Burleigh County
Emergency Management

Flood Annex

March, 2013

Prepared by Burleigh County Emergency Management, 222-6727, in coordination with stakeholders including excerpts from the "Missouri River 2013 Flood Response and Action Plan (Updated from 2012 Plan), City of Bismarck

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Flood Annex

Lead Agencies:	Burleigh County Highway Department Burleigh County Sheriff's Department Burleigh County Emergency Management/Emergency Operations Center
Support Agencies:	Ambulances Bismarck Police Department Chaplaincy Bismarck Rural Fire Department Bismarck/Burleigh Combined Communications Bismarck/Burleigh Public Health Burleigh County Extension Service Burleigh County Geographic Information System Burleigh County Social Services Burleigh County State's Attorney Burleigh County Water Resource District Lincoln Police Department Sterling Rural Fire Department Wilton Rural Fire Department Wing Rural Fire Department
Private/Nonprofit:	West Dakota American Red Cross Salvation Army

I. Situation

A. General

This Flood Annex has been prepared to address flood events in Burleigh County, North Dakota. The Flood Annex attempts to provide information and guidance, not only to minimize the hardships experienced as a result of severe flooding, but to identify proactive remediation measures, coordinate departments and resources, and public education.

Historically, extreme flooding occurs during the spring when any or all of the following events take place concurrently:

- A sudden increase of temperatures that melts existing snow cover and a high intensity rainfall event increasing the amount of water flowing into the River and Creeks.
- Ground temperatures that are below freezing, inhibiting infiltration of rain/snow, and causing water to quickly flow into the Missouri River, Apple Creek, Burnt Creek, Hay Creek or result in overland flooding.
- A restriction of flow in the River or Creeks such as debris accumulation or ice jams that would cause increased water elevations upstream of the restriction.

This plan acknowledges that flood damage may not be entirely eliminated and attempts to mitigate the effects as much as possible.

B. Scope

This plan provides direction to local government and private/nonprofit agencies within Burleigh County that are involved in preparing for and responding to a flood event. Each agency is responsible for planning how they will fulfill their task/responsibility:

- To provide for the timely and orderly response in Burleigh County when it is determined that such action is the most effective means available for protecting the public, and

- To assign responsibilities to specific agencies; and

- To ensure a coordinated effort using the Incident Command System (ICS) by local, state, and federal government, as well as private response forces, to save lives and to protect property and the environment in a flood event.

C. Legal Basis

Legal authorities outlined in the Burleigh County Emergency Operations Plan apply to this annex.

D. Planning Assumptions

The following assumptions provide the foundation for this annex:

- On an annual basis, the County may experience some level of flooding due to riverine or flash flooding.
- Floods take many forms and vary significantly in size, strength, intensity, duration and impact and may occur on several separate river/creek systems at the same time.
- Floods may escalate to a catastrophic event paralyzing municipalities and rural areas for several days by shutting down transportation routes, an inability of local emergency services to respond to calls for assistance, and extended periods of inaccessibility to basic needs.
- Floods may impact animal safety resulting in catastrophic losses for producers.
- Most floods occur gradually with advance warning, enabling first responders to pre-plan and pre-position resources.
- Floodwaters may isolate farmsteads and communities for many days as floodwaters slowly recede.
- The formation of ice jams may occur and create highly localized flooding with rapidly rising water levels on riverine systems.

II. Mission

The primary mission of local government and private/nonprofit agencies assigned responsibility in the Flood Annex is to coordinate and make available resources in support of local governments to minimize the impact of a flood on people, property, and the environment.

III. Execution

This annex is in effect when Burleigh County Emergency Management, in collaboration with other County Departments and the National Weather Service, determines an imminent threat of flooding poses a risk to public health and safety, property, and livestock, or actual flooding is occurring.

- The Burleigh County Emergency Manager will then notify the Burleigh County Commission and activate the Emergency Operations Center.

- The Burleigh County Emergency Manager or designee will notify the State Emergency Operations Center.

A. General

The ND Department of Emergency Services categorizes emergency management activities into three operational phases, which often occur concurrently: Phase 1—Prevention, Mitigation and Preparedness; Phase 2—Response; and Phase 3—Recovery. Local responses to a flood event may encompass all three phases.

B. Concept of Operations

The Burleigh County Emergency Operations Plan, of which this annex is a part, will guide local government emergency/disaster operations in relation to a flood event with support from private/nonprofit agencies.

National Weather Service flood outlooks, watches and warnings provide advance knowledge thereby affording local responders the ability to pre-position resources (i.e. equipment, sandbags, distribution points, steamers, generators and pumps) and evaluate potential shortages. The Emergency Manager will coordinate assistance requests beyond mutual aid with the North Dakota Department of Emergency Services. Flash flooding often comes without advanced warning and does not allow for pre-positioning of resources; however, assistance will be coordinated the same as flood events preceded by advance warning.

In addition to responsibilities outlined in the Burleigh County Emergency Operations Plan, specific agency tasks during a flooding event are based on operational phases as follows:

Phase 1—Prevention, Mitigation, Preparedness

(Task/Responsibility listed by agency)

All Entities

Monitor developing or current flood forecast, weather conditions and report preparedness and pre-positioning activities to Burleigh County Emergency Management.

Review agency responsibilities, flood preparedness plans and resources; and evaluate capabilities to support flooding operations and provide updates to the Burleigh County Emergency Management.

Coordinate news releases in collaboration with lead and support agencies through the Public Information Officer (PIO) or Joint Information Center (JIC) to ensure a one message, many voices concept.

Alert staff and appropriate stakeholders of impending flood and weather conditions and preparedness activities.

Prepare to support extended work day requirements.

Test and maintain communications capabilities.

Burleigh County Water Resource District

Monitor river stage, stream flow conditions and weather forecasts and coordinate with the Emergency Operations.

Prepare to provide technical support to local officials in support of preparation for flood fighting and recovery efforts.

Chaplaincy

Prepare to coordinate delivery of food and hydration to field operations.

Combined Communications

Prepare to provide voice and data public safety communications to first responders.

Prepare to relay critical information via telephone, radio, automatic notification system, and other methods.

Emergency Management/Emergency Operations Center

Assist Public Information Officer in maintenance of media contact information.

Maintain aviation resource contacts for aerial reconnaissance and damage assessment needs.

Maintain a listing of pet and livestock shelters in coordination with the Extension Service and Emergency Management.

Monitor weather outlooks, watches and warnings that may impact flood incidents and disseminate information to stakeholders.

Fire Department

Maintain awareness of the emergency snow routes which may be utilized as evacuation routes.

Maintain awareness of road closures/openings and/or establishment of alternate routes.

Prepare to assist with evacuations and search and rescue operations.

Geographic Information Systems (GIS)

Prepare to develop event-based maps for:

- Inundated areas
- Road closures
- Alternate emergency routes

Highway Department/Public Works

Maintain current listing and map of emergency snow routes which may be utilized as evacuation routes.

Monitor creek/river levels.

Prepare to pre-position equipment and provide increased support to areas of potential flood impact or relocate resources to impacted areas.

Prepare to support flood preparation, response, and recovery operations, as necessary (i.e. material hauling, dike maintenance, pumps, generators, barricades, etc.) Pre-identify materials for levees and ensure adequate supply of sandbags and other materials.

Prepare to coordinate with the Burleigh County Sheriff's Department to determine the need for road closures/openings and relay information to the Emergency Operations Center. Coordinate listing of road closures/openings on the Burleigh County Website.

Prepare to provide emergency signs, regulatory devices and barricades, as well as identify alternate traffic routes.

Prepare to provide assistance with debris removal and road repairs as needed.

Inspections

Review plans and forms for inspections of affected areas.

Prepare to provide technical assistance regarding power restoration and status reports.

Prepare to coordinate with homeowners, electrical companies, electrical engineers, and power supply companies regarding outages.

Prepare to provide assistance to restore the potable water supply and waste water disposal systems.

Prepare to provide technical assistance to licensed Plumbing Contractors and home owners regarding procedures for prevention of waste water backup and water service shut-off to prevent cross connection.

Public Health/Environmental Health

Prepare to provide technical assistance to ensure safe drinking water in the event of an emergency or disaster which may have resulted in bacteriological or chemical contamination.

Prepare to provide coordination for the delivery of safe (potable) alternate water supplies and temporary water systems.

Prepare to provide information on Carbon Monoxide poisoning, food safety, immunizations, and any other health risk associated with floods.

Prepare to provide technical assistance to assure safe and sanitary disposal of household refuse and wastewater in the event of a flood, procedures for utility shut-offs, and prevention of wastewater backup.

Prepare to serve as a liaison with health care providers and provide technical assistance to local first responders.

Review and update plans for coordination of response to:

- Mass fatalities and mortuary services;
- Environmental remediation; and
- Follow-up care to individuals impacted by the incident.

Prepare to assist healthcare facilities with such needs as backup power, relocation of patients and medical supply needs.

Prepare to request and coordinate supplemental medical personnel through the Emergency System for Advance Registration of Volunteer Health Professionals (ESAR-VP) system.

Prepare to coordinate the evacuation and sheltering of patients with medical needs.

Public Information Officer

Assist Emergency Manager in maintenance of media contact information.

Review/develop canned messages.

Review press release template.

Prepare to develop and maintain talking points.

Prepare for press briefing/conferences.

Red Cross

Prepare to coordinate with voluntary agencies to provide shelters and provisions for evacuated people.

Prepare to deliver essential items (ex. food, water, medicine) to isolated and/or special needs populations in coordination with Salvation Army, Public Health, and Social Services.

Prepare to coordinate delivery of mental health services and other assistance programs.

Work with Extension Office in maintaining relationship/listing of animal care facilities, veterinarians, and shelters for animals (pets and farming).

Salvation Army

Prepare to deliver essential items (ex. food, water, medicine) to isolated and/or special needs populations in coordination with Red Cross, Public Health, and Social Services.

Sheriff's Department/Law Enforcement

Maintain awareness of the emergency snow routes which may be utilized as evacuation routes.

Prepare to execute road closures/openings and/or establishment of alternate routes based on analysis from the Burleigh County Highway Department.

Prepare to establish traffic control on main roadways.

Prepare to assist with evacuations and search and rescue operations.

Preserve law and order.

Phase 2—Response

(Task/Responsibility listed by agency)

All Entities

Assist in warning the public.

Collect, evaluate, document and disseminate documents necessary to support incident response.

Ambulances

Coordinate medical triage at incident scene.

Coordinate incident scene decontamination procedures with fire department as necessary.

Communicate and coordinate with local hospitals for treatment.

Burleigh County Water Resource District

Analyze river stage, stream flow conditions and weather forecasts and coordinate with the Emergency Operations Center regarding identification of potential flood impact areas or imminent water retention structure failure.

Provide technical support to local officials in support of flood fighting and recovery efforts.

Chaplaincy

Assist Public Health, Red Cross, and Social Services to provide disaster mental health counseling and critical incident stress debriefings as needed.

Combined Communications

Broadcast emergency information on the Emergency Alert System and/or automatic notification system.

Emergency Management/Emergency Operations Center

Analyze weather outlooks, watches and warnings that may impact flood response and disseminate information to stakeholders.

Activate the Emergency Operations Center as necessary.

Coordinate local resources assigned to assist with response and recovery efforts.

Assess incident impacts, coordinate resource needs and response and recovery efforts with EOC personnel.

Provide liaison with state, federal, local, private and volunteer organizations.

Collect, evaluate, document and disseminate information necessary to support incident response.

Coordinate with Public Information Officer to establish a Joint Information Center as necessary.

Emergency Management/Emergency Operations Center (cont.)

Assist Public Information Officer with the following:

- Disseminate emergency information to the public (safety precautions, road closures, evacuation routes, and any additional actions).
- Provide updates as appropriate.
- Schedule media conferences as necessary.

Request aviation support for aerial reconnaissance and damage assessment needs as necessary.

Extension Service

Provide guidance in regard to animal welfare issues (ex. feeding, disposal, medical care, etc.) in coordination with local veterinarians and emergency management.

Coordinate shelters or re-location areas for livestock and pets.

Coordinate emergency feed distribution for livestock with the ND Department of Agriculture.

Provide guidance to producers.

Fire Departments

Maintain awareness of road closures/openings and/or establishment of alternate routes.

Maintain on-scene control and perimeter.

Coordinate incident scene decontamination procedures with the ambulances as necessary.

Assist Sheriff's Department in designation of evacuation routes.

Ensure fire security in evacuated areas.

Perform search, rescue and evacuation in the immediate vicinity of the incident.

Geographic Information System (GIS)

Develop event based maps for:

- Inundated areas
- Road closures
- Alternate routes
- Evacuated areas

Maps to be utilized for press briefings/conferences and to be posted on the website.

Highway Department/Public Works

Monitor creek/river levels.

Pre-position equipment and provide increased support to areas of potential flood impact or relocate resources to impacted areas.

Support flood preparation, response, and recovery operations, as necessary (i.e. material hauling, dike maintenance, pumps, generators, barricades, etc.).

Coordinate with the Burleigh County Sheriff's Department to determine the need for road closures/openings and relay information to the Emergency Operations Center. Maintain listing of road closures/openings on the Burleigh County Website.

Highway Department/Public Works (cont.)

Provide emergency signs, regulatory devices and barricades, as well as identify alternate traffic routes.

Provide assistance with debris removal and road repairs, as needed.

Provide survey documentation of the flood event (i.e. high water marks, road failures, etc.) to assist in developing future response efforts.

Inspections

Provide power outage and repair status reports to the Emergency Operations Center.

Be prepared to coordinate with homeowners, electrical companies, electrical engineers, and power supply companies regarding outages.

Provide assistance to restore the potable water supply and waste water disposal systems.

Provide technical assistance to licensed Plumbing Contractors and home owners regarding procedures for prevention of waste water backup and water service shut-off to prevent cross connection.

Public Health/Environmental Health

Provide information on Carbon Monoxide poisoning, food safety, immunizations, and any other health risk associated with floods.

Provide coordination for the delivery of safe (potable) alternate water supplies and temporary water systems.

Provide technical assistance to ensure safe public and private drinking water supplies and waste disposal.

Provide technical assistance to assure safe and sanitary disposal of household refuse and wastewater in the event of a flood, and procedures for utility shut-offs and prevention of wastewater backup.

Serve as a liaison with health care providers and provide technical assistance to local first responders.

Coordinate response to:

- Mass fatalities and mortuary services;
- Environmental remediation; and
- Follow-up care to individuals impacted by the incident.

Assist healthcare facilities with backup power, relocation of patients, and medical supply needs.

Coordinate the request for supplemental medical personal through the Emergency System for Advance Registration of Volunteer Health Professionals (ESAR-VP) system

Coordinate the evacuation and sheltering of patients with medical needs.

Assist Chaplaincy, Red Cross, and Social Services to provide disaster mental health counseling and critical incident stress debriefings as needed.

Assist with Red Cross, voluntary agencies, and Social Services to provide shelters and provisions for evacuated people.

Assist with delivery of essential items (ex. food, water, medicine) to isolated and/or special needs populations in coordination with Red Cross, Salvation Army, and Social Services.

Public Information Officer

Disseminate emergency information advising the public of safety precautions, possibility of evacuation, appropriate routes, and any additional actions.

Provide updates as appropriate.

Schedule media conferences as necessary.

Red Cross

Coordinate with voluntary agencies, Public Health, and Social Services to provide shelters and provisions for evacuated people.

Coordinate delivery of essential items (ex. food, water, medicine) to isolated and/or special needs populations in coordination with Salvation Army, Public Health, and Social Services.

Assist Chaplaincy, Public Health and Social Services to provide disaster mental health counseling and critical incident stress debriefings as needed.

Establish pet and livestock shelters in coordination with the Extension Service and Emergency Management.

Sheriff's Department/Law Enforcement

Determine the need for road closures/openings and/or establishment of alternate routes based on analysis from the Burleigh County Highway Department.

Conduct traffic control on main roadways as necessary.

Assist with evacuations, search and rescue operations, and or extraction of stranded people.

Preserve law and order.

Social Services

Assist Chaplaincy, Public Health and Red Cross to provide disaster mental health counseling and critical incident stress debriefings as needed.

Assist with Red Cross, voluntary agencies, and Public Health to provide shelters and provisions for evacuated people.

Assist with delivery of essential items (ex. food, water, medicine) to isolated and/or special needs populations in coordination with Red Cross, Salvation Army, and Public Health.

States Attorney

Provide technical assistance to the Emergency Operations Staff with interpretations of related legal issues.

Other Agencies

Provide support within the scope of agency services including, but not limited to, the following:

- Informational support to the Joint Information Center (JIC).
- Continuity of operations and continuation of essential services.

Phase 3—Recovery
(Task/Responsibility listed by agency)

Burleigh County Water Resource District

Assist community in developing floodplain management capabilities pursuant to the National Flood Insurance Program.

Provide technical and/or cost-share assistance with recovery or water restoration control projects, such as rebuilding dikes, irrigation projects, bank stabilization, channel repair, dikes and dams, etc.

Provide coordination with State and Federal agencies related to possible assistance in restoration of water resource facilities.

Chaplaincy

Assist Red Cross, Public Health, and Social Services to provide disaster mental health services and monitoring as necessary.

Emergency Management/Emergency Operations Center

Assist Public Information Officer in the dissemination of information regarding re-entry process.

Coordinate disaster recovery programs with the ND Department of Emergency Services.

Coordinate resources assisting with recovery efforts.

Assist with coordination of tasks required to provide unmet needs response to impacted urban and rural residents not meeting standard disaster relief/recovery criteria.

Extension Service

Determine eligibility for federal agricultural relief programs and coordinate as necessary with ND Department of Agriculture.

Fire Departments

Assist Sheriff's Department to ensure evacuated areas are safe for re-entry.

Assist Highway Department with debris removal.

Geographic Information System (GIS)

Develop maps of:

- Damage assessment project sites and impact areas

Highway Department/Public Works

Assist with damage assessment.

Repair damaged infrastructure.

Support local cleanup, and recover emergency signs, regulatory devices and barricades.

Continue pumping of inundated areas to protect critical infrastructure.

Public Health/Environmental Health

Provide support as needed with environmental remediation to include assessment of impacts to:

- Municipal drinking water and waste water facilities;
- Waste management operations;
- Water quality – surface and ground water contaminates; and
- Hazardous materials storage sites and controls.

Support efforts to provide follow-up health care to individuals impacted by the incident.

Provide enhanced surveillance measures.

Coordinate the repatriation of patients and residents with medical needs to their normal health and medical care systems.

Assist Red Cross, Chaplaincy, and Social Services to provide disaster mental health services and monitoring as necessary.

Public Information Officer

Disseminate information regarding re-entry process.

Red Cross

Assist in the transportation needs of shelter evacuees returning to their homes.

If homes have been damaged, determine the long-term housing requirements.

Provide clean-up kits and volunteer assistance.

Assist Chaplaincy, Public Health, and Social Services to provide disaster mental health services and monitoring as necessary.

Sheriff's Department/Law Enforcement

Ensure evacuated areas are safe for re-entry.

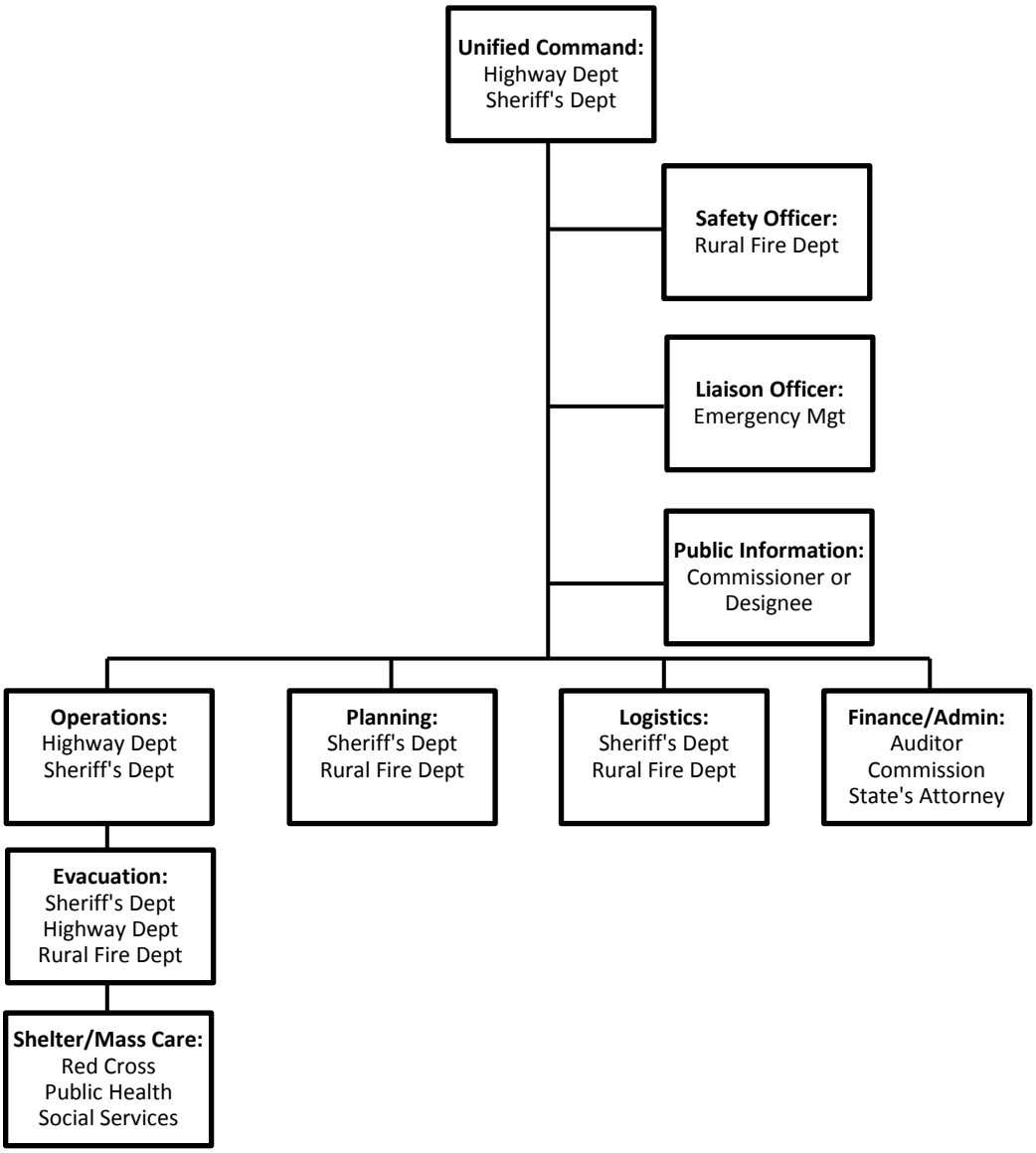
Establish traffic control for return of evacuees.

Assist Highway Department/Public Works in recovering barricades and any other barriers utilized.

Social Services
Assist Chaplaincy, Public Health, and Red Cross to provide disaster mental health services and monitoring as necessary.
Other Agencies
Provide support within the scope of agency services including, but not limited to: • Damage assessment • Cleanup efforts • Disaster relief programs

IV. Command and Control

Initial command and control will be local with on-scene incident command. Further guidance will be provided upon dispatch order. The Emergency Operations Center, as configured in the organizational chart below, will coordinate local requests for assistance with the appropriate agencies.



Note: Agencies within the incident command structure may vary based on the event.

V. Communications

Communications outlined in the Burleigh County Emergency Operations Plan apply to this annex.

VI. Media Release Information

Flood Alert
Residents between/or in the area of _____ need to prepare for potential flooding. Please consider proactive measures such as sandbagging and moving items from basements to higher levels.

Evacuation—Voluntary
A voluntary evacuation for your area has been requested. Residents in the _____ area are strongly encouraged to evacuate as a precautionary measure due to the rising waters and unpredictable nature at this time.

Evacuation— Mandatory (*effective August 1, 2013*)
A mandatory evacuation has been ordered by the Burleigh County Commission. Flooding is presenting a significant risk to life. Evacuate immediately.

Re-Entry
Emergency Management is announcing that all of the _____ areas will be open at _____.

Only residents and legitimate contractors will be allowed in the area. Be prepared to show proof of residency or contractor identification.

A checkpoint has been established at _____.

American Red Cross will have clean-up kits available at _____. If you are not current, within the last ten years, with a tetanus immunization and experiencing any cuts or wounds, see your local physician or local Public Health Unit.

Roads Closed
The Burleigh County Highway Department has a large number of roads that are closed and/or barricaded. There is a high probability of future road closures to include: _____. Emergency services are compromised due to the number of road closures.

Residents are advised to exercise extreme caution when travelling in rural Burleigh County. **Do not drive into areas where water tops the roadway!** Citations will be issued to anyone who travels on a closed road or bypasses barricades.

Roads Remain Closed
_____ will remain closed until further notice. Water is off the road making the road appear safe for travel; however, engineers have observed structural failures. Thorough inspection and repairs will take place after water recedes completely away from the road.

Again, _____ remains closed until further notice.

VI. Media Releases (cont.)

Sandbag Disposal
The following site has been established for residents to drop off their unneeded sandbags.

Location:
Map/Directions:

Local officials are very appreciative of the volunteerism and teamwork involved to fill and place the sandbags.

Sandbagging Operation—Indoor
Burleigh County has made sandbags and sand available for citizens experiencing residential flooding. Please bring your own work gloves and shovel. The operations start _____ and will run until _____.

Location:
Time:
Cost: Free (citizen fills bag with sand provided)

Sandbagging Operation—Outdoor
Burleigh County has made sandbags and sand available for citizens experiencing residential flooding. Please bring your own work gloves and shovel. The operations start _____ and will run until _____.

Location:
Time:
Cost: Free (citizen fills bag with sand provided)

Sandbags
Sandbags are available for pickup at _____ on a 24/7 basis and will also be available at _____.

Travel Advisory
Burleigh County officials want to make citizens aware of potentially dangerous rural road conditions. Due to snow melt, various county and township roads have water flowing over them. **Do not drive into areas where water tops the roadway!**

The Burleigh County Highway Department is barricading the most severe roads; however, water over the road can cause a washout at any time. Residents are urged to take extreme care, especially when driving at night.

VI. Media Releases (cont.)

Volunteers
Volunteers are being requested to help fill sandbags. You must be 18 years of age or older.

Volunteers are being asked to park at _____ and enter door _____ to register and receive instructions. Please wear work clothes and bring gloves.

VII. Resources

The Incident Commander will evaluate local assets and determine additional resource requirements in coordination with the Emergency Operations Center. The Burleigh County Emergency Operations Plan contains a Resource Section for equipment and services which will assist in providing resources in the most expedient means possible.

The Incident Commander will coordinate needs with the Emergency Operations Center. After local resources and mutual aid have been exhausted, resources will be requested from the State.

Local agencies should support both internal and external resource needs during an emergency. The following is a summary of logistical support based on the Emergency Support Functions (ESFs):

ESF 1 – Transportation: Each agency will support the transportation needs of its employees through agency vehicle resources.

ESF-2 – Communications: Each agency will support the communications needs of its agency through radio, cellular, landlines, WebEOC, internet and other means of communications. Agencies with internal communications will support their own requirements. Bismarck/Burleigh Combined Communications is responsible for maintenance and repair of infrastructure equipment and tower sites.

ESF 3 – Public Works and Engineering: Public works and engineering agencies will provide support for signage and road blocks. Other areas of support include debris removal and maintenance of ingress and egress for first responders.

ESF 4 – Firefighting: Initial firefighting operations remain the responsibility of local responders and will follow normal local protocol.

ESF 5 – Emergency Management: Each agency assigned responsibility in the Emergency Operations Plan should provide periodic updates to the Emergency Operations Plan to ensure timely, accurate information is processed immediately.

ESF 6 – Mass Care, Housing and Human Services: When required, local shelters in accordance with local plans will be used as the first level of response. Local and voluntary organization resources will be used based upon availability.

ESF 7 – Resource Support: Agencies requiring resources not readily available through the local incident command system, should contact the Emergency Operations Center.

ESF 8 – Public Health and Medical Services: Local assets will be used based on availability and will follow local protocols.

ESF 9 – Urban Search and Rescue: Initial search and rescue operations will be the responsibility of local responders and follow local protocols.

ESF 10 – Oil and Hazardous Materials Response: Any agency representative encountering a hazardous material must report the situation to the Bismarck/Burleigh Combined Communications Center (911 center).

ESF 11 – Agriculture and Natural Resources: Agencies will be required to subsist on the local economy until such time central feeding locations are secured by the Incident Commander.

ESF 12 – Energy: Agencies are responsible for securing their own fuel supplies.

ESF 13 – Public Safety and Security: Local public safety and security resources may be required to support traffic control, security, law enforcement liaison and criminal investigation efforts, as well as assist with evacuation, at the request of the local Incident Commander.

> **Safety is paramount.** Each agency is encouraged to secure a Safety Officer for the conduct of operations.

ESF 14 – Long-Term Community Recovery and Mitigation: Local support will be coordinated through the ND Department of Emergency Services' Recovery Section.

ESF 15 – External Affairs: Agencies responding to the incident are required to coordinate media inquiries with the Public Information Officer. Follow your agency PIO protocols for inquiries specific to your agency.

Appendix 1: Flood Category Definitions

Action Stage: The stage which, when reached by a rising stream, represents the level where the National Weather Service or a partner/user needs to take some type of mitigation action in preparation for possible significant hydrologic activity.

Flood Categories: Terms defined for each forecast point which describe or categorize the severity of flood impacts in the corresponding river/stream reach. Each flood category is bounded by an upper and lower stage. The severity of flooding at a given stage is not necessarily the same at all locations along a river reach due to varying channel/bank characteristics or presence of levees on portions of the reach. Therefore, the upper and lower stages for a given flood category are usually associated with water levels corresponding to the most significant flood impacts somewhere in the reach.

Minor Flooding: Minimal or no property damage, but possibly some public threat.

Moderate Flooding: Some inundation of structures and roads near stream. Some evacuations of people and/or transfer of property to higher elevations.

Major Flooding: Extensive inundation of structures and roads. Significant evacuations of people and/or transfer of property to higher elevations.

Record Flooding: Flooding which equals or exceeds the highest stage or discharge at a given site during the period of record keeping.

Note: All three of the lower flood categories (minor, moderate, major) do not necessarily exist for a given forecast point. For example, at the level where a river reaches flood stage, it may be considered moderate flooding. However, at least one of these three flood categories must start at flood stage.

Source: National Weather Service website

Appendix 2: Apple Creek

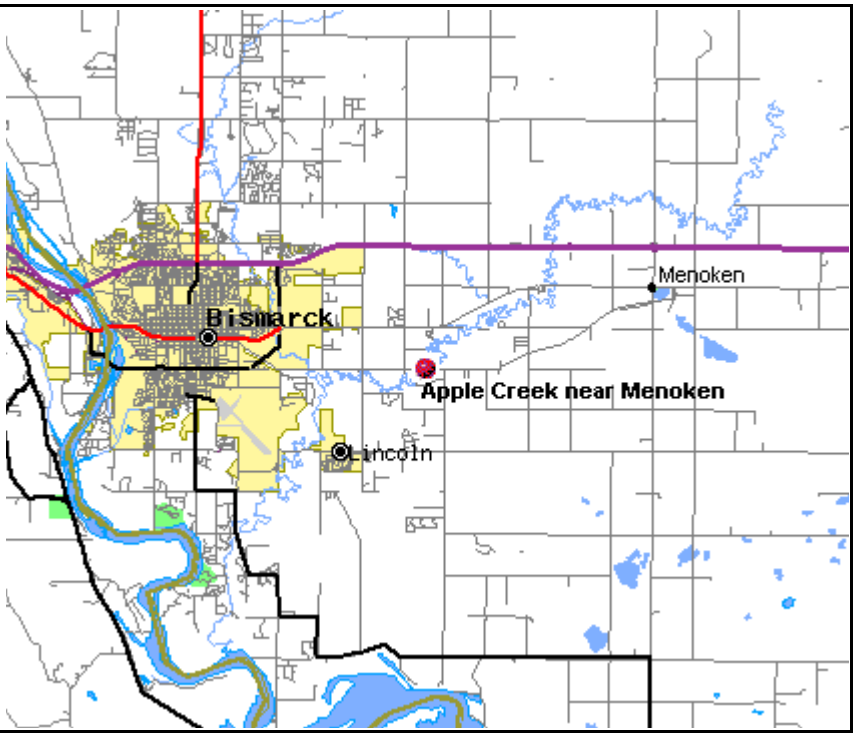
Apple Creek 6W at Menoken

Flood Categories (in feet)

Major Flood Stage:	17
Moderate Flood Stage:	16
Flood Stage:	15
Action Stage:	13

Historical Crests
(1) 17.46 ft on 04/19/1979
(2) 17.07 ft on 04/18/1950
(3) 16.96 ft on 03/27/1997
(4) 16.80 ft on 03/23/1987
(5) 16.68 ft on 04/10/1969

Low Water Records
(1) 2.0 ft on 08/25/1946



Flood Impacts

17.0 Historically speaking, an ice jam near the confluence of Apple Creek and the Missouri River created flood damage for many houses and Prairie Rose Elementary School and backed water up to a stage of 17 ft at the gage. Flooding not related to an ice jam does inundate Lincoln Road and a smaller number of homes.

16.0 Large amounts of farmland floods. Houses near Apple Creek become threatened. Apple Creek road becomes covered with water about 100 feet west of bridge.

15.3 Old Highway 10 or Apple Creek Road starts to flood.

15.0 Water floods low lying area in the immediate vicinity of creek.

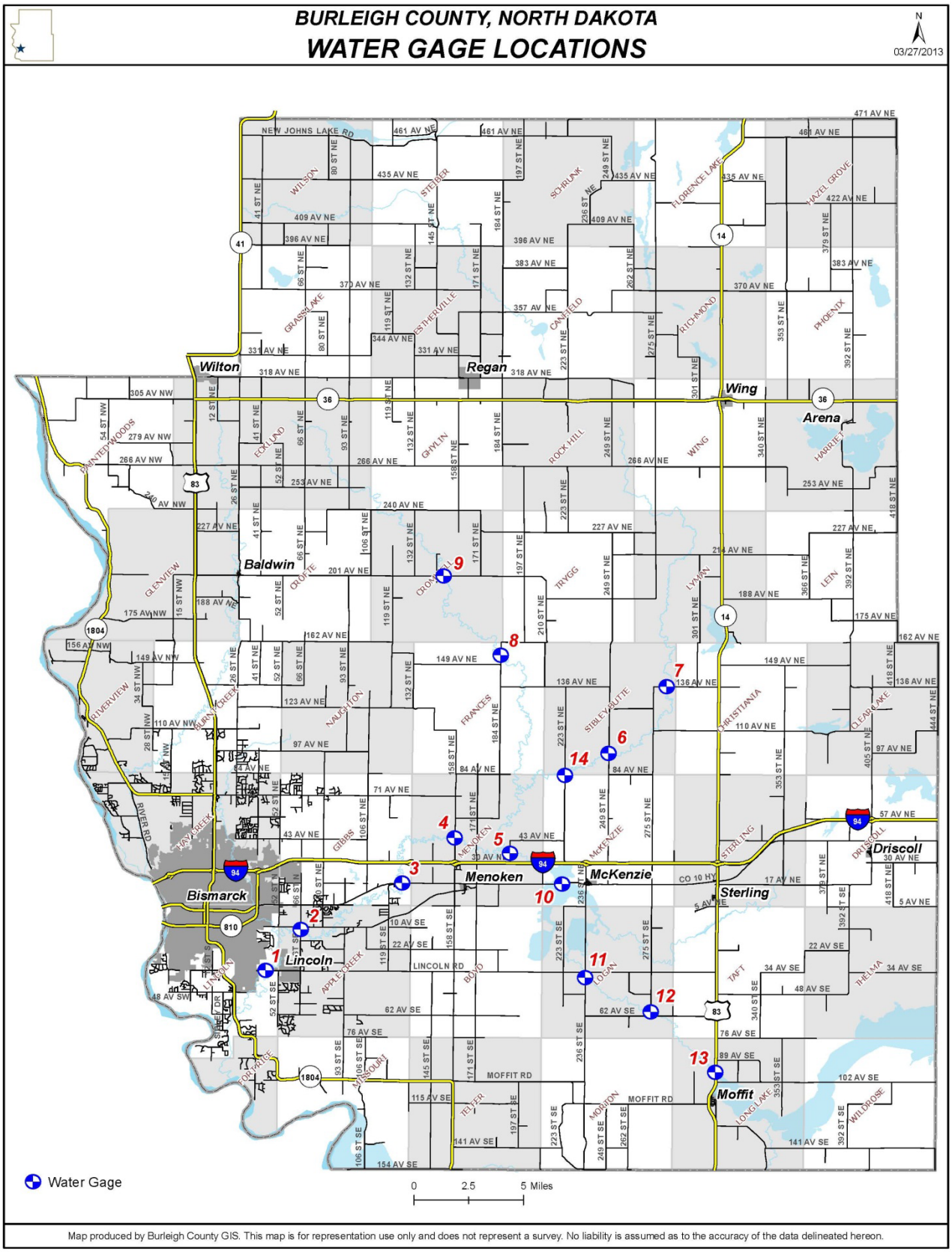
13.0 Upstream of gage, township roads become water covered when the gage is 13-15 feet.

Source: National Weather Service website

Apple Creek Stages and Response

Stage	Response Action	Potential Impacts
Beyond local capability	All is handled locally unless the Missouri River is frozen	
Spring Flood Outlook	Dependent upon outlook: • Pre-fill and stage sandbags • Indoor sandbag operation • Outdoor sandbag operation • Community Watch Program (review accessibility and function of marked water gage areas) • Consider Corps of Engineers request for technical assistance	
13' – Action Stage	Periodic visual patrols and gage monitoring. Consider aerial reconnaissance. Key personnel alerted and information disseminated.	Below bank full conditions
13-15'	Possible pre-staging of sandbags. Prepare evacuation notices.	The creek is rising to its natural banks, but has not spilled over into the floodplain. There may be some limited flooding in unprotected areas.
15' – Flood Stage, Minor Flooding	Emergency Operations Center activated. Barricades/road closure signs placed. Publicize road closures. Possible evacuation notices.	The Creek has risen beyond its banks. Some low lying farmland and roads are inundated. Apple Creek Road starts to flood, 80th St SE, 158th St NE, water floods low areas near the Creek (no properties threatened—just access)
16' – Moderate Flood Stage	Monitor bank erosion and areas of seepage/boils monitored and repaired as necessary. Possible evacuation notices.	The Creek has generally widened into the floodplain. 66th St SE/Apple Creek Road floods and 119th St SE
17' – Major Flood Stage	Final evacuation notices.	Homes in lower Falconer Estates Subdivision threatened (have water around them), Apple Creek Golf Course is flooded, Apple Valley Cooperative, Lagoon is in floodway and is no longer accessible, though not flooded.
17.16'		2009 crest
17.46' Record Flood		Creek is at the level of the flood of record in 1979.

Apple Creek Staff Gage Locations



Burleigh County Hwy Dept Water Gaging Stations

February 2010

Staff 1: Located on Lincoln Road, approximately ½ mile east of Yegen Road, at the Apple Creek bridge. The gage location is on the north side of road on the first power pole west of bridge. The reading on this gage simply indicates a rise or fall of the creek level at that location.

Staff 2: Located on 66th St SE, just south of Apple Creek Road, at the Apple Creek Bridge. The gage location is on the inside of the NE wing wall. The reading on this gage simply indicates a rise or fall of the creek level at that location.

Staff 3: Located approximately 6 ½ miles east of Bismarck on Hwy 10 at the Apple Creek Bridge. The gage location is on the upstream side on the NE wing wall. It can be read the easiest from the opposite NW wing wall. The reading on this gage simply indicates a rise or fall of the creek level at that location. Most of the major tributaries are above or upstream from this location. Generally speaking there is not a significant amount of additional water entering Apple Creek past this location, with the exception of Hay Creek. However in a typical thaw Hay Creek is much faster to crest and the major flush should be mostly over, or at a minimum see the significant water flows decreasing enough not to make a significant impact on the Apple Creek levels below this location.

Staff 4: Located on 158th St NE, approximately 1 mile north of the 1-94 interchange at Menoken. The gage location is on the east side of road on the third power pole to the south of the bridge. The reading on this gage simply indicates a rise or fall of the creek level at that location. This is the first gage after the confluence of the east & west branches, however there are still some fairly major tributaries yet to dump into the creek downstream from this location.

Staff 5: Located on 191st St NE, approximately ½ mile north of 30th Ave NE, and is often referred to as the "Maher Box". The gage location is on a railroad tie corner post just SW of box culvert. This is a unique location because the water will run in both directions. If the water is pushing east, this indicates that Apple Creek is on the rise and the McKenzie slough elevation is lower and will absorb extra water or store it, and that's a good thing. If the water is pushing west, that means that Apple Creek may be falling to a point low enough that the McKenzie slough will drain back into the creek. It may also indicate a push coming from the Long Lake area into McKenzie Slough.

Staff 6: Located on 249th St NE, approximately 5 miles north of 30th Ave NE, or 1-94. It is also referred to as the McKenzie haul road. This gage is located on the East side of the road on the first corner post in the fence line south of the box culvert. This location is on the lower east branch of Apple Creek. The reading on this gage simply indicates a rise or fall of the creek level at that location.

Staff 7: Located on 136th Ave NE, approximately ½ mile east of 27Sth St NE, it is commonly referred to as the Patterson Ranch Bridge. The gage is located on the NE wing wall and can be best seen from the NW wing wall. This location is on the upper east branch of Apple Creek. The reading on this gage simply indicates a rise or fall of the creek level at that location.

Staff 8: Located on 184th St NE, approximately ½ mile north of 140th Ave NE, it is commonly referred to as the Harold McCormick Bridge. The gage is located on the west side of the road on a corner post just south of the bridge. This location is towards the lower west branch of Apple Creek. The reading on this gage simply indicates a rise or fall of the creek level at that location.

Staff 9: Located on 201" Ave NE (the Baldwin Road) approximately ½ mile east of 145th St NE, it is commonly referred to as the Doug Schonert Bridge. The gage is located on the NE wing wall and can be best seen from the NW wing wall. This location is on the upper west branch of Apple Creek. The reading on this gage simply indicates a rise or fall of the creek level at that location.

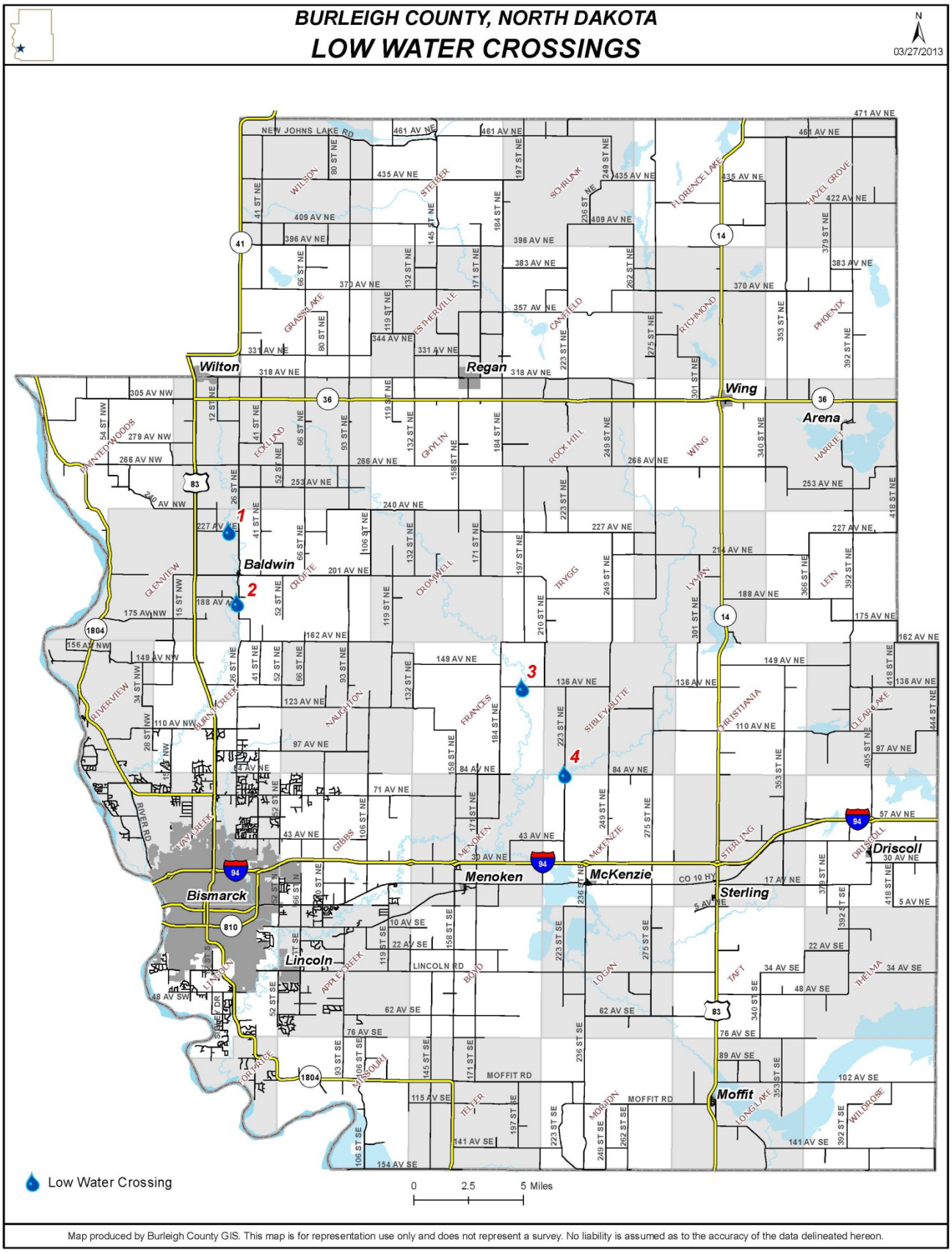
Staff 10: This staff gage is located on County Hwy 10 approximately 1 mile west of the town of McKenzie. The gage is located on the north side of the road, on the first tree west of the box culvert. The reading on this gage simply indicates a rise or fall of the slough level at that location. In addition one should note the water direction through the box culvert at this location. Flow to the north would indicate either a drop in the levels of Apple Creek allowing the slough to begin dumping water into that system, or it could also indicate a strong push of water from the Long Lake area. Water flowing to the south would indicate Apple Creek is still dumping (storing) water in the McKenzie Slough and the slough levels low enough to allow this. Either way all of the Slough water will drain into Apple Creek at some point. Monitoring the other gaging sites would provide clarity as to what exactly is going on.

Staff 11: Located on 236th St SE, approximately 1/4 mile south of 34th Ave SE (Lincoln Road), it is commonly referred to as the Wade Anderson Bridge. The gage is located on the west side of the road just south of the bridge on a power pole. This location is on the Long Lake Creek just before it dumps into the McKenzie slough. This water usually pushes up from Long Lake. The reading on this gage simply indicates a rise or fall of the creek level at that location.

Staff 12: Located on 27Sth St SE, approximately 1/4 mile north of 62nd Ave SE, it is commonly referred to as the Adams Bridge. The gage is located on the east side of the road just north of the bridge on a railroad tie corner post. This location is on the Long Lake Creek. This water usually pushes up from Long Lake and dumps into McKenzie Slough. The reading on this gage simply indicates a rise or fall of the creek level at that location.

Staff 13: Located on Hwy 83, approximately ½mile north of 102nd Ave SE, or just north of the Moffit County Shop. The gage is located on the west side of the road just south of the bridge on a power pole near the right of way. This location is the 1st location on Long Lake Creek. This water usually pushes up from Long Lake and dumps into McKenzie Slough. The reading on this gage simply indicates a rise or fall of the creek level at that location.

Appendix 3: Low Water Crossings



Low Water Crossings within Burleigh County
(County and Township Road Systems)

February 2010

Location 1: 227th Ave NE, approximately ½ mile west of 26th St NE. This is on a Glenview Township roadway that crosses the northern reaches of Burnt Creek. This is the first major road crossing of the creek towards the north and has a paved overflow section. It is closed for a short period of time nearly every spring and after heavy rain fall events. All residential traffic is generated on the west side of the crossing and accesses from US Hwy 83 to the west during road closures. No residents live between the crossing and 26th St NE. Any traffic approaching from the east is easily detoured north & south on 26th St NE.

Location 2: 188th Ave NE, just west of 26th St NE. This is on a Glenview Township roadway that crosses Burnt Creek and has a paved overflow section. It is referred to as the Lenihan crossing. It is closed for a period of time nearly every spring and after heavy rain fall events. All residential traffic is generated on the west side of the crossing and accesses from US Hwy 83 to the west during road closures. Any traffic approaching from the east is easily detoured north & south on 26th St NE.

Location 3: 136th Ave NE, one mile east of 184th St NE. This is on a Burleigh County roadway and is located on the west branch of Apple Creek. It has a paved overflow section and is referred to as the Kershaw Crossing. Local residents live on the west side of the crossing and can be accessed from the west on 184'h St NE. Any traffic approaching from the east is easily detoured around to the north at a point one mile east of the crossing. No residents live in the mile east of the crossing. It is closed for long periods of time (more than 2 weeks) nearly every spring and after heavy rain fall events.

Location 4: 249th St NE, five miles north of 30th Ave NE. This is on a Sibley Butte Township roadway and is located on the east branch of Apple Creek. It has a paved overflow section and is referred to as the Bliss Crossing. Local residents live on the south side of the crossing and can be accessed from the south on 249th St NE. Any traffic approaching from the north is easily detoured around east or west on 136th Ave NE at a point four miles north of the crossing. No residents live on 249th St NE between the crossing and 136th Ave NE. It is closed for long periods of time (more than 2 weeks) nearly every spring and occasionally after heavy rain fall events.

Appendix 4: Missouri River

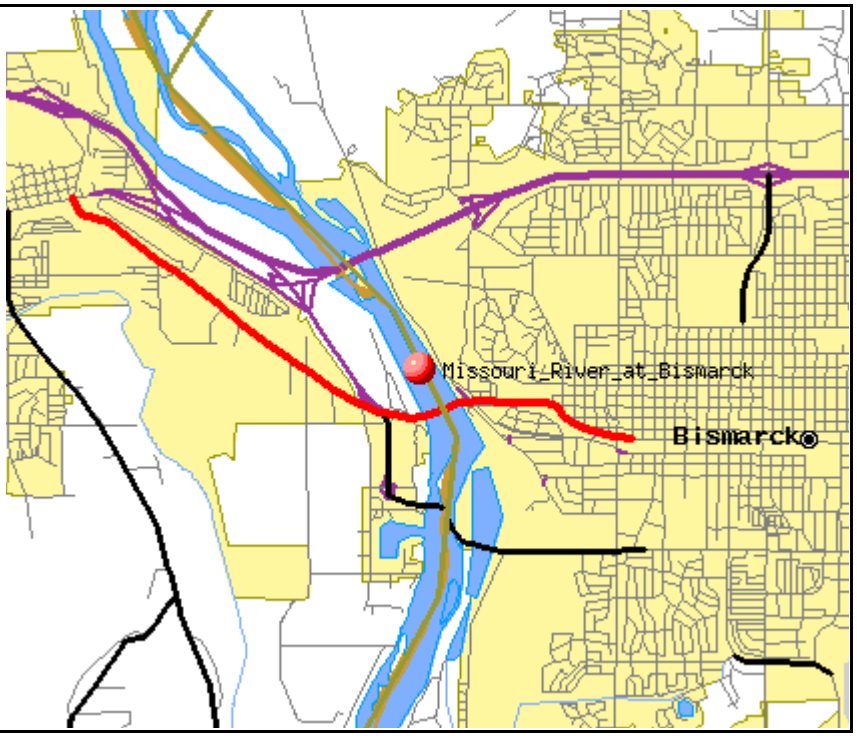
Missouri River at Bismarck

Flood Categories (in feet)

Major Flood Stage:	18
Moderate Flood Stage:	16
Flood Stage:	14.5
Action Stage:	12.5

Historical Crests
(1) 31.60 ft on 03/31/1883
(2) 31.10 ft on 01/01/1887
(3) 30.40 ft on 03/14/1910
(4) 27.90 ft on 04/06/1952
(5) 27.70 ft on 04/08/1897

Low Water Records
Currently none available.



Flood Impacts

22’	Significant number of homes and businesses on both sides of the river should be expected to flood if not protected.
20’	Water begins to appear on the lowest stretches of River Road north of Bismarck.
18’	Homes in the low-lying incorporated parts of Bismarck if not protected risk inundation.
17’	City of Bismarck experiences flooding of streets in low-lying areas if not protected. Access to Fox Island and other rural developments becomes increasingly difficult. Access to homes in the Briardale, Hoge Island, Ponderosa, and Misty Waters developments north of Bismarck may be cutoff and some homes are taking on water if not protected.
16’	Before 16 feet, older homes in the Fox Island area may experience flooding. Homes built to this level are at less risk but may have water surrounding them. Access to Fox island is difficult because of water on Riverwood Drive. No significant threat to the incorporated cities of Bismarck and Mandan.
14.5’	Flooding of rural areas begins. Inundation of croplands and the potential closure of local boat ramp access is likely. Riverbank erosion rates increase and cause unstable shorelines. If water levels are the result of an icejam south of Bismarck, water levels will be relatively higher near the jam and cause concerns for residents south of Fox Island.
12.5’	Unusually high river stage for this reach of the Missouri River. Residents are encouraged to pay close attention to NWS updates, local media, and local emergency management for information concerning why the river is this high and its potential for further rises.

Source: National Weather Service website

Missouri River Stages and Response

Ice Jam Scenario

Ice Jam	Response Action
Burleigh County	South of I-94: • Close Tavis Road Pump Control Structure (Page 24) and Mills Avenue Culvert (Page 20). • Plug culverts on Gallatin Loop and monitor Farwest Drive (Page 23). Plug culvert on Whisper Drive (Page 21). • Plug 12th Street Southeast approach culvert and driveway culvert to the west (Page 27). • Consider implementing ice dusting.

City of Bismarck (Page 30)	12' Stage at Bismarck Gage or a corresponding water surface elevation of 1631.5 NAVD 88 in south Bismarck
	• Ice Jam Alert: Issue a public announcement for potential flooding and prepare a call for sandbagging volunteers.
	• Close South Bismarck stormwater channel.
	  o Mobilize and start pumping west of Tatley Meadows at the drain ditch closure.
	  o One 10-inch pump will be rented and installed immediately after installation of the earthen plug is finished. This pump will control internal drainage behind the earthen plug until the river stage has receded allowing the earthen plug to be removed and the drain ditch to once again function normally.
	  o Additional pumps and plugs will be called for to provide additional pumping capacity as needed to control internal drainage
	• Mobilize equipment to haul and place fill at Mills Avenue and north closure of Southport Loop.
	
	14' Stage at Bismarck Gage or a corresponding water surface elevation of 1633.0 NAVD 88 in Southport Bay
	• Riverwood Drive
	  o The top of the existing Hesco Barriers along Riverwood Drive at the low point are approximately at elevation 1636.5 NAVD 88. This elevation is sufficient to prevent the overtopping of Riverwood Drive from an event similar to the 2009 ice jam north of Southport.
	  o To prevent overtopping of Riverwood Drive between the Southport Loop intersections, a small earthen levee will be constructed from the south end of the existing Hesco Barriers to the south intersection of Southport Loop. The temporary levee will be constructed on the west side of Riverwood Drive in the public right-of-way. This protection could also be constructed with a temporary flood barrier such as AquaFence.
	• Mills Avenue will be temporarily protected from overtopping with a small earthen levee on either side of the roadway while still allowing traffic.
	• Install plug and minor pumping on London Avenue storm water outfall.
	• Install effluent pumping from the Wastewater Treatment Facility.
	• Mobilize volunteers to fill sandbags at EOC designated locations.

Flooding Scenario

Beyond local capability	18' (forecasted Bismarck Gage reading)

Spring Flood Outlook

Dependent upon National Weather Service outlook:

- Pre-fill and stage sandbags (move to indoor location)
- Indoor sandbag operation
- Evaluate pumping plan
- Review levee maintenance plan
- Outdoor sandbag operation
- Alert Community Watch Program
- Consider aerial reconnaissance
- Consider State request for:
  - Sandbags
  - High water vehicle
  - Corps of Engineers technical assistance, planning assistance, ice jam expertise/demolition, pumps
- Review City of Bismarck Existing Protective Measures (Page 28)
- Review City of Bismarck 2011 Temporary Levee Status (Page 29)

Stage	Response Action	Potential Impacts
11' (forecasted)	Close control structure at the corner of Whisper Drive and Woodland Drive and set up pumping equipment if needed (Page 21). Monitor outlet pipe at the south end of Gallatin Loop and sandbag if necessary (Page 22).	Fox Island area threatened. Water floods Fox Island interior ponds.
12' (forecasted)	Emergency Operations Center activated. Stage barricades and road closure signs for deployment.	
12.5' – Action Stage	Prepare evacuation notices. Periodic visual patrols and gage monitoring. Monitor Far West Drive for yard encroachment. Consider aerial reconnaissance. Key personnel alerted and information disseminated. Possible pre-staging of sandbags. Monitor all control structures on Burleigh County Water Resource Board levees. Review implementation of pumping with City of Bismarck	Below bank full conditions. Watering coming up on Fox Island Boat Ramp parking area.
13' (forecasted)	Plug culverts under Mills Avenue in coordination with the City of Bismarck (Page 20). Close Tavis Road Pump Control Structure and monitor water levels east of Tavis Road (Page 24).	Storm sewer flows from South Bismarck are restricted when flows reach 13'.

Stage	Response Action	Potential Impacts
14’	• Review and implement pumping plan. • Observe Sandy River Drive.	
14.5’ – Flood Stage		
15’	**Close floodgates on the Channel at Washington Street**. If the gates are not functioning properly, a secondary emergency plan shall be activated which will involve placing approximately 10,000 cubic yards of clay from the Bismarck Municipal Solid Waste Facility or another available site into the Channel to block the migration of Missouri River floodwaters upstream into the Channel **Raising of Washington Street** - An area south of Burleigh Avenue along Washington Street approximately 800 feet in length between cross sections W and X on the Missouri River Flood Insurance Re-Study maps indicates an area that may allow water to back up and potentially flood low lying areas north of this area. In the event that Level III water levels are forecasted, the City will construct an earthen berm using either sandbags or clay depending on the availability of materials. Personnel from the City of Bismarck Public Works department will construct the berm. The berm will be constructed to a grade that will be adequate to control the 100-year flood event at this location. The berm will be monitored by Public Works personnel around the clock in the event that the water level does exceed the current level of Washington Street in this area. Flooding in the unprotected (un-gated) south side of the City of Bismarck is a concern when stages reach 15+’. This includes the need to block storm sewers to prevent backwater flooding into adjoining streets and risk for inundation of properties and in some instances excessive infiltration into basements constructed below the Base Flood Elevation (BFE) is an issue.	The River is rising to its natural banks, but has not spilled over into the floodplain. There may be some limited flooding in unprotected areas. Southport area impacted: • Southport Marina • Gas Station • The Pier

Stage	Response Action	Potential Impacts
16' – Moderate Flood Stage 16' (forecasted) Burleigh County	Review and construct a temporary levee along the west bank of the Glenview Township Drainage Ditch (Page 11). Observe and plug two culverts on Sand Dune Lane and construct a temporary levee along the south side of 149th Avenue NW. Pumps may be needed to remove trapped water (Page 12). South Central Regional Water District pump heads and all pumping equipment will need to be secured with levees and pumps (Page 13). Close control structure on south leg of Burnt Creek Loop (Page 18). Existing berm north of Ponderosa Riverside Village should be monitored to ensure it is holding water to the north and west of this location (Page 15). Plug ditches on each side of Olive Tree Drive midway between Burnt Creek Loop and the Missouri River. Pumps may be needed to remove trapped water. (Page 16). Close culvert under Burnt Creek Loop north of Misty Waters Drive (Page 17). Plug culverts on Burnt Creek Loop. Pumps will be needed to remove trapped water (Page 18). Plug culverts along Far West Drive and Gallatin Loop. Pumps will be needed to remove trapped water (Page 23). Plug culverts under 48th Avenue Southwest and Washington Street and set up pumping equipment to be used if needed. (Page 25) Close gate and control structure in Sibley Island Park and set up pumping equipment to be used if needed (Page 26). Barricades/road closure signs placed. Publicize road closures. Possible evacuation notices; review and implement for Briardale III and lower end of Hogue Island.	The River has risen beyond its banks. Emergency access impaired within and to the Fox Island area.

Stage	Response Action	Potential Impacts

16' - Moderate Flood Stage
 	
16' (forecasted) City of Bismarck
 	
(Page 31)
	Alert City Officials when river stage reaches 12.0 ft. concurrently with a forecast of future stage increases.
	
	Mobilize Emergency Operations Center.
	
	Mobilize volunteers to fill sandbags at EOC designated locations.
	
	Construct temporary protective measures:
	
	• Segment A
	  o Approximately 1200-feet of the north end of Segment A was removed after the 2011 flood. This area shall be monitored closely during such event.
	  o Riverwood Drive (The top of the existing Hesco Barriers along Riverwood Drive at the low point are approximately at elevation 1636.5 NAVD. This elevation is sufficient to prevent the overtopping of Riverwood Drive from an open water stage of 16-feet.
	  o To prevent overtopping of Riverwood Drive between the Southport Loop intersections, a small earthen levee will be constructed from the south end of the existing Hesco Barriers to the south intersection of Southport Loop. The temporary levee will be constructed on the west side of Riverwood Drive in the public right-of-way. This protection could also be constructed with a temporary flood barrier such as AquaFence
	• Mills Avenue
	  o The culvert through Mills Avenue will be plugged to prevent backup from the Southport Bay into the area south of Mills Avenue.
	  o Mills Avenue will be temporary protected from overtopping with an earthen levee from Riverwood Drive to Whispering Bay. The levee will be constructed at an elevation of stage 18-ft and wide enough to allow two-way traffic, and will have a gravel surface.
	• Whisper Drive
	  o Burleigh County will close the newly installed gate on Whisper Drive.
	• Tavis Road Flood Control Gate
	  o Burleigh County will close the Tavis Road Flood Control Gate.
	• Internal Drainage
	  o See Page 33 for the Internal Drainage Plan common to both the 16-foot and 20-foot open water stages.
	• Bismarck property not protected
	  o Sandbags will be provided for any properties outside of the protected area.
	
	• During the flood.
	  o Provide dike patrols.
		Areas: Southport, Airport Village, Skyway Park Village, Tatley Meadows, Colonial Estates
		Streets: Munich Dr, Bonn Blvd, Birchwood, Santa Fe, San Angelo Dr, Santa Barabara, Manchester Dr, Devon Dr, Essex Lp, Basin Ave
		
		Businesses: Riverwood Golf Course, businesses on Basin Ave west of 12th St S, Expressway Ave between 9th St S and 13th St S, 12th St S between Expressway Av and University Dr
		
		Vulnerable Populations/Facilities: Solheim Elementary School, City of Bismarck South Fire Station (Station 2)

	o 24 hour alert for changing conditions. o Deliver sandbags to local problem points.	

Stage	Response Action	Potential Impacts
16+’		Threat to critical infrastructure.
16.11’	2009 ice jam crest at Bismarck USGS Gage (03-24-09)	
17’		Corps of Engineers’ flood stage. City of Bismarck infrastructure (sewer, water) threatened/impacted.
18’ – Major Flood Stage 18’ (forecasted) Burleigh County	Monitor bank erosion and areas of seepage/boils monitored and repaired as necessary. Continue to review and implement evacuation notices. Plug culverts under West Harbor Drive and construct a temporary level on West Harbor Drive. Levee should be constructed to allow residents to drive on the levee and access homes to the west of the roadway. In addition, the County should set up pumping equipment to be used if needed. (Page 19)	The River has generally widened into the floodplain.
19.25’	2011 Flood Crest at Bismarck USGS Gage (07-01-11)	

Stage	Response Action	Potential Impacts

20’
(forecasted)
City of Bismarck
 	
(Page 32)
	Alert City Officials when river stage reaches 12.0 ft. concurrently with a forecast of future stage increases.
	
	Mobilize Emergency Operations Center.
	
	Mobilize volunteers to fill sandbags at EOC designated locations.
	
	• Segment A
	  o Approximately 1200-feet of the north end of the Segment A levee was removed after the 2011 flood. This segment will be reconstructed with 1-foot of free-board above stage 20-feet.
	• Riverwood Drive
	  o The top of the existing Hesco Barriers along Riverwood Drive at the low point are approximately at elevation 1636.5 NAVD 88. This elevation is not sufficient to prevent the overtopping of Riverwood Drive from an open water stage of 20-feet. The Hesco Barriers will either have to be reconstructed or raised with another barrier layer, depending on the integrity of the existing Hesco Barriers.
	• Southport Levee and Closure of Southport Inlet
	  o An earthen levee will be constructed along the north side of Southport Loop to the river side of Southport and extended south to the bay inlet.
	  o The culvert through the north leg of Southport Loop that provides freshening water to Southport Bay will be plugged for the duration of the flood.
	  o The property located on the northwest corner of Southport will receive sandbags for flood protection due to the close proximity to the bank on the north side of the structure.
	  o The Southport inlet will be closed with a sheet piling plug.
	  o An earthen levee will be constructed along the westerly perimeter of Southport along a portion of Harbor Drive south of the Southport Bay inlet. Burleigh County has identified constructing a temporary levee on Harbor Drive as a temporary protective measure.
	• Mills Avenue
	  o The culvert through Mills Avenue will be plugged to prevent backup from the Tavis Road area into the Southport Bay.
	  o An earthen levee will be constructed on Mills Avenue from Riverwood Drive to West Harbor Drive. The levee will be constructed at an elevation of stage 22-ft and wide enough to allow two-way traffic and will have a gravel surface.
	• Whisper Drive
	  o Burleigh County will close the newly installed gate on Whisper Drive.	

	• Tavis Road Flood Control Gate
	  o Burleigh County will close the Tavis Road Flood Control Gate.
	• Internal Drainage
	  o See (Page 33) for the Internal Drainage Plan common to both the 16-foot and 20-foot open water stages.
	• Bismarck property not protected
	  o Sandbags will be provided for any properties outside of the protected area.
	• During the flood.
	  o Provide dike patrols.
	  o 24 hour alert for changing conditions.
	  o Deliver sandbags to local problem points.	

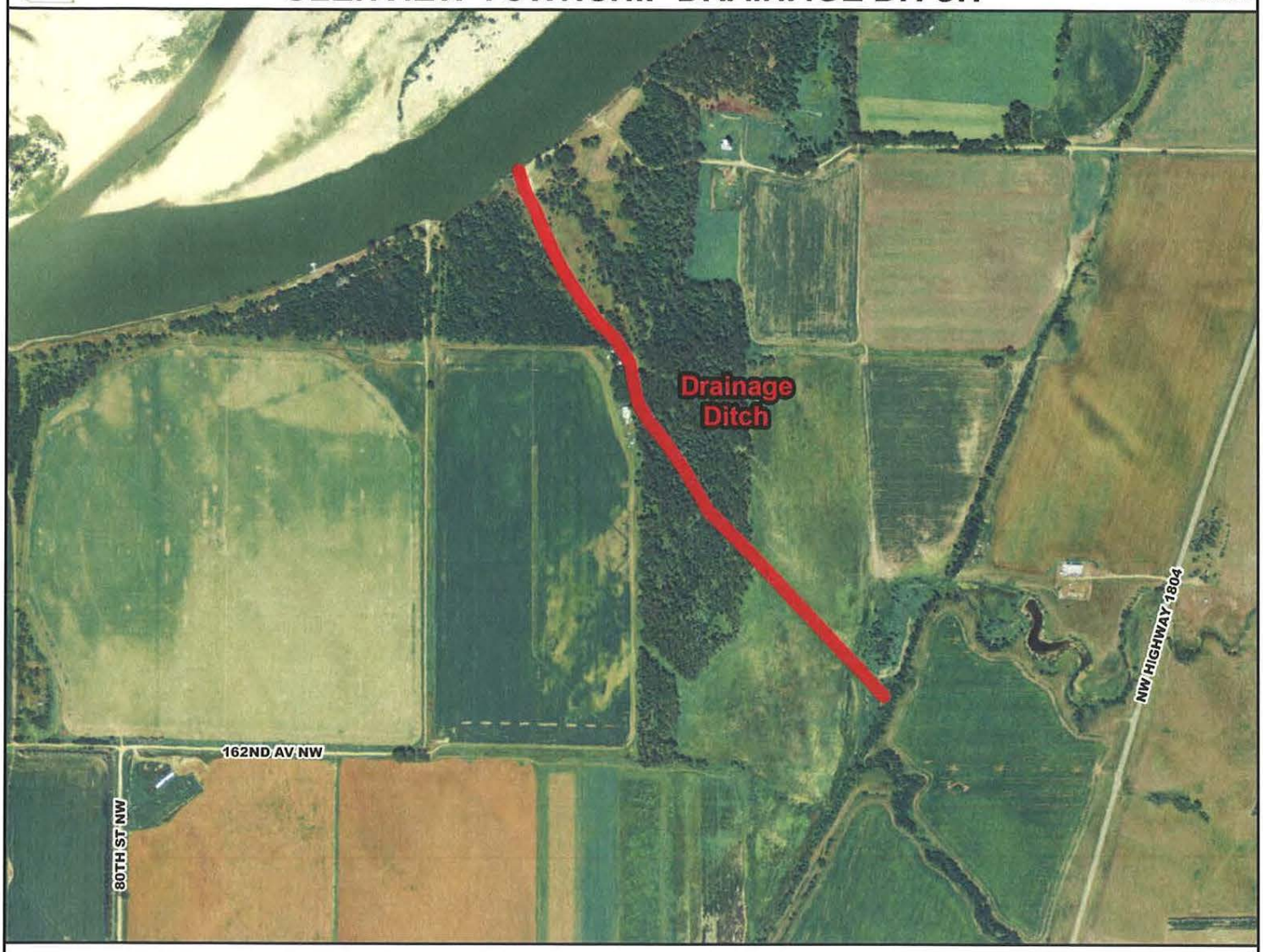
31.6’ Record Flood	River is at the level of the flood of record in 1883.	

BURLEIGH COUNTY, NORTH DAKOTA

GLENVIEW TOWNSHIP DRAINAGE DITCH

N

01/18/2013



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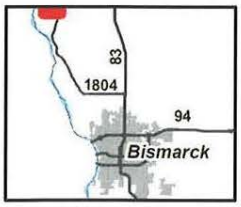


Action Plan

Action Level: 16 feet (Forecasted Bismarck gage reading)

Responsibility: Burleigh County Highway Department

Action: Review and construct a temporary levee along the west bank of the Glenview Township Drainage Ditch.

History: During the 2011 flood event water flooded through the west bank of the Glenview Township Drainage Ditch and proceeded in flooding areas to the south and west of State Highway 1804. The low areas in the west bank may be plugged to prevent flooding. This action will need to take place early in the flood fighting efforts. If the area is wet or flood waters have saturated the area it may not be possible to move material into the low areas.

Map produced by Burleigh County GIS. This map is for representation use only and does not represent a survey. No liability is assumed as to the accuracy of the data delineated hereon.

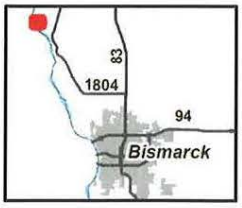
BURLEIGH COUNTY, NORTH DAKOTA

149TH AVE NW

N

01/18/2013

0 250 500 Feet



Action Plan

Action Level: 16 feet (Forecasted Bismarck gage reading)

Responsibility: Burleigh County Highway Department

Action: Plug culverts on Sand Dune Lane and construct a temporary levee along the south side of 149th Avenue NW. Pumps may be needed to remove trapped water.

History: During the 2011 flood event, water backed up through the culverts under Sand Dune Lane and came overland from the south across 149th Avenue NW. At a gage reading of 16.5' the flooding isolated the homes at the end of 149th Avenue and forced them to have boating access only. At a gage reading of 19' flooding will take place from the north and residents will lose roadway access. However, plugging culverts and constructing levee should allow them to maintain roadway access between 16.5 feet and 19 feet.

Map produced by Burleigh County GIS. This map is for representation use only and does not represent a survey. No liability is assumed as to the accuracy of the data delineated hereon.

BURLEIGH COUNTY, NORTH DAKOTA
SOUTH CENTRAL REGIONAL WATER DISTRICT

N
01/18/2013

0 250 500 Feet

Action Plan

Action Level: 16 feet (Forecasted Bismarck gage reading)

Responsibility: South Central Regional Water District / Burleigh County Highway Department

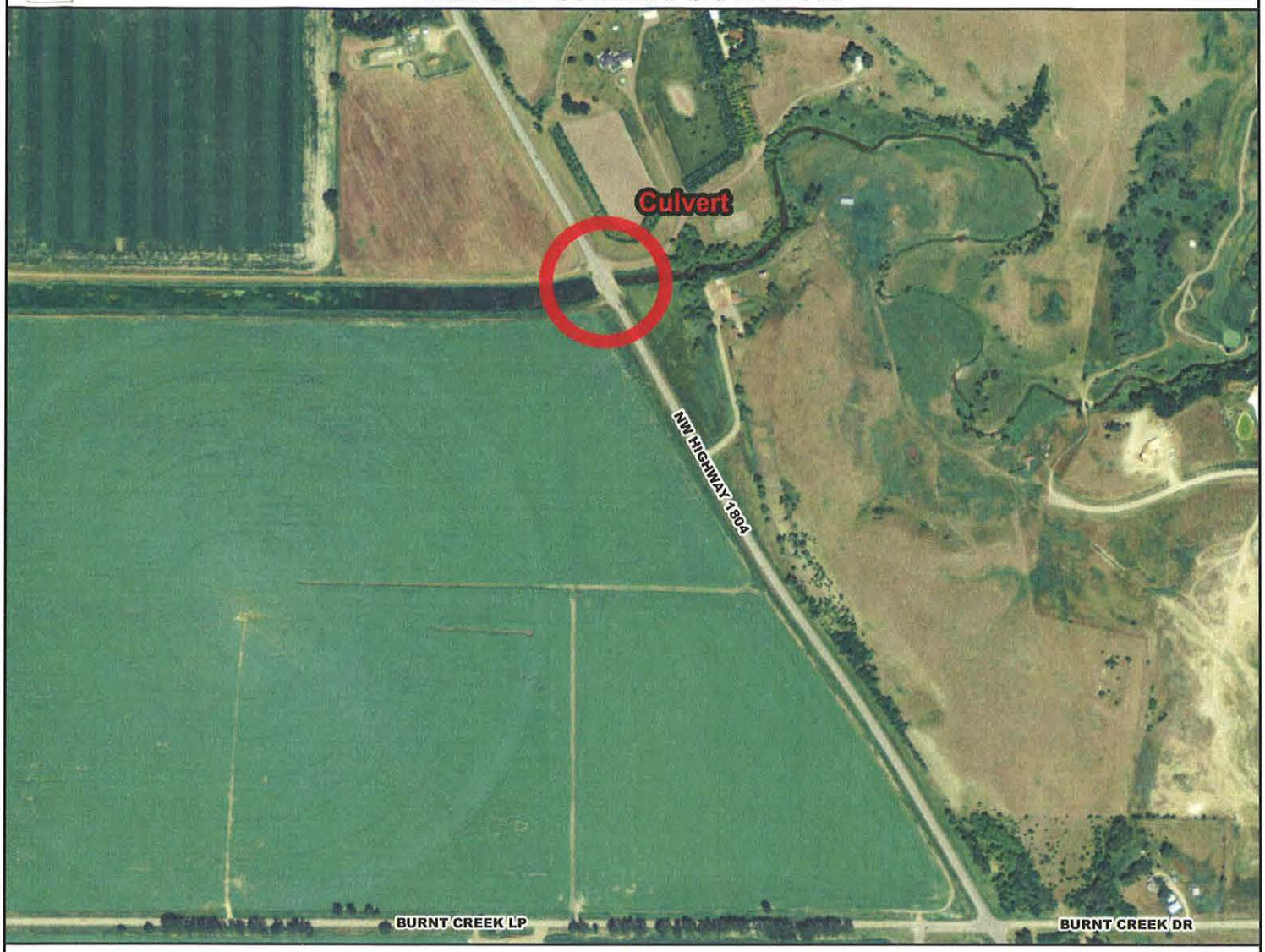
Action: Pump heads and all pumping equipment will need to be secured with levees and pumps.

History: During the 2011 flood event, the County assisted the South Central Regional Water District in constructing levees around pumping equipment. Failure at this location will result in water shortages and outages for a large portion of rural Burleigh County. Levees and pumps will need to be maintained throughout the flooding event.

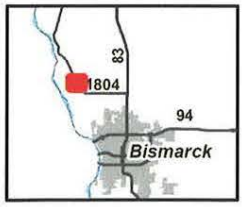
Map produced by Burleigh County GIS. This map is for representation use only and does not represent a survey. No liability is assumed as to the accuracy of the data delineated hereon.

BURLEIGH COUNTY, NORTH DAKOTA
BURNT CREEK CULVERT

N
01/18/2013



0 250 500 Feet



Action Plan

Action Level: 16 feet (Forecasted Bismarck gage reading)

Responsibility: North Dakota Department of Transportation

Action: Plug culvert through the south bank of the Burnt Creek Drainage Ditch.

History: During the 2011 flood event the DOT plugged a culvert that goes through the south bank of the Burnt Creek Drainage Ditch. If the culvert is not plugged water from the Drainage Ditch will go through the south bank and flood areas to the southwest of Highway 1804.

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BURLEIGH COUNTY, NORTH DAKOTA

BERM NORTH OF PONDEROSA RIVERSIDE VILLAGE

N
01/18/2013

0 500 1,000 Feet

Action Plan

Action Level: 16 feet (Forecasted Bismarck gage reading)

Responsibility: Burleigh County Highway Department

Action: Existing berm should be monitored to ensure that it is holding water to the north and west of this location.

History: During the 2011 event, some leakage took place along the this berm at flood stage 18'. Filling of lower areas at the north end and the west end of the berm plugged the berm and no additional problems were observed to flood stage 19.25'.

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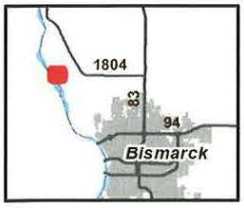
BURLEIGH COUNTY, NORTH DAKOTA

OLIVE TREE DR

N

01/18/2013

0 250 500 Feet



Action Plan

Action Level: 16 feet (Forecasted Bismarck gage reading)

Responsibility: Burleigh County Highway Department

Action: Plug the ditches on each side of Olive Tree Drive midway between Burnt Creek Loop and the Missouri River. Pumps may be needed to remove trapped water.

History: During the 2011 flood event, water backed up along Olive Tree Drive and added water to the Ponderosa Riverside Village subdivision. At a gage reading of 16.5', the flooding started to flow east into the subdivision. Once the ditches were blocked, no additional water entered this area.

Map produced by Burleigh County GIS. This map is for representation use only and does not represent a survey. No liability is assumed as to the accuracy of the data delineated hereon.

BURLEIGH COUNTY, NORTH DAKOTA
BURNT CREEK LOOP CULVERT

N
01/18/2013

0 250 500 Feet

Action Plan

Action Level: 16 feet (Forecasted Bismarck gage reading)

Responsibility: Burleigh County Highway Department

Action: Plug the culvert under Burnt Creek Loop just north of Misty Waters Drive.

History: During the 2011 flood event, water backed up through the ditch (just north of the Misty Waters Subdivision) into the Burnt Creek Loop ditch which contributed to flooding on the east side of Burnt Creek Loop. Water reached Burnt Creek Loop at a gage reading of 17.0'. After plugging the ditch, no additional problems were observed up to flood stage 19.25 feet.

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BURLEIGH COUNTY, NORTH DAKOTA

SOUTH LEG OF BURNT CREEK LOOP

N

01/18/2013

0 250 500 Feet

Action Plan

Action Level: 16 feet (Forecasted Bismarck gage reading)

Responsibility: Burleigh County Highway Department

Action: Plug culverts on Burnt Creek Loop. Pumps will be needed to remove trapped water.

History: During the 2011 flood event, water backed up over Burnt Creek Loop (from the south) and flooded subdivisions north of the roadway. In the summer of 2013, Burleigh County reconstructed and raised the grade of Burnt Creek Loop and Misty Waters Drive. The new grade matched the flood stage reading of 20 feet. During future flooding events, the culverts under Burnt Creek Loop need to be plugged to reduce the chance of flooding north of Burnt Creek Loop.

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BURLEIGH COUNTY, NORTH DAKOTA
WEST HARBOR DRIVE

N
01/18/2013

0 245 490 Feet

Action Plan

Action Level: 18 feet (Forecasted Bismarck gage reading)

Responsibility: Burleigh County Highway Department

Action: Plug culverts under West Harbor Drive and construct a temporary levee on West Harbor Drive. Levee should be constructed to allow residents to drive on the levee and access homes to the west of the roadway. In addition, the County should set up pumping equipment to be used if needed.

History: During the 2011 flood event, no work was done north of Mills Avenue. In 2014 West Harbor Drive was raised to prevent flooding to a gage reading of 18'. Construction of a temporary levee on West Harbor Drive will protect homes to the east of West Harbor Drive. If the level is constructed, water on the east side of the road will need to be pumped back across the roadway.

Map produced by Burleigh County GIS. This map is for representation use only and does not represent a survey. No liability is assumed as to the accuracy of the data delineated hereon.

BURLEIGH COUNTY, NORTH DAKOTA

MILLS AVE CULVERT

N

02/01/2013

0 250 500 Feet

Action Plan

Action Level: 13 feet (Forecasted Bismarck gage reading)

Responsibility: City of Bismarck in coordination with the Burleigh County Highway Department

Action: Plug culverts under Mills Avenue.

History: During the 2011 flood event, water flowed around Fox Island under Mills Avenue and flooded areas east of Fox Island. At a gage reading of 13 feet, the culvert should be plugged to reduce the chance of flooding east of Fox Island.

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BURLEIGH COUNTY, NORTH DAKOTA

CONTROL STRUCTURE AT WHISPER DR AND WOODLAND DR

N

01/18/2013

Action Plan

0 250 500 Feet

Action Level: 11 feet (Forecasted Bismarck gage reading)

Responsibility: Burleigh County Highway Department

Action: Gate at the control structure at the corner of Whisper Drive and Woodland Drive should be closed and pumping equipment should be set up to use if needed.

History: During the 2011 flood event, water backed up through the culvert under Whisper Drive and flooded areas to the east of Whisper Drive. The County plugged the culvert and pumped water across Whisper Drive into Whisper Bay throughout the whole flood. The new control gate allows the County to stop water from coming into the neighborhood under Whisper Drive and pump water from the east to Whisper Bay in the same structure.

Map produced by Burleigh County GIS. This map is for representation use only and does not represent a survey. No liability is assumed as to the accuracy of the data delineated hereon.

BURLEIGH COUNTY, NORTH DAKOTA

GALLATIN LOOP CULVERT

N
02/01/2013

0 250 500 Feet

Action Plan

Action Level: 11 feet (Forecasted Bismarck gage reading)

Responsibility: Burleigh County Highway Department

Action: Culverts along Gallatin Loop need to be plugged. Pumps will be needed to remove trapped water.

History: During the 2011 flood event, water would have backed up through the culverts under Gallatin Loop. However, the County plugged the culverts to reduce the chance of flooding. During future flooding events, the culverts under Gallatin Loop will need to be plugged to reduce the chance of flooding within Fox Island.

Map produced by Burleigh County GIS. This map is for representation use only and does not represent a survey. No liability is assumed as to the accuracy of the data delineated hereon.

BURLEIGH COUNTY, NORTH DAKOTA

CULVERTS IN SOUTH FOX ISLAND

N

02/01/2013

0 250 500 Feet

Action Plan

Action Level: 16 feet (Forecasted Bismarck gage reading)

Responsibility: Burleigh County Highway Department

Action: Culverts along Far West Drive and Gallatin Loop need to be plugged. Pumps will be needed to remove trapped water.

History: During the 2011 flood event, water would have backed up through the culverts under Far West Drive and Gallatin Loop. However, the County plugged the culverts to reduce the chance of flooding. During future flooding events, the culverts under Far West Drive and Gallatin Loop will need to be plugged to reduce the chance of flooding within Fox Island.

Map produced by Burleigh County GIS. This map is for representation use only and does not represent a survey. No liability is assumed as to the accuracy of the data delineated hereon.

BURLEIGH COUNTY, NORTH DAKOTA

TAVIS ROAD PUMP CONTROL STRUCTURE

N

02/01/2013

0 250 500 Feet

Action Plan

Action Level: 13 feet (Forecasted Bismarck gage reading)

Responsibility: Burleigh County Highway Department and City of Bismarck

Action: Close gate structure and monitor water levels east of Tavis Road.

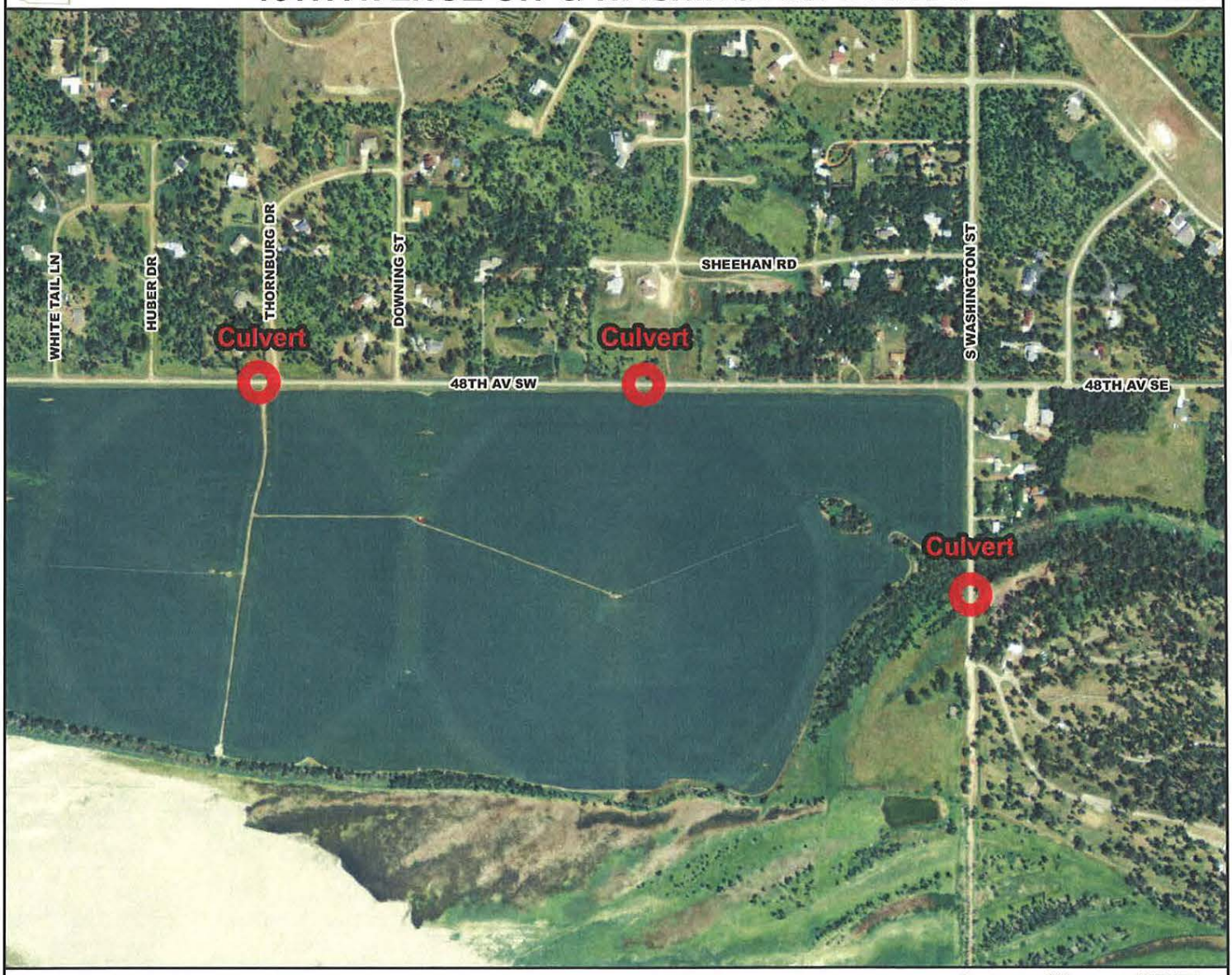
History: During the 2011 flood event, water flowed around Fox Island under Tavis Road and flooded areas east of Fox Island. During future flooding events (13 feet gage reading); the County/City should close the gate at Tavis Road. If water levels east of Tavis reach a gage reading of 14 feet, the County/City should start the pumps in order to reduce the chance of flooding east of Fox Island.

Map produced by Burleigh County GIS. This map is for representation use only and does not represent a survey. No liability is assumed as to the accuracy of the data delineated hereon.

BURLEIGH COUNTY, NORTH DAKOTA

48TH AVENUE SW & WASHINGTON STREET

N
01/18/2013



0 500 1,000 Feet

Action Plan

Action Level: 16 feet (Forecasted Bismarck gage reading)

Responsibility: Burleigh County Highway Department

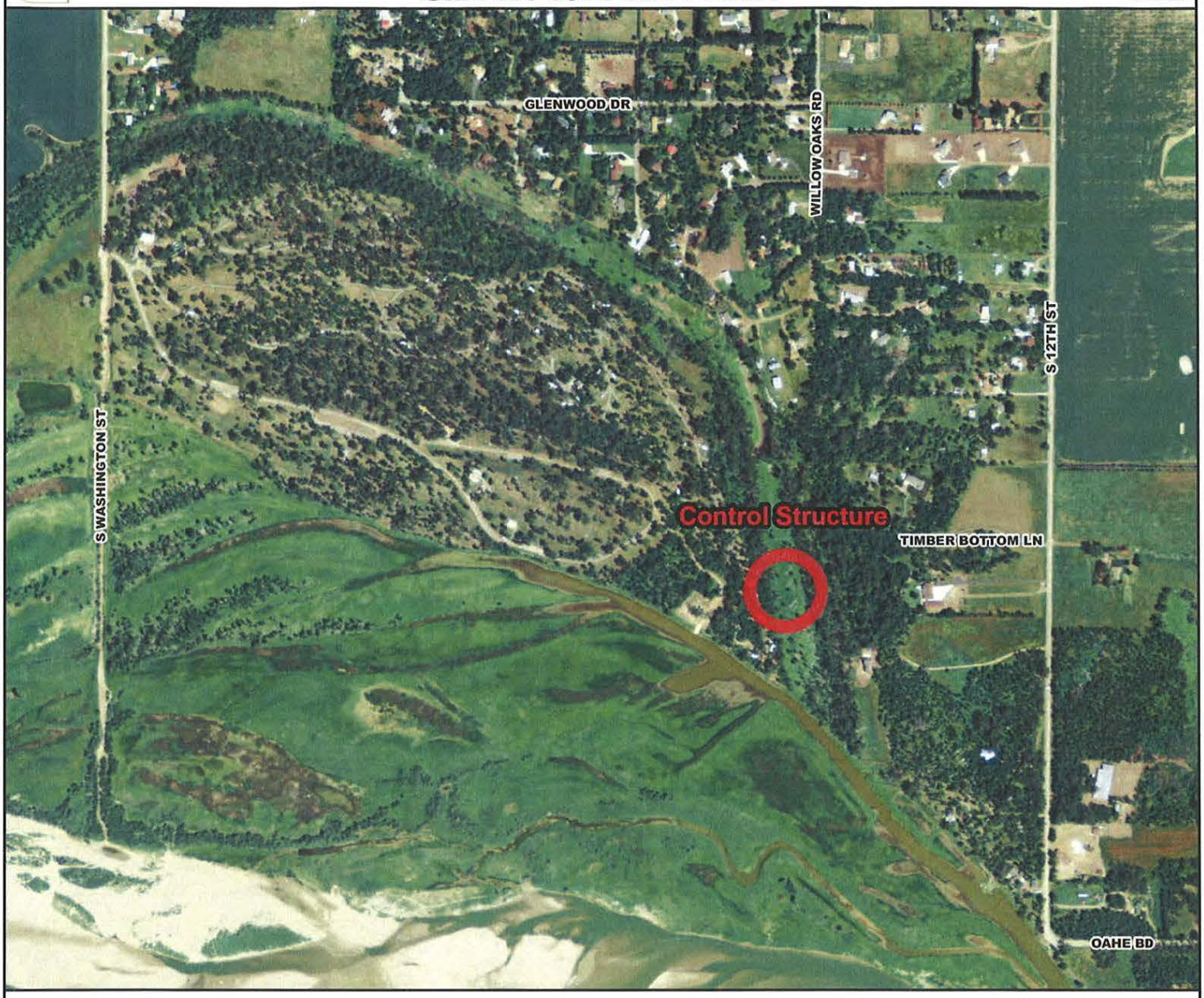
Action: Plug culverts under 48th Avenue SW and Washington Street and set up pumping equipment to be used if needed.

History: During the 2011 flood event, a temporary levee was constructed along 48th Avenue SW to prevent water from flooding areas to the north of 48th Avenue SW. In 2013 the County raised the grade of both 48th Avenue SW and Washington Street to protect the areas north and east of these roadways to a gage reading of 20'. During future events, the culverts under 48th Avenue SW and Washington Street will need to be plugged and water will need to be pumped back across the roadways.

Map produced by Burleigh County GIS. This map is for representation use only and does not represent a survey. No liability is assumed as to the accuracy of the data delineated hereon.

BURLEIGH COUNTY, NORTH DAKOTA
SIBLEY ISLAND PARK

N
01/18/2013



0 500 1,000 Feet

Action Plan

Action Level: 16 feet (Forecasted Bismarck gage reading)

Responsibility: Burleigh County Highway Department

Action: Gate at the control structure in the Sibley Island Park should be closed and pumping equipment should be set up to use if needed.

History: During the 2011 flood event, water backed up through this area and flooded the subdivisions north of the Park. In 2014, the Burleigh County Water Board will construct a levee and control structure that will allow the County to stop water from coming into the neighborhood to the north and pump water from the north back into the river in the same structure.

Map produced by Burleigh County GIS. This map is for representation use only and does not represent a survey. No liability is assumed as to the accuracy of the data delineated hereon.

BURLEIGH COUNTY, NORTH DAKOTA

CULVERTS NEXT TO SOUTH 12TH STREET

N

02/01/2013

0 125 250 Feet

Action Plan

Action Level: 13 feet (Forecasted Bismarck gage reading)

Responsibility: Burleigh County Highway Department

Action: Culverts under driveways just off of South 12th Street need to be plugged.

History: During the 2011 flood event water backed up through the culverts under south 12th Street and flooded the area north and west of South 12th Street. During future flooding events the culverts under South 12th Street will need to be plugged to reduce the chance of flooding within this area.

Map produced by Burleigh County GIS. This map is for representation use only and does not represent a survey. No liability is assumed as to the accuracy of the data delineated hereon.

Exhibit 18: City of Bismarck Existing Protective Measures

The 2011 temporary protective measures included approximately 4.6 miles of earthen levee and Hesco Barriers to protect much of South Bismarck from the floodwaters of the Missouri River. After the flood receded, many of the structures were left in place. The temporary protective measures that were in place in the 2012 Flood Response and Action Plan remain in place.

Segment	Alterations
A	North 1,200 ft completely removed. South 100-ft altered.
B	Top row of Hesco Barriers removed from Expressway to Southport Loop. Completely removed between Southport Loop intersections.
C	Completely removed.
D	East 2,600-ft completely removed.
E	East 2,600-ft completely removed.
F	South 1,100-ft altered.

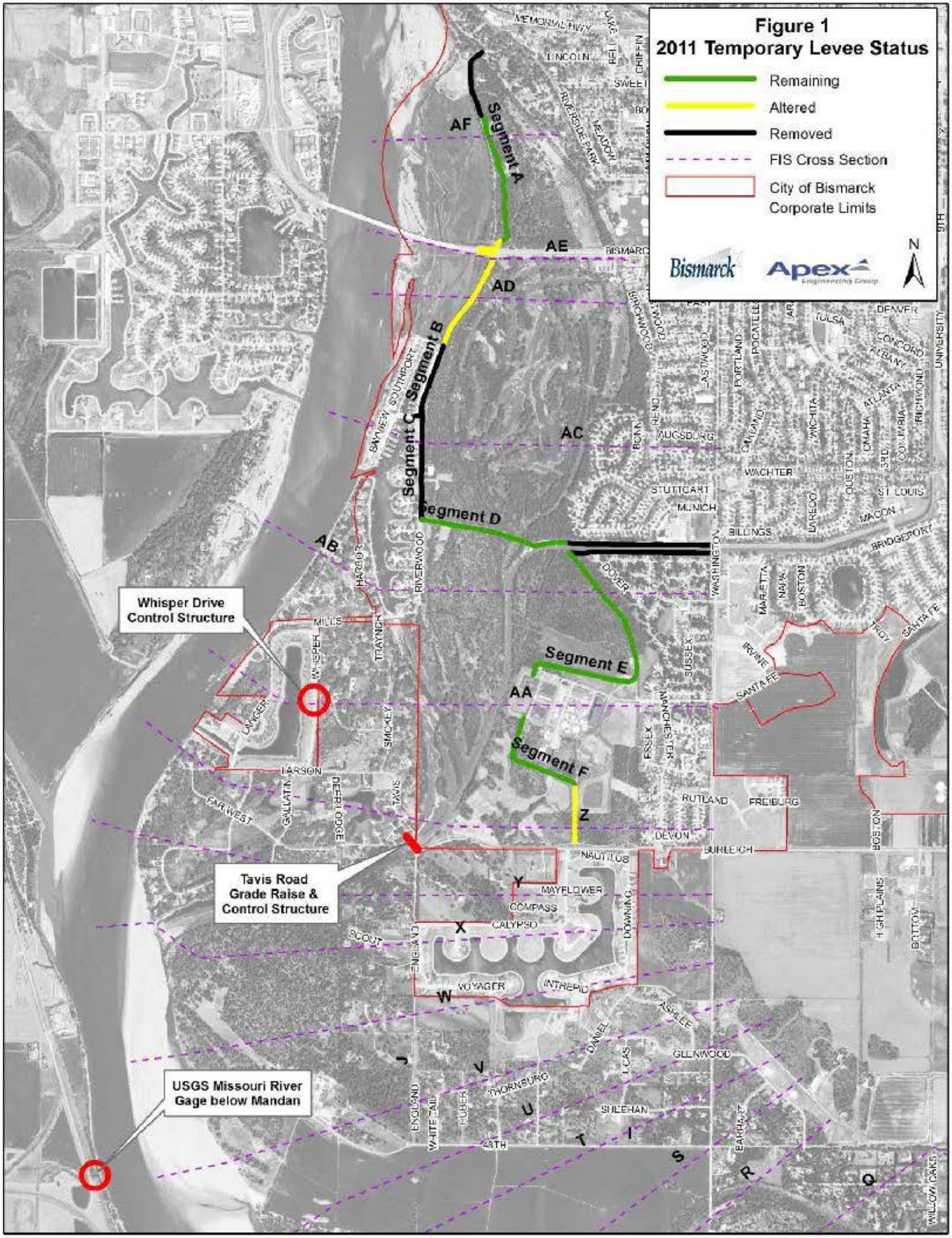


Figure 1
2011 Temporary Levee Status
Remaining
Altered
Removed
FIS Cross Section
City of Bismarck Corporate Limits
Bismarck
Apex
N
Segment A
Segment B
Segment C
Segment D
Segment E
Segment F
AF
AE
AD
AC
AB
AA
Z
Y
X
W
V
U
T
S
R
Q
Whisper Drive Control Structure
Tavis Road Grade Raise & Control Structure
USGS Missouri River Gage below Mandan

Figure 2 - 2013 Ice Jam Temp. Protective Measures
2011 Remaining Levee
Contingency Levee
2013 Protection
City of Bismarck Corporate Limits
N
Bismarck
Apex Engineering Group
BISMARCK
PORTLAND
BOISE
DENVER
TUCSON
WICHITA
ATLANTA
COLUMBIA
RICHMOND
OMAHA
HOUSTON
ST LOUIS
MACON
BRIDGEPORT
MODESTO
SAN ANGELO
FRESNO
SANTA FE
TROY
PEACH TREE
IRVINE
MARIETTA
NAPA
BOSTON
COTTONWOOD
LONDON
BRANDENBURG
FREIBURG
RUTLAND
DEVON
DORTMUND
BURLEIGH
CROSS BOTTOM
HIGH PLAINS
BOTTOM
NAUTILUS
MAYFLOWER
COMPASS
CALYPSO
POSEIDON
NEPTUNE
BOUNTY
DOWNING
SCOUT
ENGLAND
FAR WEST
LARSON
DEERLODGE
SMOKEY
WOODLAND
WHISPER
TRAYNOR
MILLS
GALLEON
MUTINEER
BUCCANEER
RIVERWOOD
SOUTHPORT
BAYVIEW
HARBOR
YORKSHIRE
BEDFORD
DOVER
WASHINGTON
SWEETWOOD
VICTORIA
SUSSEX
ESSEX
WARWICK
MANCHESTER
MUNICH
STUTTGART
HAMBURG
AUGSBURG
COLOGNE
BONN
RENO
OSNABRUCK
WACHTER
OAKLAND
TAHOE
SAN DIEGO
BILLINGS
LAREDO
ALBANY
CONCORD
TULSA
LANSING
WILLOW
EASY
ASHWOOD
EASTWOOD
PORTLAND
ROCATELLO
LARAMIE
INDIANA
ARBOR
HAMMIN
ANDERSON
MEADOW
GARDEN
RIVERSIDE PARK
BOWEN
LINGALS
IVY
1ST
2ND
3RD
4TH
5TH
6TH
7TH
8TH
9TH
10TH
UNIVERSITY
BASIN
NORTHWEST
TACOMA

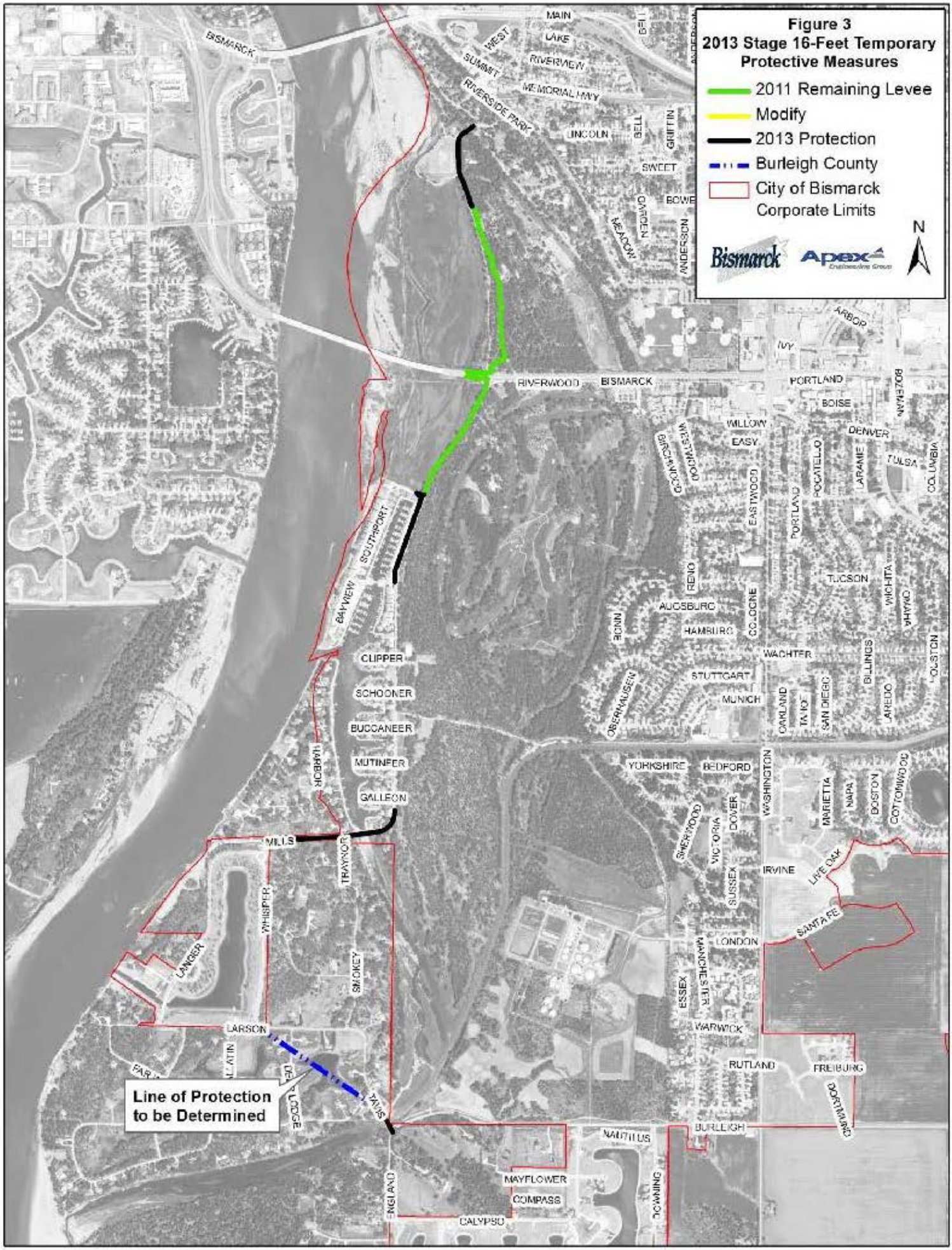


Figure 3
2013 Stage 16-Feet Temporary Protective Measures
2011 Remaining Levee
Modify
2013 Protection
Burleigh County
City of Bismarck Corporate Limits
N
Bismarck
Apex
Line of Protection to be Determined
BISMARCK
MAIN
LAKE
RIVERVIEW
MEMORIAL HWY
RIVERSIDE PARK
LINCOLN
SWEET
RIVERWOOD
PORTLAND
BOISE
WILLOW
EASY
DENVER
TULSA
TUCSON
WICHITA
AUGSBURG
HAMBURG
WACHTER
STUTTGART
MUNICH
CLIPPER
SCHOONER
BUCCANEER
MUTINEER
GALLEON
YORKSHIRE
BEDFORD
IRVINE
LIVE OAK
SANTA FE
LONDON
WARWICK
RUTLAND
FREIBURG
BURLEIGH
MAYFLOWER
COMPASS
CALYPSO
LARSON
MILLS
SOUTHPORT
BAYVIEW
HARBOR
TRAYNOR
WHISPER
SMOKEY
LANGER
ENGLAND
DOWNING
DORTMUND

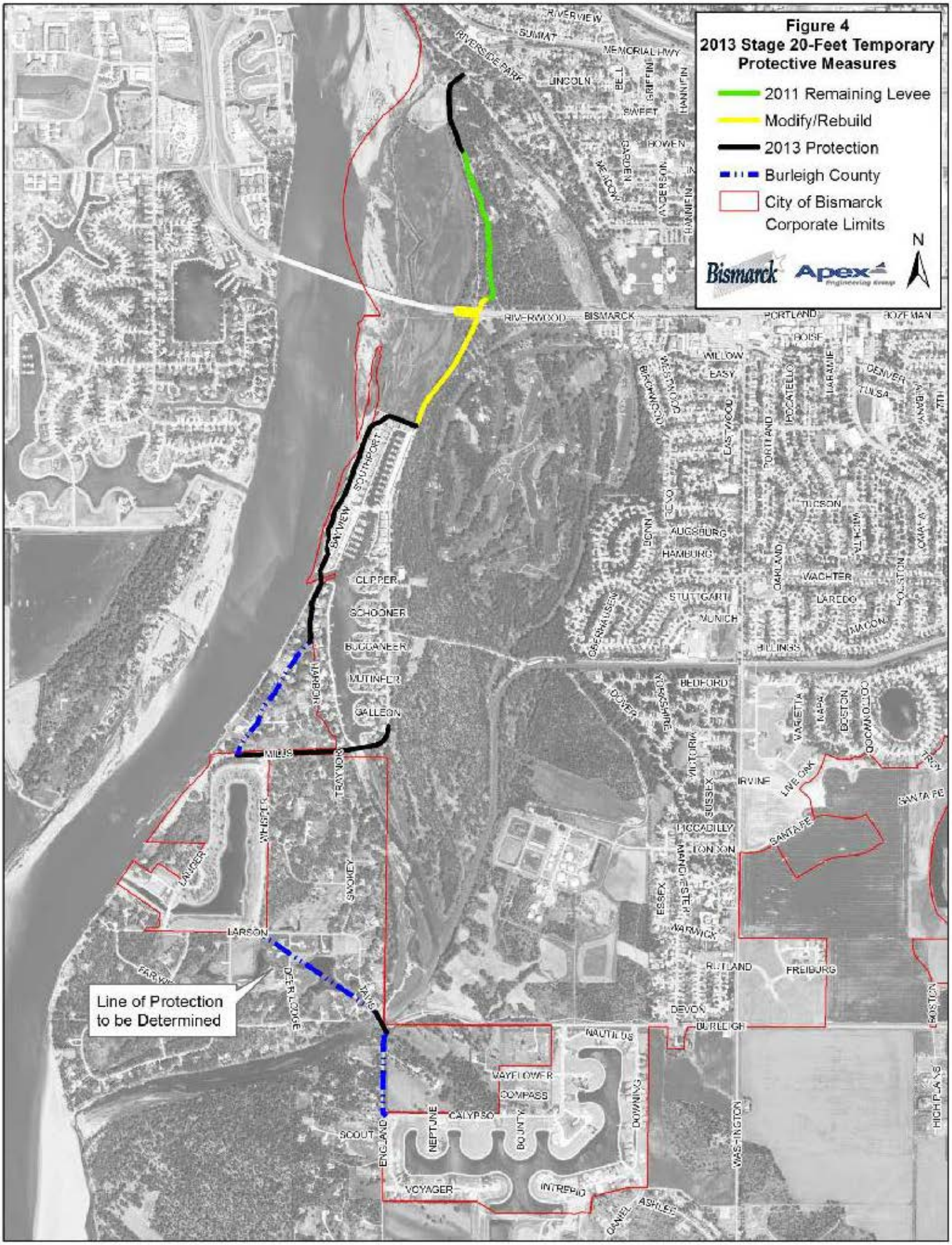


Figure 4
2013 Stage 20-Feet Temporary Protective Measures
2011 Remaining Levee
Modify/Rebuild
2013 Protection
Burleigh County
City of Bismarck Corporate Limits
N
Bismarck
Apex
Line of Protection to be Determined
RIVERVIEW
SUMMIT
RIVERSIDE PARK
MEMORIAL HWY
LINCOLN
BELL
GRIFFIN
SWEET
HANNIFIN
BOWEN
MEADOW
ANDERSON
RIVERWOOD
BISMARCK
PORTLAND
BOZEMAN
BOISE
WILLOW
EASY
DENVER
TULSA
LARAMIE
POCATELLO
EASTWOOD
TUCSON
AUGSBURG
HAMBURG
OAKLAND
WACHTER
STUTTGART
LAREDO
MUNICH
MACON
BILLINGS
BEDFORD
VARSITY
VARSITY
NAPA
BOSTON
IRVINE
LINCOLN
SANTA FE
PICCADILLY
TONKON
ESSEX
MANCHESTER
WARWICK
RUTLAND
FREIBURG
DEVON
BURLEIGH
NAUTILUS
WAYFLOWER
COMPASS
CALYPSO
NEPTUNE
BOUNTY
DOWNING
WASHINGTON
HIGHPLAINS
VOYAGER
INTREPID
DANIEL ASHLEY
SCOUT
ENGLAND
DEER LODGE
LARSON
SMOKEY
WHISTLE
LANGER
TRAYNOR
MILLS
GALLEON
MUTINEER
BUCCANEER
SCHOONER
CLIPPER
SKYVIEW
SOUTHPORT
BOWN
TEXAS
GREENHAUSEN
COLUMBIA
WASHINGTON
BROADWAY
COLUMBIA
EASTWOOD
PORTLAND
POCATELLO
LARAMIE
DENVER
TULSA
WALTHAM
HOUSTON
OMAHA
MACON
BOSTON
COCHRANE

Exhibit 23: City of Bismarck Internal Drainage

The internal drainage must be pumped utilizing temporary portable pumps. The recommended pump sizes are based on discussions with City staff about the 2011 pumping. Minor pumping may also be required on the east side of Riverwood Drive, north of Southport.

Site	Temporary Pumps
1	2-8" Pumps
2	2-8" Pumps
3	1-6" Pump & 1-8" Pump
4	2-3" Pumps
5	4-18" Pumps
6	1-10" Pump
7	WW Treatment Plant 2-6" Pumps

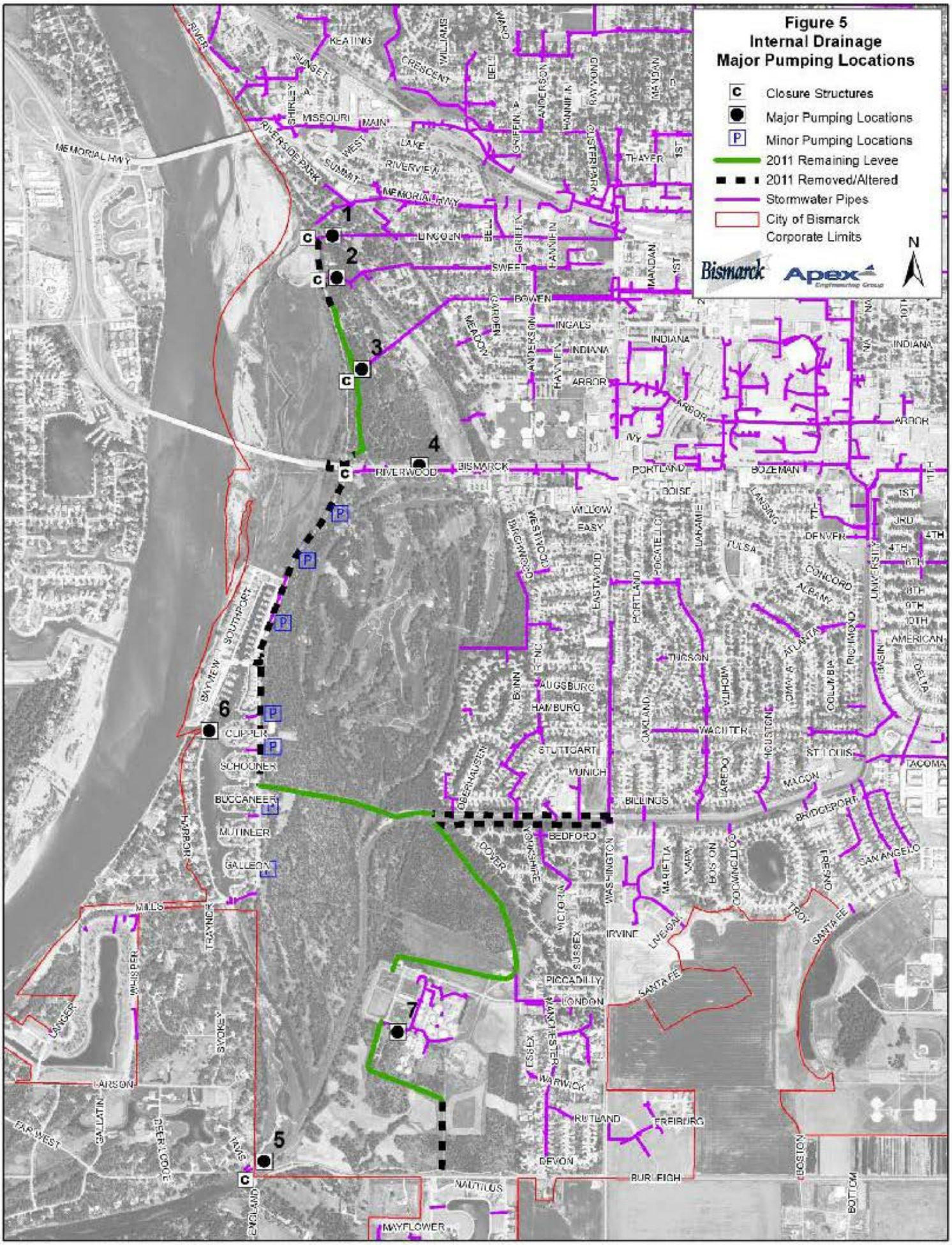


Figure 5
Internal Drainage
Major Pumping Locations
Closure Structures
Major Pumping Locations
Minor Pumping Locations
2011 Remaining Levee
2011 Removed/Altered
Stormwater Pipes
City of Bismarck
Corporate Limits
N
Bismarck
Apex
1
2
3
4
5
6
7
MEMORIAL HWY
RIVERSIDE PARK
MISSOURI
MAIN
LAKE
RIVERVIEW
SUMMIT
KEATING
CRESCENT
WILLIAMS
LINCOLN
SWEET
BOWEN
INGALS
INDIANA
ARBOR
IVY
RIVERWOOD
BISMARCK
PORTLAND
BOZEMAN
BOISE
WILLOW
EASY
EASTWOOD
WESTWOOD
BRIGHTWOOD
AUGSBURG
HAMBURG
STUTTGART
MUNICH
BILLINGS
BEDFORD
OBERHAUSEN
DOVER
WASHINGTON
VICTORIA
SUSSEX
PICCADILLY
LONDON
WARWICK
RUTLAND
FREIBURG
DEVON
BURLEIGH
NAUTILUS
MAYFLOWER
CUPPER
SCHOONER
BUCCANEER
MUTINEER
GALLEON
SKYVIEW
SOUTHPORT
HARBOR
MILLS
THAYER
WHISPER
LANGER
SYDNEY
LARSON
GALLATIN
FAR WEST
DEER LODGE
IVES
ENGLAND
TUCSON
WACHITA
LAREDO
HOUSTON
ST LOUIS
MACON
BRIDGEPORT
SAN ANGELO
FRESNO
TROY
SANTA FE
LIVEOAK
MARIETTA
VAPA
BOSTON
COCHINCHOO
IRVINE
LANSING
DENVER
TULSA
CONCORD
ALBANY
ATLANTA
RICHMOND
COLUMBIA
OMAHA
LAHAMIE
POCATELLO
TACOMA
AMERICAN
DELTA
BASIN
UNIVERSITY
BOTTOM

Appendix 5: Ice Dusting

Guidance on Ice Dusting Material

The ideal material for ice dusting has a dark color and a grain size of about 0.1 to 2.5 mm. The application rate for materials with an average grain size of 0.1 mm should be approximately 95 tons/sq mile, with a maximum thickness of 1 cm. The application rate for material with an average grains size of 2.5 mm should be approximately 2,400 tons/sq mile, with a maximum thickness of 1 cm. There are several materials that could be used for ice dusting including but not limited to:

- Sand
- Salt
- Soil
- Leaf Mulch
- Ashes

Due to environmental concerns, the following materials are not allowed: coal dust, bottom slag or other by-products of fossil fuels. Furthermore, it is highly recommended that the Department of Health be consulted during early planning on any potential material other than washed sand.

It is debatable whether using salt in any ice dusting procedure is effective. Some publications have determined that salt actually has an adverse effect on melting ice.

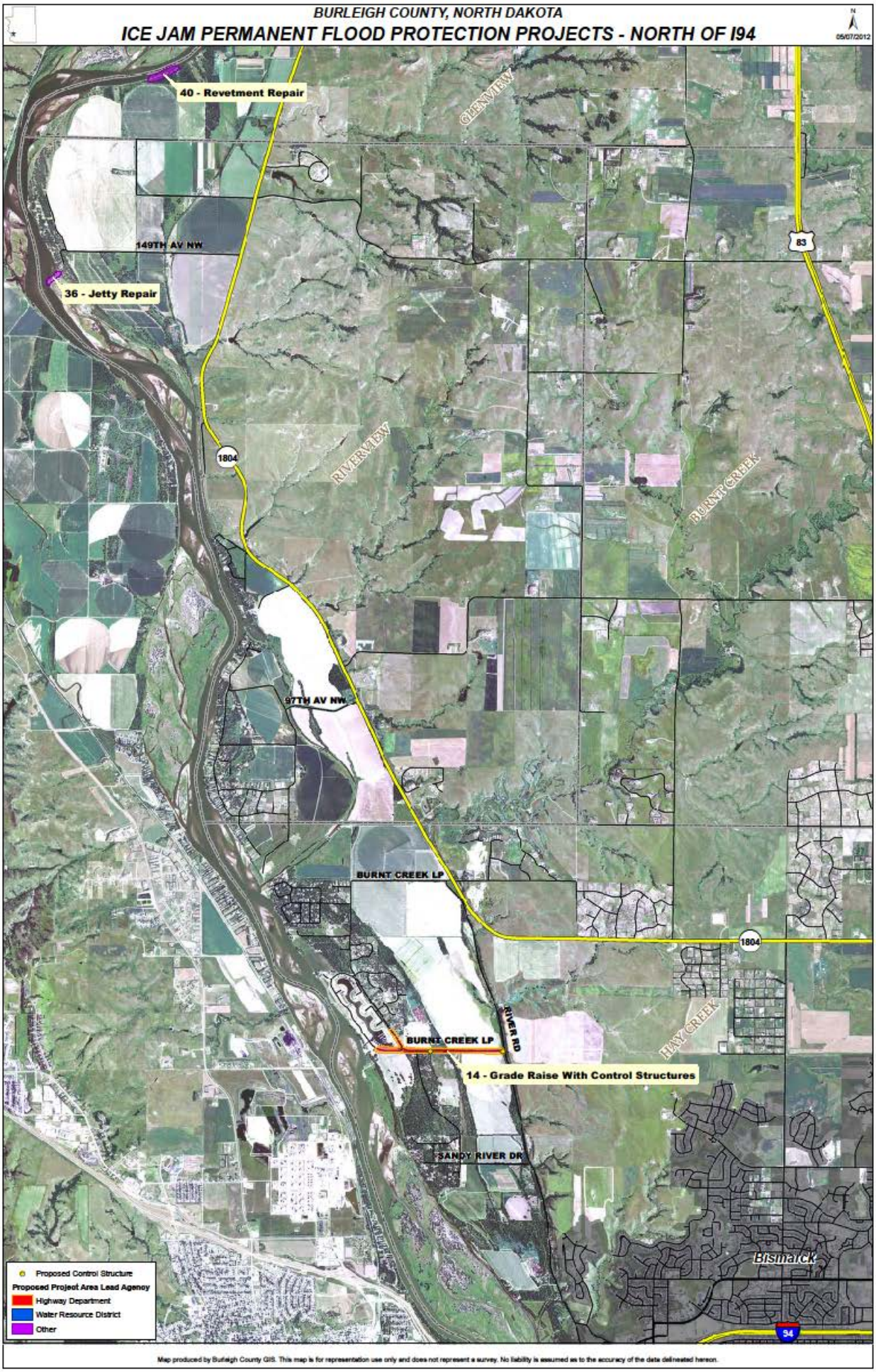
> "Mixing salt with the dust does not appear to increase appreciably the melting rate, and in some cases may reduce it. One reason for this is that salt is a light-colored material and so has a fairly high albedo (Sprigler)." And
> "the addition of rock salt to dusting materials appeared to reduce the long-term effectives of the material." (Arnold)

Other instances may limit the effectiveness of materials applied: wind could blow the material away or snow could cover the material.

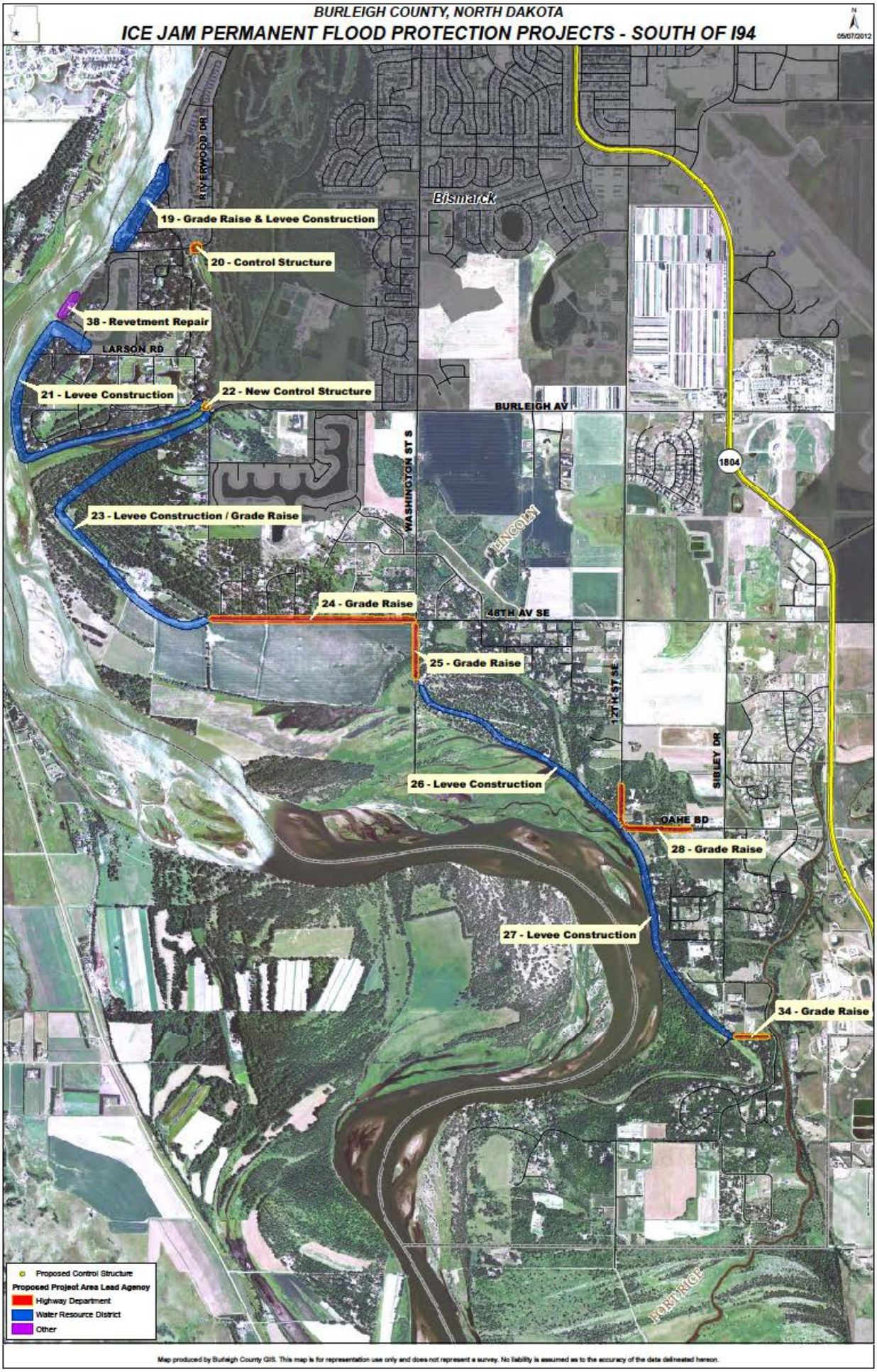
There are several factors that weigh into the decision of when to ice dust, but the rule of thumb is that dusting should be done three to four weeks prior to breakup, with trouble spots dusted even earlier.

Contacts:
Kelly Casteel: 328-2762, kcasteel@nd.gov, ND Water Commission
328-5210, ND Department of Health, Division of Water Quality

Appendix 6: Burleigh County Permanent Flood Protection Projects (North of Interstate 94)


BURLEIGH COUNTY, NORTH DAKOTA
ICE JAM PERMANENT FLOOD PROTECTION PROJECTS - NORTH OF I94
05/07/2012
40 - Revetment Repair
GLENVIEW
149TH AV NW
83
36 - Jetty Repair
1804
RIVERVIEW
BURNT CREEK
97TH AV NW
BURNT CREEK LP
1804
RIVER RD
HAY CREEK
BURNT CREEK LP
14 - Grade Raise With Control Structures
SANDY RIVER DR
Bismarck
94
Proposed Control Structure
Proposed Project Area Lead Agency
Highway Department
Water Resource District
Other
Map produced by Burleigh County GIS. This map is for representation use only and does not represent a survey. No liability is assumed as to the accuracy of the data delineated hereon.

Appendix 7: Burleigh County Permanent Flood Protection Projects (South of Interstate 94)


BURLEIGH COUNTY, NORTH DAKOTA
ICE JAM PERMANENT FLOOD PROTECTION PROJECTS - SOUTH OF I94
05/07/2012
Bismarck
19 - Grade Raise & Levee Construction
20 - Control Structure
38 - Revetment Repair
LARSON RD
21 - Levee Construction
22 - New Control Structure
BURLEIGH AV
WASHINGTON ST S
1804
23 - Levee Construction / Grade Raise
LINCOLN
24 - Grade Raise
46TH AV SE
25 - Grade Raise
127TH ST SE
SIBLEY DR
26 - Levee Construction
OAHE BD
28 - Grade Raise
27 - Levee Construction
34 - Grade Raise
FORT RICE
Proposed Control Structure
Proposed Project Area Lead Agency
Highway Department
Water Resource District
Other
Map produced by Burleigh County GIS. This map is for representation use only and does not represent a survey. No liability is assumed as to the accuracy of the data delineated hereon.

Appendix 8: City of Bismarck South Washington Street Flood Gate Operations and Management Plan

South Washington Street
Flood Gate Operations and Management Plan
June, 2001

SUMMARY OF OPERATION DURING FLOOD EMERGENCY

The City of Bismarck, located on the east bank of the Missouri River, has developed an operation plan during the event of a Missouri River flood emergency. The following report will describe the need, purpose, and proper operation for the principal features of the project. Emphasis has been placed on the operation of the flood control structures, warning systems, evacuation plan, and chain of command.

The City of Bismarck currently has a major stormwater channel in South Bismarck which provides stormwater relief during major rainfall events. The South Bismarck Stormwater Channel (Channel) is approximately 3.5 miles in length and has a 30-foot bottom width, 3:1 side slopes, a gradient of 0.1 % or 0.001 ft/ft, and three street crossings. Each street crossing consists of three 8' x 5' concrete box culverts.

A flood control gate was placed on the west side of the triple 8' x 5' box culvert at South Washington Street when the channel was constructed in 1969. This gate was installed to prevent Missouri River floodwaters from flowing east (i.e., upstream) through the Channel and into southeast Bismarck.

Gate Operation - The Channel gates are to be closed when flows on the Missouri River exceed 74,000 cfs or a 15-foot stage at the Bismarck USGS gage located on the left bank approximately 40 feet upstream from the Bismarck Water Treatment Facility. This translates to a backwater elevation of 1630.8 at the gates. The flood stage at the Bismarck USGS gage is 16-feet.

The key factor in deciding when to close the gates is the projected flow on the Missouri River based on releases from Garrison Dam. The Corps of Engineers in Omaha makes the releases from Garrison Dam and under emergency conditions they typically will provide several days of advanced notice prior to major changes in the release rate. Several other potential flood sources include tributary inflows to the Missouri River and ice jams south of the Tavis Road outfall near the Heart River confluence. While these conditions are less predictable, the National Weather Service provides forecasts on potential flood conditions each spring.

The decision to close the gates will be made by the Director of Utility Operations of the Public Works Department for the City of Bismarck (Director). The Director shall closely monitor the flood forecast to determine the level of protection that will be required. A flood monitoring team shall be developed for each level of flood forecast; Level I, II, or III.

Level I is identified when the Missouri River exceeds 12-feet at the Bismarck USGS gage station. This level requires the Director to closely monitor the flood forecast from both the National Weather Service and the Corps of Engineers. Level I has a group of City of Bismarck employees assigned to monitor the potential for flooding along the riverbanks as well as the Channel.

Level II is identified when the Missouri River exceeds 14-feet at the Bismarck USGS gage station. The level of monitoring and protection will be greatly increased when the river reaches this stage. The Director shall develop the calling tree for contacting the required personnel at any time of the day. The calling tree includes work and home phone numbers, cellular phone numbers, and radio call numbers. All personnel will be notified of their on-call status to be prepared for emergency actions. The personnel from the City of Bismarck will continue to closely monitor flooding along the riverbanks as well as the Channel. Local media shall be notified to distribute the flood-forecast information.

Level III is identified when the Missouri River exceeds 15-feet at the Bismarck USGS gage station. This level triggers the closing of the floodgates on the Channel at Washington Street. Emergency personnel from the City of Bismarck shall close the gates and closely monitor the water levels to assure that the gates have been closed properly and are holding the water back. If the gates are not functioning properly, a secondary emergency plan shall be activated which will involve placing approximately 10,000 cubic yards of clay from the Bismarck Municipal Solid Waste Facility or another available site into the Channel to block the migration of Missouri River floodwaters upstream into the Channel.

Raising of Washington Street - An area south of Burleigh Avenue along Washington Street approximately 800 feet in length between cross sections W and X on the Missouri River Flood Insurance Re-Study maps indicates an area that may allow water to back up and potentially flood low lying areas north of this area. In the event that Level III water levels are forecasted, the City will construct an earthen berm using either sandbags or clay depending on the availability of materials. Personnel from the City of Bismarck Public Works department will construct the berm. The berm will be constructed to a grade that will be adequate to control the 100-year flood event at this location. The berm will be monitored by Public Works personnel around the clock in the event that the water level does exceed the current level of Washington Street in this area.

Emergency Evacuation - Level III will require the Director to work very closely with the Director of Emergency Management, the North Dakota National Guard (if the Governor has declared the flood a disaster), and local media. The media will be requested to notify all citizens via television, radio and newspaper of the dangers of the high floodwaters. The areas in danger will be outlined, and the people in those areas will be placed on standby for emergency evacuation. In the event that the closing of the floodgates or the blocking of the Channel does not function properly, the citizens in eminent danger of flooding will be notified that they must evacuate the areas in danger. The notice to evacuate will be completed via news media as well as door-to-door notification by emergency personnel. The City of Bismarck Police Department and Fire Department will be available to assist with the notification as well as evacuation of citizens needing special care, including elderly and disabled.

The Emergency Management Center will operate a 24-hour emergency phone line for citizens to receive flood status updates as well as provide the location of flood shelters.

INTERNAL STORMWATER MANAGEMENT

Once the gates are closed, the ability to accommodate upstream stormwater runoff becomes extremely limited. In order to accommodate stormwater runoff during this period, the City will be prepared to dewater the Channel to maximize detention storage.

The first line of defense once the gates are closed is to bring in a temporary pump to remove excess waters from the detention storage. The required pump capacity is based on two criteria. The first is a desire to dewater the Channel and storm sewers in a period not to exceed three days. This may require the removal of 82 acre-feet of water (i.e., elevation 1630.8) which will require pumps with a capacity of 15 cfs. The second is to remove a 10-year 6-hour rainfall event or an equivalent of 187 acre-feet over a period of not more than seven days. This also requires pumping capacity of 15 cfs.

Another floodwater removal alternative is a storm sewer connection between the Channel and the man-made lake to the south of the future Santa Fe Avenue. This lake is public property owned by the Bismarck Parks and Recreation District. This connection would be accomplished by extending existing storm sewer approximately 1300 feet to the man-made lake. The routing of floodwaters to the man-made lake would provide the City of Bismarck with an addition 74 acre-feet to 173 acre-feet depending on the amount of water that was allowed to flow into the lake. Although this alternative is not currently constructed, the City will continue to construct these facilities as the property is annexed into the City. If the entire pipeline is not completed, this alternative could also be accomplished, in the case of an emergency situation, by excavating an open channel to allow the water to flow to the man-made lake.

Appendix 9: Pre-Identified Material Locations for Levee Construction

- Bismarck Municipal Landfill
- Yegen Road/Apple Creek Road
- Bismarck Water Treatment Plan
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Appendix 10: Pre-Identified Sandbag Sites

Outdoor
Missouri Valley Complex

Indoor
Bismarck Civic Center
- Exhibit Hall A/B
- Arena

Self-Fill Site Locations
Locations will be identified and publicized dependent upon flood type and resources.

Possible locations include:
- Missouri Valley Complex
- Sertoma Park parking lot near amusement and zoo, and west of maintenance shop
- Cottonwood Park parking lot off Santa Fee Ave
- Archery Range parking lot on Riverwood Drive
- Horse Arena parking lot on Riverwood Drive
- Horizon School parking lot off Ash Coulee
- Ash Coulee water tower site
- BSC community bowl parking lot west of Aquatic Center along Canary Ave
- Sibley Park on South Washington Street
- Whispering Bay Shoreline Drive turnaround
- Hogue Island park property near playground and boat ramp
- Riverwood Golf Course parking lot

Appendix 11: Forms – Volunteer Waiver Form

Informed Consent, Waiver and Release of Liability Agreement
Burleigh County Sandbagging Operations

The undersigned, being at least 18 (eighteen) years of age, does hereby agree to this consent, waiver, and release of liability.

Acknowledgement and Assumption of Risk
I recognize that the sandbagging operations will involve physical labor and may carry a risk of personal injury. I hereby agree to assume all risks which may be associated with or may result from my participation in this effort.

I also recognize that the physical activity and may cause physical and emotional discomfort. I state that I am free from any known heart or other health problems that could prevent me from participating. I further state that I am sufficiently physically fit to participate in the activities.

Waiver and Release of Liability
I agree to release Burleigh County, their agencies, departments, officers, employees, agents, and all sponsors and/or officials and staff of any said entity or person, their representatives, agents, affiliates, directors, servants, volunteers, and employees from the cost of any medical care that I receive while participating in this activity or as a result of it.

I further agree to waive, release, and discharge Burleigh County from any and all liability, claims, demands, actions, and causes of actions whatsoever, except to the extent prohibited by N.D.C.C. § 9-08-02, for any loss, claim, damage, injury, illness, attorney's fees or harm of any kind or nature to me arising out of any and all activities associated with participating in this activity or as a result of it.

Consent
In the event of injury while participating in any and all activities associated with the Program, I consent to receive any emergency medical aid, anesthesia, and/or medical treatment or operation if, in the opinion of the attending physician, such treatment is necessary.

I, the undersigned participant, affirm that I am at least 18 years of age and am freely signing this agreement. I have read this form and fully understand that by signing this form I am giving up legal rights and/or remedies which may otherwise be available to me regarding any losses I may sustain as a result of my participation. I agree that if any portion is held invalid, the remainder will continue in full legal force and effect.

READ BEFORE SIGNING

NAME: _____

SIGNATURE: _____ DATE: _____

WITNESS: _____ DATE: _____

Return completed form to Burleigh County Emergency Management.

Authorization for Participants Under 18 Years of Age

NAME OF MINOR_____

NAME OF MINOR_____

NAME OF MINOR_____

NAME OF MINOR_____

NAME OF MINOR_____

I have read the "Informed Consent, Waiver and Release of Liability Agreement" and do hereby authorize and give permission for the above-names minor(s) to participate in Burleigh County Sandbagging Operations.

PARENT/GUARDIAN NAME_____

_____

PARENT/GUARDIAN SIGNATURE DATE

WITNESS: _____DATE: _____

Return completed form to Burleigh County Emergency Management.

Appendix 13: Forms – Volunteer Registration Form

Volunteer Registration Form

Date	Name	Mark if less than age 18?	Phone #	Location	Activity	Time In	Time Out	Total Hours

Return completed form to Burleigh County Emergency Management.