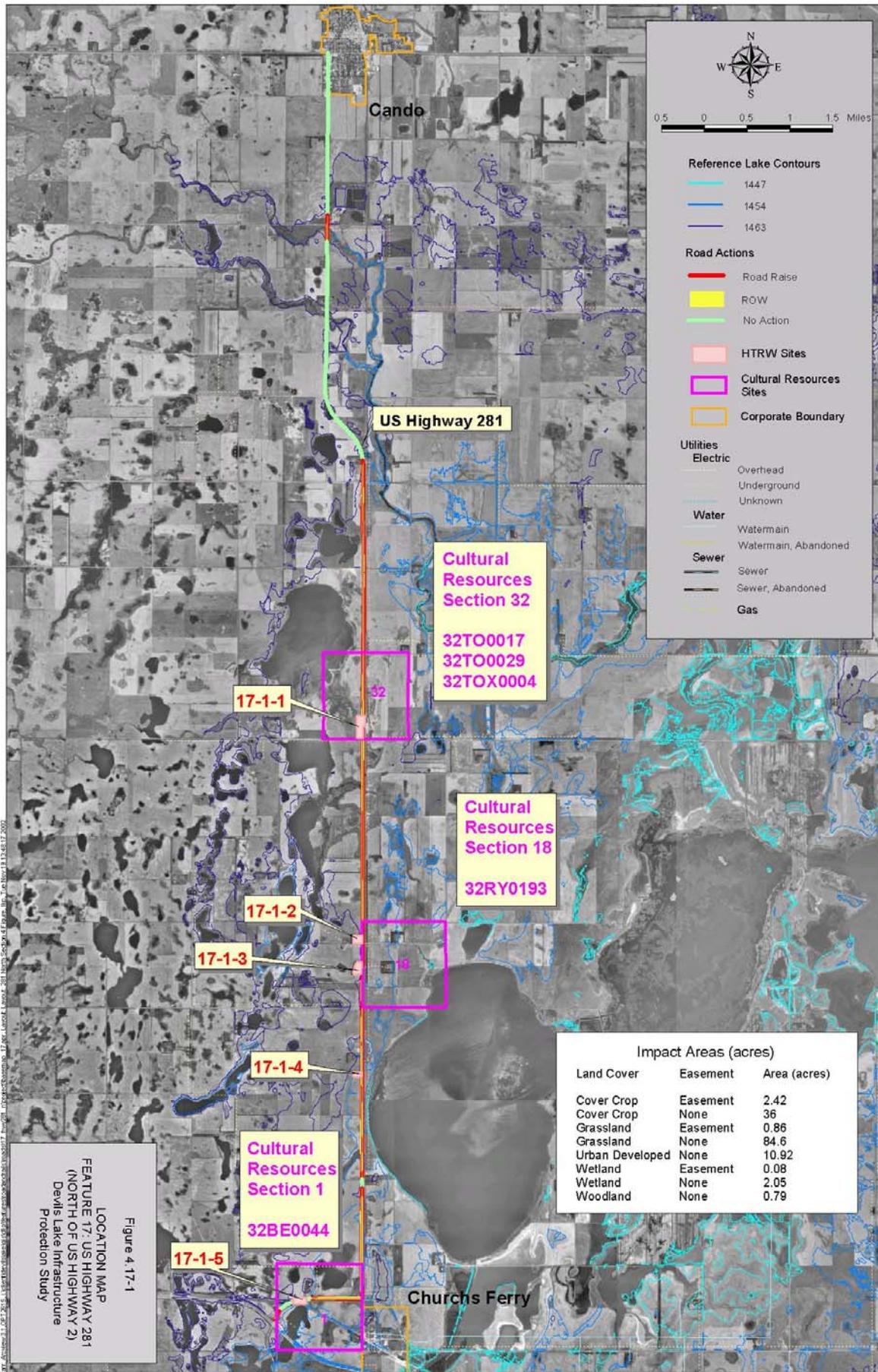
General Protection Strategy: The ND DOT plans to raise US Highway 281 north of US Highway 2 and south of Cando to a minimum road surface elevation of 1457.4. The roadway embankment will also be widened along the entire length (below 1465) to accommodate potential future raises up to road surface elevation 1465 without requiring fill placement below water.

Selected Flood Protection Strategy

The first level of incremental flood protection that was analyzed for US Highway 281 (North of US Highway 2) was an incremental road raise to 1457.4.

Drawing

Figure 4.17-1 shows this feature and flood protection alternatives that were analyzed. It also shows utilities, potential HTRW sites, and potential cultural resource sites that are in the area of the project. The identified sites may or may not be of concern to potential projects. They would need to be field investigated during further development of the project. The drawing also shows an estimate of natural resource lands that may be affected by a flood control project.



Impact Areas (acres)		
Land Cover	Easement	Area (acres)
Cover Crop	Easement	2.42
Cover Crop	None	36
Grassland	Easement	0.86
Grassland	None	84.6
Urban Developed	None	10.92
Wetland	Easement	0.08
Wetland	None	2.05
Woodland	None	0.79

Figure 4.17-1
 LOCATION MAP
 FEATURE 17: US HIGHWAY 281
 (NORTH OF US HIGHWAY 2)
 Devils Lake Infrastructure
 Protection Study

DATA: 1997 USGS Digital Ortho Quad

FEATURE 18: ND HIGHWAY 19

General Information

Most Recent Study: 2001

Feature Type: Road

Location: ND Highway 19 is located in Creel North, Grand Harbor, Pelican, Riggins East and Riggins West Townships, Benson County. The feature extends approximately 16 miles between US Highway 281 at the west to the City of Devils Lake at the east. The accompanying Figure 2.18-1 shows the feature's location and extents, and the inundation extents at the three reference lake levels (1447, 1454, and 1463).

Description: ND Highway 19 is a two-lane bituminous-surfaced state highway. The centerline elevation is, at its lowest, 1448.

Significance: ND Highway 19 is important because it is the major east/west arterial route through the Devils Lake region and provides a primary route between the Minnewaukan area and the City of Devils Lake.

Damages: The flooding of ND Highway 19 would result in the following damages:

- Detour damages resulting from the added travel time and miles traveled when ND Highway 19 is closed and traffic is detoured.
- Restoration damages resulting from repairs that would be necessary to bring the highway back to a useable condition after a period of inundation.

Owner/Sponsor: The North Dakota Department of Transportation is responsible for managing and maintaining ND Highway 19.

Lead Federal Agency: The Federal Highway Administration would take the lead for ND Highway 19 in any road raises or relocations that may take place.

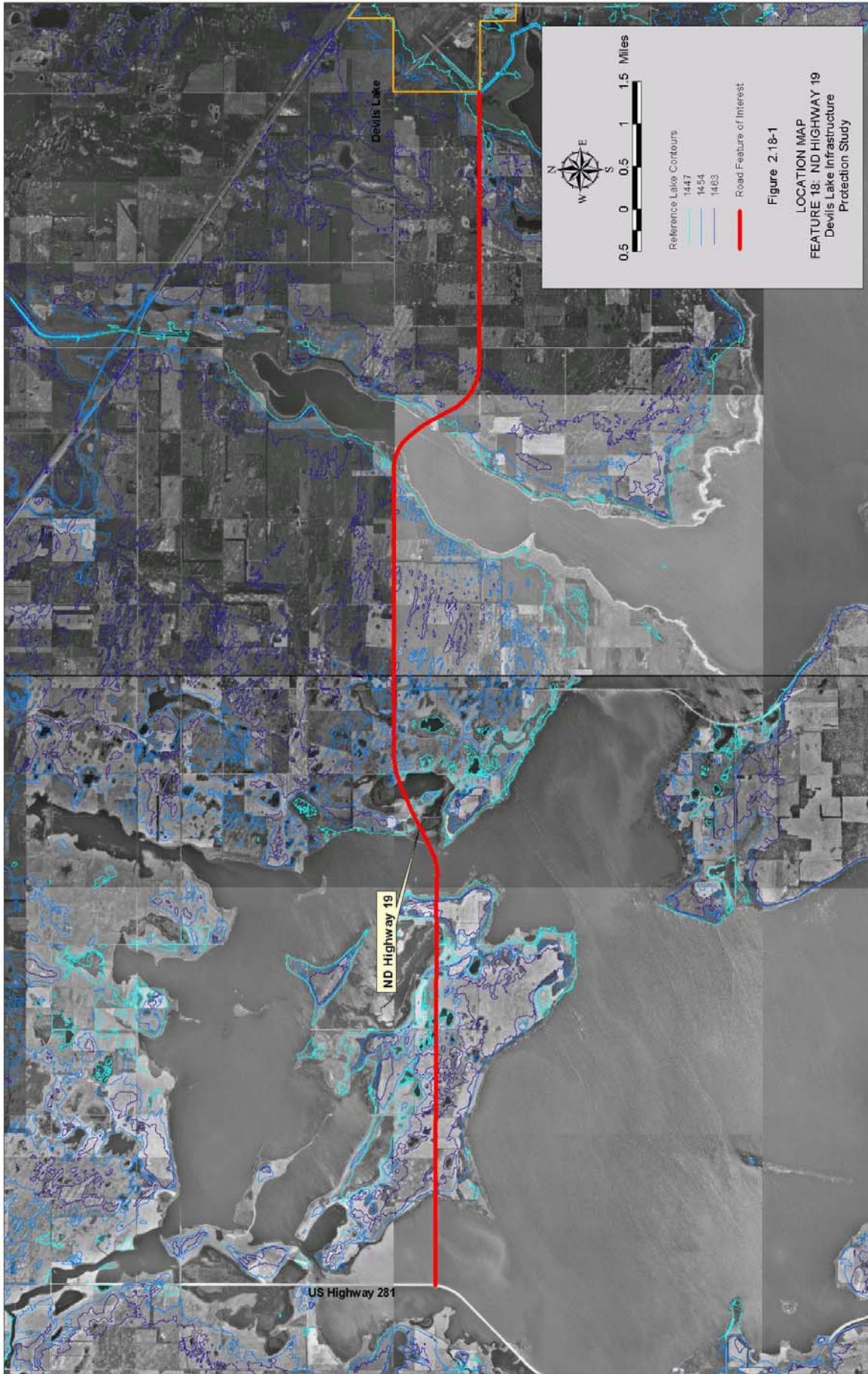
History of Flood Protection: In the past, flood protection for ND Highway 19 has consisted of raising the road to keep it from being overtopped. The most recent raise of ND Highway 19 occurred in 1997 when four separate areas of the road were raised to 1448. The raise locations were near Creel Bay, across Six-Mile Bay, near Mauvais Coulee and the US Highway 281 and ND Highway 19 junction.

General Protection Strategy: The analysis identified and evaluated several different approaches for protecting ND Highway 19. These included:

- Temporary highway closure
- Incremental road raises, triggered by rising lake levels
- Raising the road immediately to 1468
- Hybrid strategies that involved raising the road, then allowing temporary closure

Selected Flood Protection Strategy

The Economic Analysis of Devils Lake Alternatives indicated that the flood protection strategy with the highest net incremental road raises.



DATA: 1997 USGS Digital Ortho Quad

FEATURE 19: ND HIGHWAY 1

General Information

Most Recent Study: 2002

Feature Type: Road

Location: Feature 19 is the portion of ND Highway 1 in Nelson County that begins at the southern ends of Sections 15 and 16 in Wamduska Township, and continues south to the southern end of the border between Sections 34 and 35. It extends approximately 3.4 miles across this stretch. The accompanying Figure 4.19-1 shows the feature's location and approximate extents, and the inundation extents at the three reference lake levels (1447, 1454, and 1463).

Description: ND Highway 1 in Wamduska Township is a two lane bituminous-surfaced state highway. The centerline elevation varies from a minimum of 1465 just east of the easternmost part of Stump Lake, to 1503 approximately 3 miles south of Stump Lake. Average daily traffic counts for this feature were 638 in 1994 and 469 in 2002.

Significance: This portion of ND Highway 1 is important because it is a major north-south traffic route for the area east of Devils Lake and Stump Lake. It is vital to serving local transportation, agricultural needs, and moving products through the area. The Average Daily Traffic (ADT) counts on this highway were 469 in 2002.

Damages: The flooding of Feature 19 would result in the following damages:

- Detour damages resulting from the added travel time and miles traveled when ND Highway 1 is closed and traffic is detoured.
- Restoration damages resulting from repairs that would be necessary to bring the highway back to a useable condition after a period of inundation.

Owner/Sponsor: North Dakota Department of Transportation

Lead Federal Agency: The Federal Highway Administration would take the lead for ND Highway 1 for any road raises or relocations that may take place.

History of Flood Protection: The ND DOT completed the realignment of 2.4 miles of ND Highway 1 in fall of 2002. The realignment involved abandoning a segment of the road inundated by the rising level of Stump Lake and relocating of that section of the road east of Stump Lake.

General Protection Strategy: The general protection strategy for this feature—already implemented—consists of road relocation.

Selected Flood Protection Strategy

The flood protection strategy evaluated for ND Highway 1 was relocation of one reach of the highway. The ND DOT implemented this strategy in 2002.

FEATURE 20: ND HIGHWAY 20 (NORTH OF CITY OF DEVILS LAKE)

General Information

Most Recent Study: 2001

Feature Type: Road

Location: ND Highway 20 (North of City of Devils Lake) is located in Freshwater and Webster Townships, in Ramsey County. The feature extends from one mile north of the city of Webster in the north to 3 miles south of the city of Webster. The accompanying Figure 2.20-1 shows the feature's location and extents, and the inundation extents at the three reference lake levels (1447, 1454, and 1463).

Description: ND Highway 20 (North of City of Devils Lake) is a two-lane bituminous-surfaced state highway. The lowest centerline elevation is 1460.

Significance: ND Highway 20 (North of City of Devils Lake) is important because it is a major north/south arterial route through the Devils Lake region.

Damages: The flooding of ND Highway 20 (North of City of Devils Lake) would result in the following damages:

- Detour damages resulting from the added travel time and miles traveled when ND Highway 20 (North of City of Devils Lake) is closed and traffic is detoured.
- Restoration damages resulting from repairs that would be necessary to bring the highway back to a useable condition after a period of inundation.

Owner/Sponsor: The North Dakota Department of Transportation is responsible for managing and maintaining ND Highway 20 (North of City of Devils Lake).

Lead Federal Agency: The Federal Highway Administration would take the lead for ND Highway 20 (North of City of Devils Lake) in any road raises or relocations that may take place.

History of Flood Protection: Flood protection for ND Highway 20 (North of City of Devils Lake) has not yet been an issue because of the high road elevation relative to historic lake levels.

General Protection Strategy: The analysis identified and evaluated several different approaches for protecting ND Highway 20 (North of City of Devils Lake). These included:

- Temporary highway closure
- Road raise, triggered by rising lake levels.

Selected Flood Protection Strategy

The Economic Analysis of Devils Lake Alternatives indicated that the flood protection strategy with the highest net benefits for ND Highway 20 (North of City of Devils Lake) was incremental road raises.



DATA: 1997 USGS Digital Ortho Quad

FEATURE 21: ND HIGHWAY 20 (CITY OF DEVILS LAKE LEVEE TO ND HIGHWAY 57)

General Information

Most Recent Study: 2001

Feature Type: Road

Location: ND Highway 20 (City of Devils Lake Levee to ND Highway 57) is located in Creel Township in Ramsey County. The feature extends approximately 3 miles between ND Highway 57 at the southeast to the levee on the south side of Devils Lake to the north. The accompanying Figure 2.21-1 shows the feature's location and extents, and the inundation extents at the three reference lake levels (1447, 1454, and 1463).

Description: ND Highway 20 (City of Devils Lake Levee to ND Highway 57) is a two-lane bituminous-surfaced state highway. The centerline elevation is at a minimum of 1455. Portions of the roadway are acting as dams (Analyzed as Expanded Infrastructure Alternative).

Significance: ND Highway 20 (City of Devils Lake Levee to ND Highway 57) is important because it is the major north/south arterial route through the Devils Lake region and provides primary access to and from the City of Devils Lake and region on the south side of Devils Lake, and particularly the Spirit Lake Nation Reservation.

Damages: The flooding of ND Highway 20 (City of Devils Lake Levee to ND Highway 57) would result in the following damages:

- Detour damages resulting from the added travel time and miles traveled when ND Highway 20 (City of Devils Lake Levee to ND Highway 57) is closed and traffic is detoured.
- Restoration damages resulting from repairs that would be necessary to bring the highway back to a useable condition after a period of inundation.

Owner/Sponsor: The North Dakota Department of Transportation is responsible for managing and maintaining ND Highway 20 (City of Devils Lake Levee to ND Highway 57).

Lead Federal Agency: The Federal Highway Administration would take the lead for ND Highway 20 (City of Devils Lake Levee to ND Highway 57) in any road raises or relocations that may take place.

History of Flood Protection: In the past, flood protection for ND Highway 20 (City of Devils Lake Levee to ND Highway 57) has consisted of raising the road to keep it from being overtopped.

General Protection Strategy: The analysis identified and evaluated several different approaches for protecting ND Highway 20 (City of Devils Lake Levee to ND Highway 57). These included:

- Temporary highway closure
- Incremental road raises, triggered by rising lake levels
- Raising the road immediately to 1468
- Hybrid strategies that involved raising the road, then allowing temporary closure

Selected Flood Protection Strategy

The Economic Analysis of Devils Lake Alternatives indicated that the flood protection strategy with the highest net benefits for ND Highway 20 (City of Devils Lake Levee to ND Highway 57) were incremental raises.

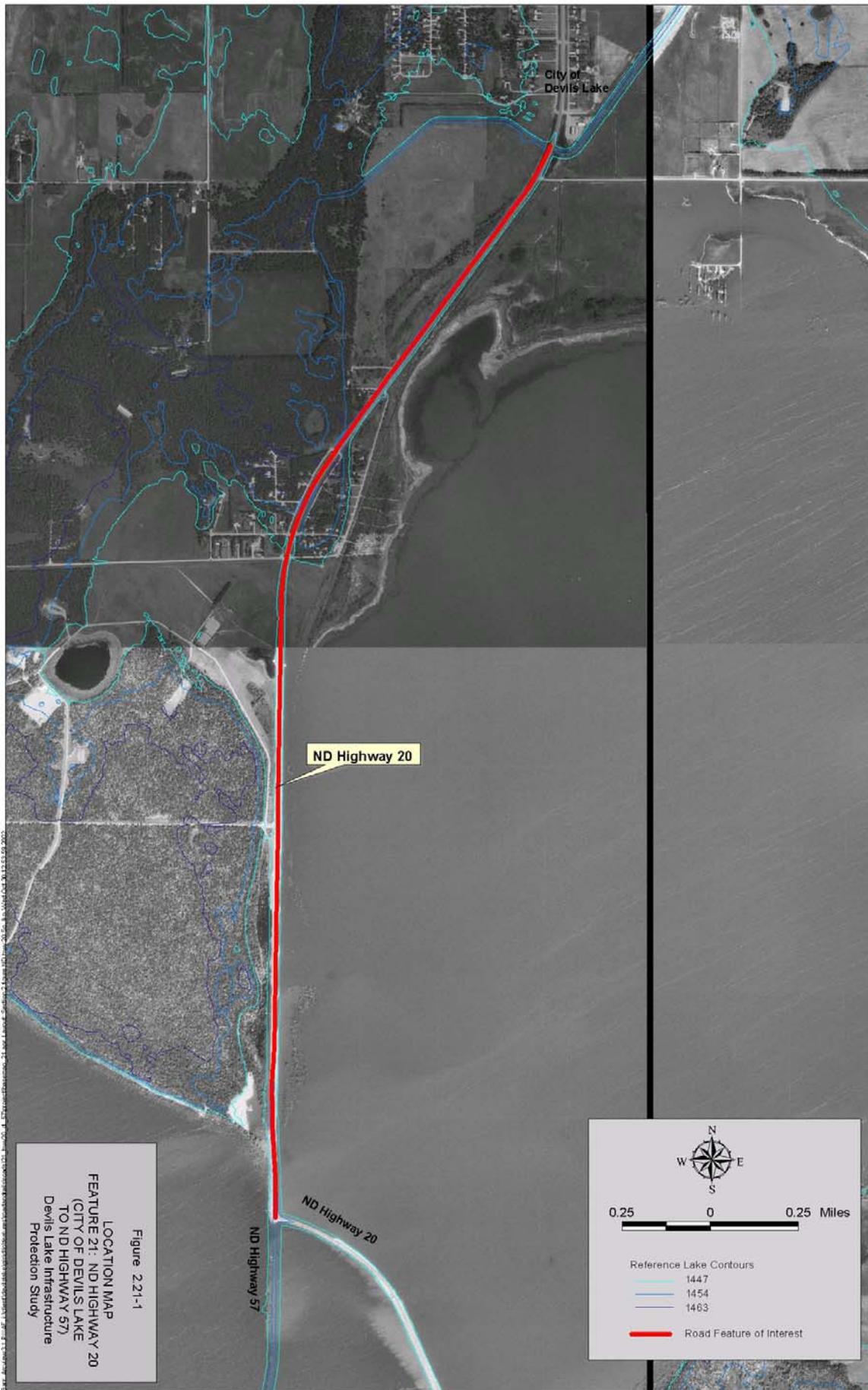


Figure 2.21-1
 LOCATION MAP
 FEATURE 21: ND HIGHWAY 20
 (CITY OF DEVILS LAKE
 TO ND HIGHWAY 57)
 Devils Lake Infrastructure
 Protection Study

DATA: 1997 USGS Digital Ortho Quad

FEATURE 22: ND HIGHWAY 20 (ND HIGHWAY 57 TO TOKIO)

General Information

Most Recent Study: 2002

Feature Type: Road

Location: ND Highway 20 (ND Highway 57 to Tokio) is located in Mission Township, Benson County and on the Spirit Lake Nation Reservation. The feature extends 10.6 miles between ND Highway 57 at the northwest to the town of Tokio to the south. The accompanying Figure 4.22-1 shows the feature's location and extents, and the inundation extents at the three reference lake levels (1447, 1454, and 1463).

Description: ND Highway 20 (ND Highway 57 to Tokio) is a two-lane bituminous-surfaced state highway. The centerline elevation varies from 1445 to 1495 near Tokio. Portions of the roadway are acting as dams (see Expanded Infrastructure Alternative). Average daily traffic counts for this feature were 1,070 in 1994 and 663 in 2002.

Significance: ND Highway 20 (ND Highway 57 to Tokio) is important because it is the major north/south arterial route through the Devils Lake region. It provides primary access from the north and south between the City of Devils Lake and Mission Township and the eastern portion of the Spirit Lake Nation Reservation.

Damages: The flooding of ND Highway 20 (ND Highway 57 to Tokio) would result in the following damages:

- Detour damages resulting from the added travel time and miles traveled when ND Highway 20 (ND Highway 57 to Tokio) is closed and traffic is detoured.
- Restoration damages resulting from repairs that would be necessary to bring the highway back to a useable condition after a period of inundation.

Owner/Sponsor: The North Dakota Department of Transportation is responsible for managing and maintaining ND Highway 20 (ND Highway 57 to Tokio).

Lead Federal Agency: The Federal Highway Administration would take the lead for ND Highway 20 (ND Highway 57 to Tokio) in any road raises or relocations that may take place.

History of Flood Protection: In the past, flood protection for ND Highway 20 (ND Highway 57 to Tokio) has consisted of raising the road to keep it from being overtopped. The most recent raise of ND Highway 20 occurred in 1999 when the road elevation was raised from 1448.5 to 1452.5 for 3.7 miles. The raise locations (there were two separate segments) were on the north and east sides of sections 3 and 4, and in sections 26 & 35 in Mission Township.

Emergency levees were originally constructed by the Corps north and northeast of the east-west portion of ND Highway 20 in 1998. The western-most of the three levees, constructed along a township road in Section 35 (T153N64W) was raised to 1447.6 in

1998 and 1452, its current crest elevation, in 2001. The other two levee sections, located in Section 35 (T153N64W) and Section 31 (T153N63W) were also raised in 1998 and 2001, to 1449 and 1453, respectively. These levees currently protect the 2,000-foot section of the ND Highway 20 immediately west of the road's intersection with BIA Highway 9 that has a surface elevation at about 1445.

General Protection Strategy: The Infrastructure Protection Study's analysis for ND Highway 20 (ND Highway 57 to Tokio) considered one incremental flood protection strategy (apart from abandonment) for ND Highway 20 (ND Highway 57 to Tokio). At the first action level, that flood protection strategy was the only strategy that was feasible both from an economic and a constructability standpoint. The strategy involved raising the road to a minimum road surface elevation of 1457.5. This constitutes a 5-foot raise for the majority of the roadway being raised and a 13.5 foot raise for the 2,000 foot section with current road surface at 1445.

Selected Flood Protection Strategy

The first level of incremental flood protection that was analyzed for ND Highway 20 (ND Highway 57 to Tokio) was an incremental road raise to 1457.5.

Drawing

Figure 4.22-1 shows this feature and flood protection alternatives that were analyzed. It also shows utilities, potential HTRW sites, and potential cultural resource sites that are in the area of the project. The identified sites may or may not be of concern to potential projects. They would need to be field investigated during further development of the project. The drawing also shows an estimate of natural resource lands that may be affected by a flood control project.

FEATURE 23: BIA HIGHWAY 1

General Information

Most Recent Study: 2002

Feature Type: Road

Location: BIA Highway 1 is located in Sections 7, 8 and 17 of Mission Township in Benson County and on the Spirit Lake Nation Reservation. The feature extends 2.72 miles between ND Highway 57 at the northwest to Highway BIA 6 to the southeast. The accompanying Figure 4.23-1 shows the feature's location and extents, and the inundation extents at the three reference lake levels (1447, 1454, and 1463).

Description: BIA Highway 1 is a two-lane bituminous-surfaced federal highway. The centerline elevation varies from 1451 to 1488, and crosses Mission Bay (a portion of Devil's Lake) at its northwest end.

Significance: BIA Highway 1 is important because it is the major northbound and southbound route to and from the town of St. Michael and surrounding areas.

Damages: The flooding of BIA Highway 1 would result in the following damages:

- Detour damages resulting from the added travel time and miles traveled when BIA Highway 1 is closed and traffic is detoured.
- Restoration damages resulting from repairs that would be necessary to bring the highway back to a useable condition after a period of inundation.

Owner/Sponsor: The US Department of Interior, Bureau of Indian Affairs, is responsible for managing and maintaining BIA Highway 1.

Lead Federal Agency: The Federal Highway Administration or the Bureau of Indian Affairs would take the lead for BIA Highway 1 in any road raises or relocations that may take place.

History of Flood Protection: In the past, flood protection for BIA Highway 1 has consisted of raising the road to keep it from being overtopped. BIA Highway 1 was last raised in 2001 to a minimum road surface elevation of approximately 1451.

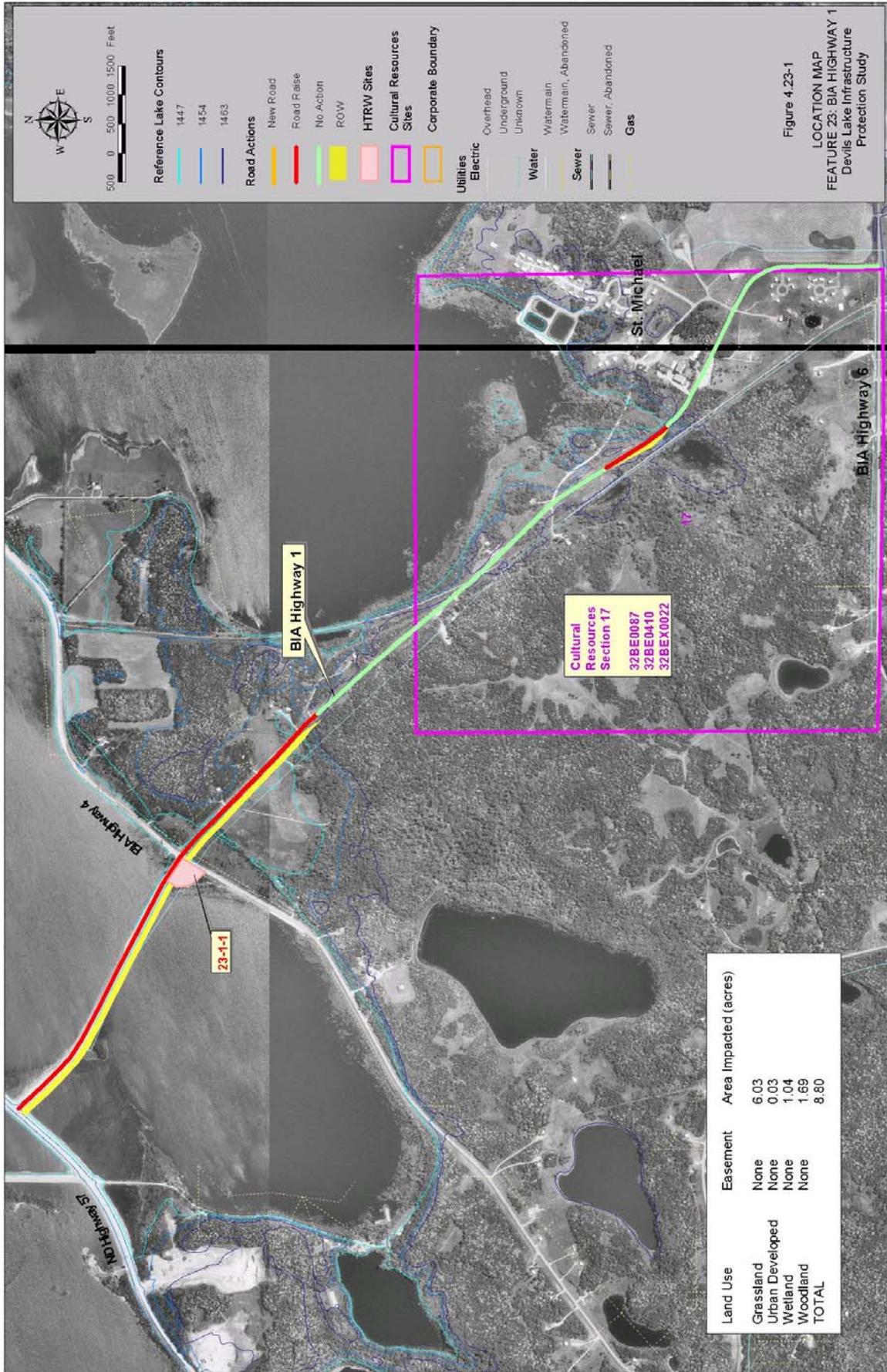
General Protection Strategy: The Infrastructure Protection Study's analysis for BIA Highway 1 considered one incremental flood protection strategy (apart from abandonment) for BIA Highway 1. At the first action level, that flood protection strategy was the only strategy that was feasible both from an economic and a constructability standpoint. The strategy involved raising the road 5-feet to a minimum road surface elevation of 1456.

Selected Flood Protection Strategy

The first level of incremental flood protection that was analyzed for BIA Highway 1 was an incremental road raise to 1455.5.

Drawing

Figure 4.23-1 shows this feature and flood protection alternatives that were analyzed. It also shows utilities, potential HTRW sites, and potential cultural resource sites that are in the area of the project. The identified sites may or may not be of concern to potential projects. They would need to be field investigated during further development of the project. The drawing also shows an estimate of natural resource lands that may be affected by a flood control project.



FEATURE 24: BIA HIGHWAY 6

General Information

Most Recent Study: 2002

Feature Type: Road

Location: Feature 24 is the 9 mile portion of BIA Highway 6 between Fort Totten at the west and ND Highway 20 at the east, and is located in Benson County. The accompanying Figure 4.24-1 shows the feature's location and approximate extents, and the inundation extents at the three reference lake levels (1447, 1454, and 1463).

Description: BIA Highway 6 is a two-lane bituminous-surfaced federal highway. The centerline elevation varies from 1625.0 just east of Fort Totten to 1440.0 just west of ND Highway 20.

Significance: BIA Highway 6 is important because it is a major traffic route in the area, including the main route between Fort Totten and St. Michael. The Average Daily Traffic (ADT) counts on this highway were not available.

Damages: The flooding of Feature 24 would result in the following damages:

- Detour damages resulting from the added travel time and miles traveled when BIA Highway 6 is closed and traffic is detoured.
- Restoration damages resulting from repairs that would be necessary to bring the highway back to a useable condition after a period of inundation.

Owner/Sponsor: The US Department of Interior, Bureau of Indian Affairs, is responsible for managing and maintaining BIA Highway 6.

Lead Federal Agency: The Federal Highway Administration or the Bureau of Indian Affairs would take the lead for BIA Highway 6 in any road raises or relocations that may take place.

History of Flood Protection: BIA Highway 6 is located in the area that is currently being protected by roads that are acting as dams. Therefore, the flood level at BIA Highway 6 is much lower than the level of Devils Lake. Therefore, flood protection for BIA Highway 6 has, for the most part, not been an issue. Only a small portion (approximately 1,000 feet) was raised in 1988 due to water elevations nearing the road surface. This is the only flood protection that has been implemented.

General Protection Strategy: The BIA started construction of a raise to the low section of Feature 24 in the Fall 2002. The construction will involve raising 4,700 feet of BIA Highway 6 to a minimum road surface elevation of 1456.9. The roadway embankment will also be widened along that length to accommodate potential future raises up to road surface elevation 1465 without requiring fill placement below water.

Selected Flood Protection Strategy

The flood protection strategy evaluated for BIA Highway 6 was an incremental raise to a minimum road surface elevation of 1456.9 feet MSL. The BIA began construction of this road raise in the fall of 2002, so this Infrastructure Protection Study did not analyze the flood protection strategy with the largest net benefits for BIA Highway 6.

Drawing

Figure 4.24-1 shows this feature and flood protection alternatives that were analyzed. It also shows utilities, potential HTRW sites, and potential cultural resource sites that are in the area of the project. The identified sites may or may not be of concern to potential projects. They would need to be field investigated during further development of the project. The drawing also shows an estimate of natural resource lands that may be affected by a flood control project.

