

Sibley Island Flood Control



Flood Hazard Mitigation Memorandum

To: Terry Fleck, Chairman
Burleigh County WRD

From: Craig Odenbach, P.E.

Date: October 26, 2013

Subject: Feasibility Assessment

Background:

The Burleigh County Water Resource District directed Houston Engineering, Inc. to conduct a feasibility level assessment of the potential to construct a flood control project for the Glenwood Estates/Falconer Estates areas south of the City of Bismarck. These areas, lying south of 48th Avenue SE and east of Washington Street, were not protected by the temporary flood control measures constructed during the 2011 flood event.

A Public Informational Meeting was held October 25, 2012 to receive public input and gage support for permanent flood control measures. A memorandum summarizing this meeting is attached. In general, those present expressed support for further evaluation of a project to provide flood protection. The concerns ranged from the projected costs to the levee's location, its impacts to yards and trees, and public access. Some questioned the cost and whether the money would be better spent dredging the Missouri River. Others questioned the likelihood of a recurrence of a Missouri River flood of a similar magnitude to the 2011 flood event, but noted the threat of flooding from ice jam events is ongoing, and the risk is real.

It was readily apparent after a technical review that this project may be best approached in two segments: the area immediately north of Sibley Island and south of 48th Avenue being the first segment, and the area south of Oahe Bend being the second. A discussion of these segments is provided sequentially as follows.

Sibley Island Levee

A potential levee alignment is illustrated on **Figure 1**. This alignment initiates on Washington Street, then follows the existing roadway through much of the Sibley Island Park, crosses the backwater channel at the location of an existing dam and crossing, then extends to the south/southeast to the intersection of South 12th Street and Oahe Bend. This is one of three alignments that were originally considered, and preliminary evaluations concluded Alignment #2, **Figure 1**, was the most cost effective and viable route.

A meeting was held with representatives of Bismarck Parks and Recreation District (BPRD) and the US Army Corps of Engineers (COE) to discuss the potential levee alignments through the park on property owned by the COE. The BPRD manages the park facilities under a lease agreement with the COE. Concerns with the identified route include access to the camping spots along the roadway and interruptions that would occur during the camping season. It was explained that the road would only need to be raised minimally through most of the park, and providing reasonably level access to camping pads should not be a problem. There were also discussions related to widening the existing roadway to accommodate a marked bike trail and the future pedestrian trail being considered along the west side of Washington Street to the park.

A portion of the Washington Street grade raise that was part of the Lincoln Township roadway project being constructed by the Burleigh County Highway Department was removed from their project. This segment

impacted the COE's property, and, due to the timing required to obtain additional easements for construction, it was determined this work should be postponed and completed as part of the Sibley Island Levee segment. The costs to construct this portion of the levee system would be paid by Lincoln Township; therefore these costs are not included in this memorandum.

A feasibility level Opinion of Probable Cost was developed for the Sibley Island Levee segment and is summarized below. A more detailed summary is attached. The approximate cost per lot is based on 108 lots being located within the benefited area. These costs could change significantly if cost share assistance were provided by the State Water Commission for the levee portion or if other sources of funding were found to offset some of the paving costs.

| Sibley Island Levee | |
|-------------------------------|---------------------|
| Construction | \$ 1,027,202 |
| Geotechnical | \$ 10,000 |
| Engineering | \$ 184,897 |
| Administration | \$ 82,176 |
| Levee Total | \$ 1,304,275 |
| Cost Per Lot | \$ 12,076 |
| Sibley Island Paving | |
| Construction | \$ 427,963 |
| Engineering | \$ 77,033 |
| Administration | \$ 34,237 |
| Paving Total | \$ 539,233 |
| Project Combined Total | \$ 1,843,508 |
| Cost Per Lot | \$ 17,070 |

The area potentially benefitted by the construction of the Sibley Island Levee is illustrated on **Figure 2**. Paving within the park would not be considered an assessed cost to the properties. These costs likely would be paid through other funding mechanisms, such as federal/state recreational grants or park district funds.

Oahe Bend Levee – Alternative #1

Two potential alignments remain under consideration to protect the area south of Oahe Bend/Falconer Estates. Alternative #1 involves a levee running along the rear or west side of the riverward lots from Oahe Bend to Dogwood Drive as illustrated on **Figure 3**. This alignment would cross several residential lots and would vary significantly in height with an average of around two (2) feet. A feasibility level Opinion of Probable Cost was developed for Alternative #1 and is summarized below. A more detailed summary is attached. The approximate cost per lot is based on 133 lots being located within the benefited area.

| Oahe Bend Levee – Alternative #1 | |
|----------------------------------|---------------------|
| Construction | \$ 852,941 |
| Geotechnical | \$ 10,000 |
| Engineering | \$ 153,530 |
| Administration | \$ 68,235 |
| Levee Total | \$ 1,084,706 |
| Cost Per Lot | \$ 8,156 |

Based on feedback received during the initial Public Informational Meeting, there will likely be many issues that need to be resolved with locating the levee across any residential lot. These will include tree removal, impacts to the property, impacts or changes to the viewshed, sprinkler systems and proximity to houses. These issues have been raised on other projects under consideration by the BCWRD and have resulted in considerable time and expense to attempt finding common ground or resolution. Therefore, serious consideration needs to be given to options that would avoid such conflicts. While this may result in some residential structures being placed on the riverward side of the levee the project cannot be constructed without landowner agreement.

The area potentially benefitted by the construction of this segment is illustrated on **Figure 4**.

Oahe Bend Levee – Alternative #2

Another alternative considered for this second segment (Alternative #2) was to extend the levee south/southwest from Dogwood Drive, then south across a backwater channel, then across the area near the Girl Scout Campgrounds, where it would tie into Sibley Drive as illustrated on **Figure 5**. This extension south from Dogwood Drive would also provide some protection to portions of the Briardale Area. A feasibility level Opinion of Probable Cost was developed for Alternative #2 as summarized below. A more detailed summary is attached. The approximate cost per lot is based on 155 lots being located within the benefited area.

| Oahe Bend Levee – Alternative #2 | |
|---|---------------------|
| Construction | \$ 1,357,962 |
| Geotechnical | \$ 10,000 |
| Engineering | \$ 244,433 |
| Administration | \$ 108,637 |
| Levee Total | \$ 1,721,033 |
| Cost Per Lot | \$ 11,103 |

The levee extension south from Dogwood Drive would appear to have significant regulatory hurdles to overcome. It would require two crossings of the old backwater channel, possibly triggering the need for a permit under Section 404 of the Clean Water Act, as well as the potential need for authorization from the State Engineer to construct the project on Sovereign Lands of North Dakota.

The additional area potentially benefitted by the extension of the levee is illustrated on **Figure 6**. Given the limited number of additional properties protected, the question has to be raised as to the value of the additional cost for this alternative. Further consideration of the benefits and the number of lots that could be provided an increased measure of protection is required before completion of the preliminary engineering report phase for project development.

Conclusions and Next Steps

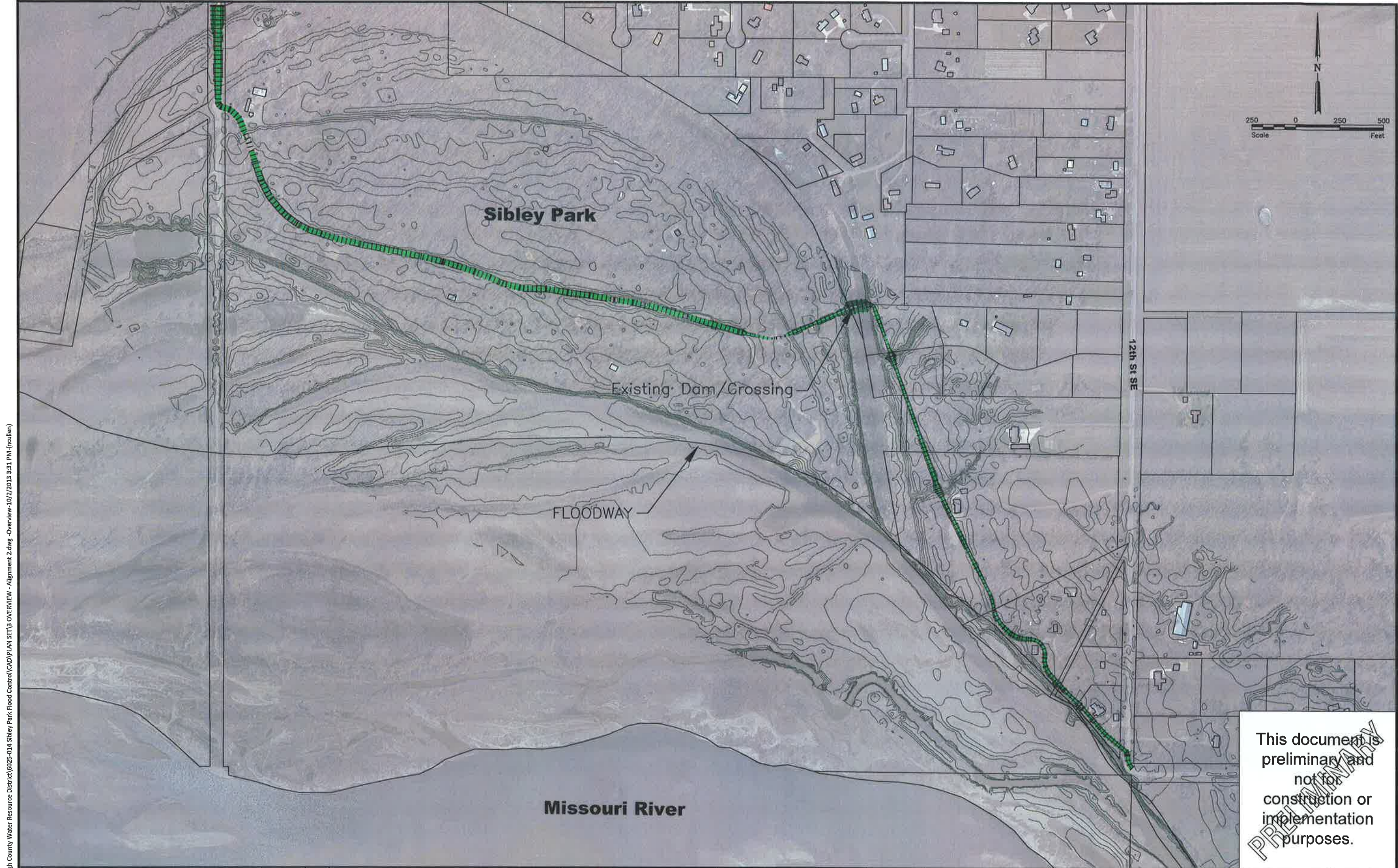
The entire project could be put to a vote of the benefitted parties and allowed to pass or fail on its merits, or each segment could be taken to the voter's independently. The Sibley Island Levee provides the intended benefits regardless of whether or not the levee segments to the south are constructed, whereas the southern areas are only protected if the Sibley Island Levee is constructed. Therefore, it appears prudent to first proceed with project development and a vote of the potentially benefitted landowners for the Sibley Island Levee. Should these landowners vote to proceed with a project, then consideration could be given to the Oahe Bend Levee. This next segment could be developed in two stages, depending on public feedback, with the Oahe Bend to Dogwood Drive as a second project, and the levee from Dogwood Drive to Sibley Drive as a potential third project.

Now that preliminary alignments have been identified and feasibility level opinions of probable cost developed, the next step would be to conduct a second Public Informational Meeting to present these findings, explain the anticipated process, and gather additional feedback.

Given the nature of constructing such projects on private properties, the Sibley Island Levee appears to have the greatest potential to be carried forward to completion. Developing the other levee segments will require a greater consensus regarding support by the residents before proceeding, specifically those on whose property the levee may be located. The BCWRD may wish to consider conducting a straw poll to document support or requesting a petition from those interested in a project, prior to incurring significant project development expense.

The next step in developing the Sibley Island Levee would be to formalize a Preliminary Engineering Report then proceed to a public hearing and project vote. If that vote fails, further project development would cease, because, without this levee, the southern levees would not be effective. If the vote passes, then a Preliminary Engineering Report could be developed for the area south of Oahe Bend, and a public hearing and vote would be scheduled for that segment. This would be preceded by a careful measure of public support and interest in the project.

One element not evaluated in this feasibility study is the impact to water surface elevations on the Missouri River. The proposed alignments do not encroach on the designated floodway boundary. An evaluation of the project's potential impact on water surface elevations could occur as part of the preliminary engineering report for a project or it could be included in the permitting phase. The impacts on river elevations should be evaluated to provide assurances to neighboring properties related to project implementation.



This document is preliminary and not for construction or implementation purposes.

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| No. | Revision | Date | By |
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Houston
Engineering Inc.

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| Bismarck | Drawn by NRC | Date 10-2-13 |
| P: 701.323.0200 F: 701.323.0300 | Checked by MHG | Scale AS SHOWN |

SIBLEY ISLAND
ALIGNMENT 2
BISMARCK, ND

ALIGNMENT 2
OVERVIEW
PROJECT NO. 6025-014

FIGURE
1

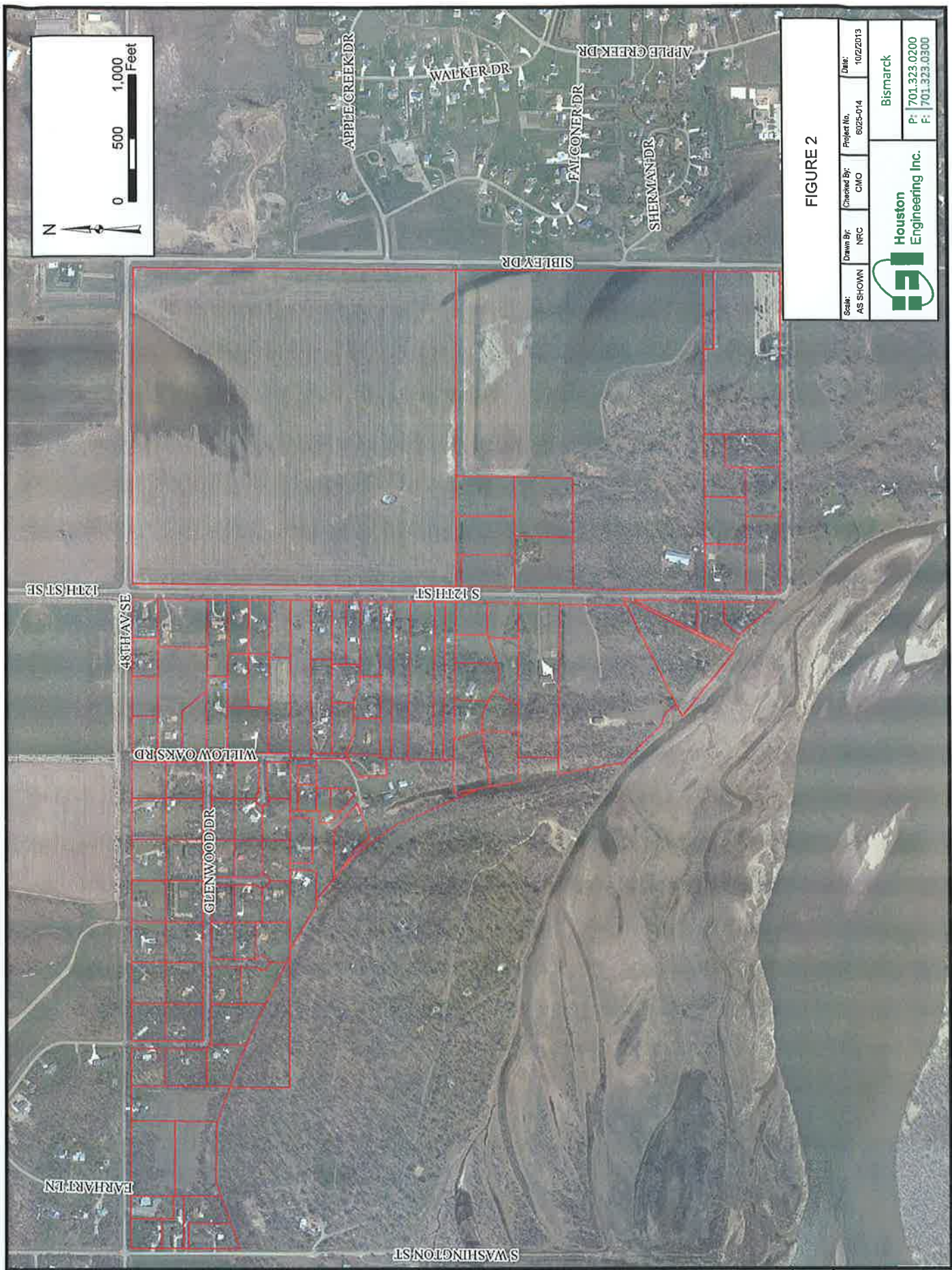

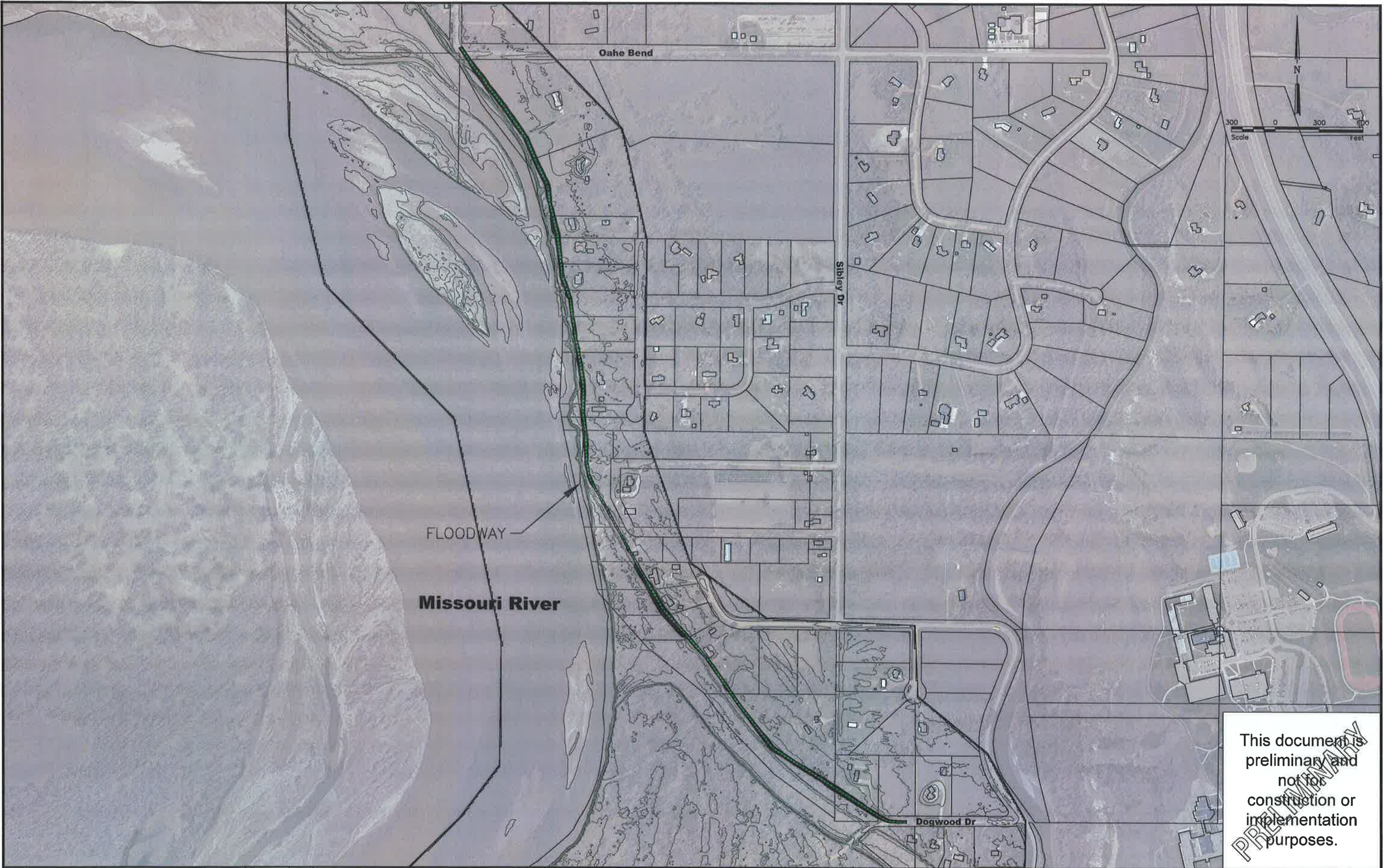


FIGURE 2

| | | | | |
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| Scale: | Drawn By: | Checked By: | Project No. | Date: |
| AS SHOWN | NRC | CNO | 6025-014 | 10/2/2013 |
|  Houston Engineering Inc. | | | | Bismarck |
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| SIBLEY SOUTH ALIGNMENT BURLEIGH COUNTY, ND |
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| OVERVIEW |
| PROJECT NO. 6025-XXX |

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| FIGURE |
| 3 |

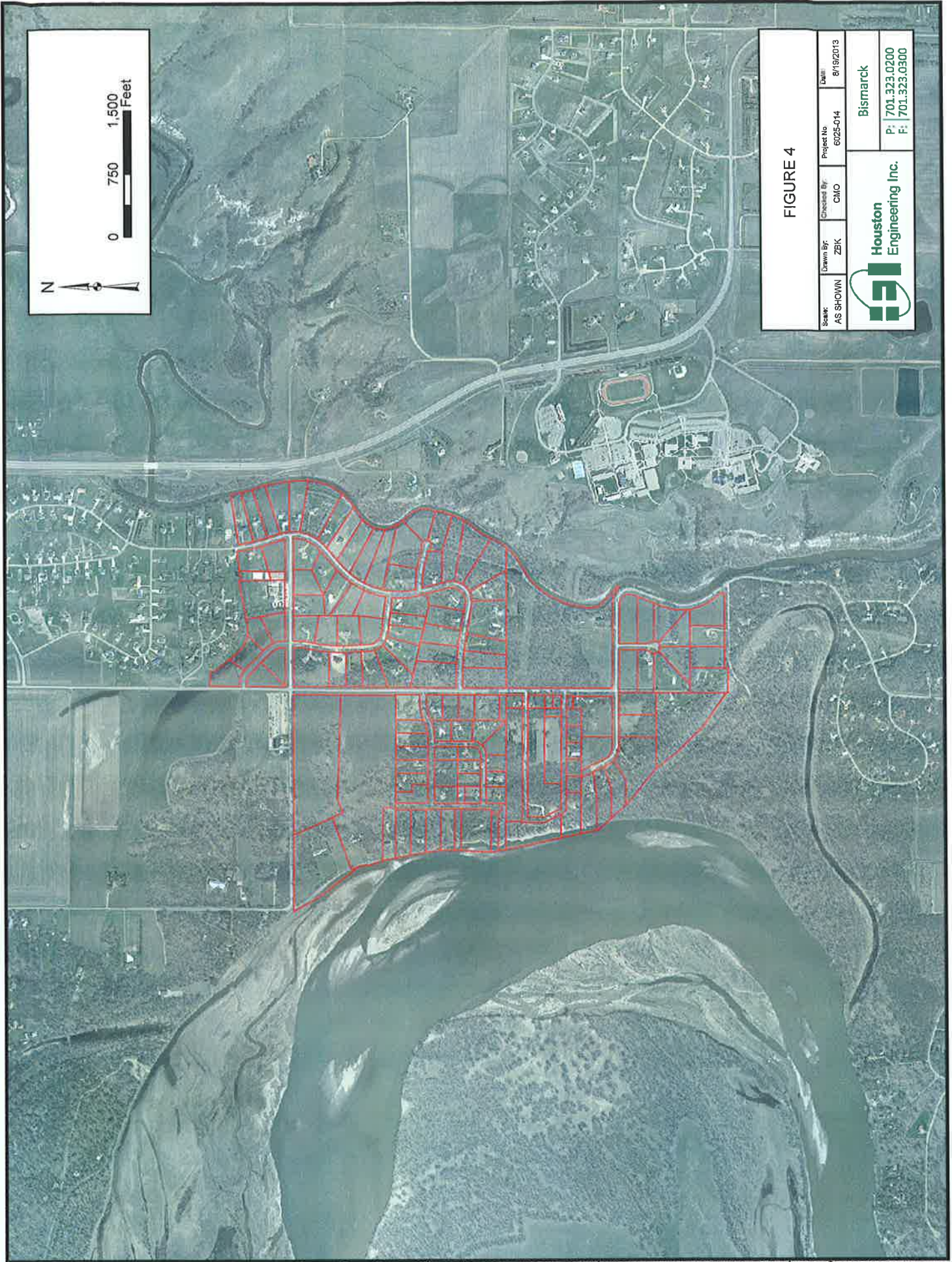
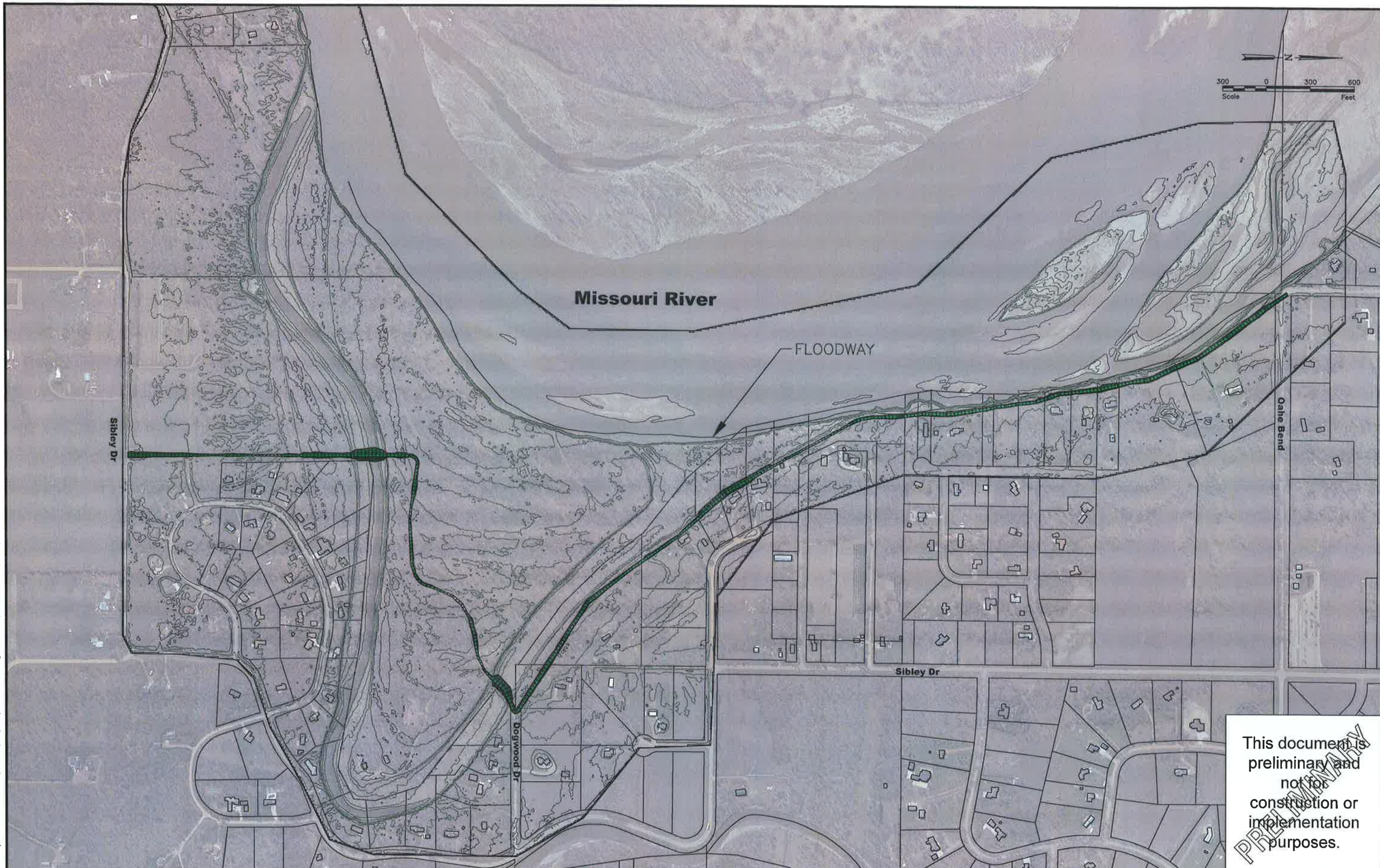


FIGURE 4

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This document is preliminary and not for construction or implementation purposes.

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| | | | |  | Bismarck | Drawn by NRC | Date 10-2-13 | SIBLEY SOUTH ALIGNMENT ALT 2 BURLEIGH COUNTY, ND | OVERVIEW PROJECT NO. 6025-XXX | FIGURE 5 |
| | | | | | P: 701.323.0200 F: 701.323.0300 | Checked by MHG | Scale AS SHOWN | | | |
| No. | Revision | Date | By | | PROJECT NO. 6025-XXX | | | | | |

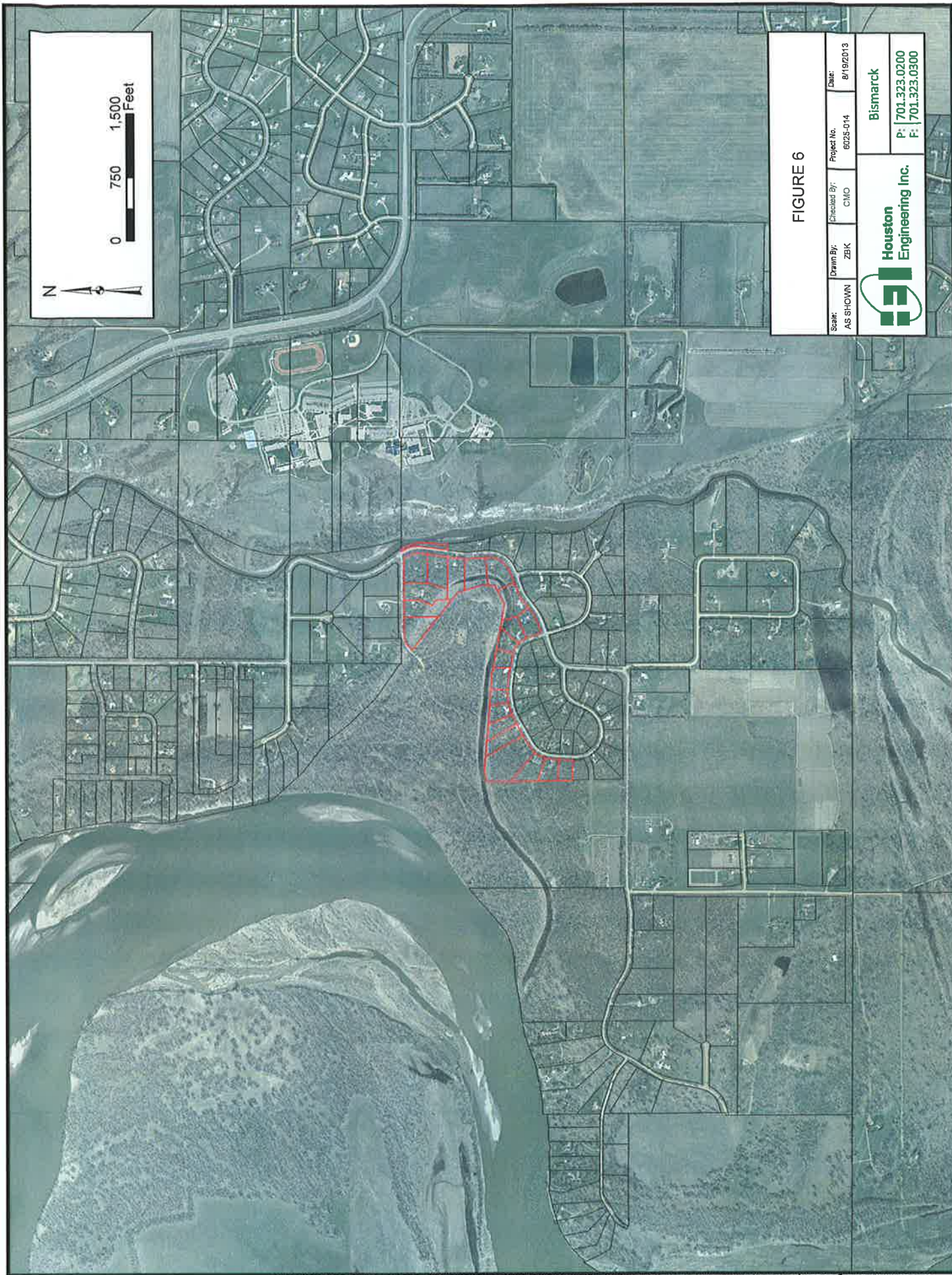


FIGURE 6

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|--------------------------|-----------|-------------|-------------|-----------------|
| Scale: | Drawn By: | Checked By: | Project No. | Date: |
| AS SHOWN | ZBK | CNO | 6025-014 | 8/19/2013 |
| Houston Engineering Inc. | | | | Bismarck |
| P: 701.323.0200 | | | | F: 701.323.0300 |

Sibley Island Levee Washington Street to Oahe Bend

Opinion of Probable Cost - Feasability

HEI# 6025-014

Thursday, September 26, 2013

| Item No. | Description | Quantity | Unit | Unit Price | Amount |
|----------------------------|--------------------------------------|----------|-------|--------------|------------------------|
| 1 | Contract Bond | 1 | L SUM | \$ 44,660.98 | \$ 44,660.98 |
| 2 | Mobilization | 1 | L SUM | \$ 89,321.95 | \$ 89,321.95 |
| 3 | Pipe Conduit 18" | 1,120 | LF | \$ 112.00 | \$ 125,440.75 |
| 4 | Pipe Conduit 36" | 156 | LF | \$ 134.00 | \$ 20,904.00 |
| 5 | Sluice Gate & Connection | 26 | EA | \$ 6,500 | \$ 165,880.87 |
| 6 | Remove, Stockpile, & Replace Topsoil | 8.57 | Acre | \$ 2,800 | \$ 23,985.48 |
| 7 | Saw Bituminous Surfacing | 60 | LF | \$ 3.00 | \$ 180.00 |
| 8 | Removal of Bituminous Surfacing | 13451 | SY | \$ 5.75 | \$ 77,342.68 |
| 9 | Excavation Waste | 1524 | CY | \$ 11.00 | \$ 16,767.29 |
| 10 | Levee Embankment - Fat Clay | 14992 | CY | \$ 8.90 | \$ 133,427.46 |
| 11 | Tree Removal | 239 | EA | \$ 750.00 | \$ 179,010.90 |
| 12 | Erosion Control Levee | 17974 | SY | \$ 3.50 | \$ 62,907.95 |
| 13 | Seeding & Hydromulch | 8.66 | Acre | \$ 5,005 | \$ 43,338.92 |
| 14 | Silt Fence | 16012 | LF | \$ 2.75 | \$ 44,033.22 |
| Construction Cost = | | | | | \$ 1,027,202.44 |

| | |
|---|---------------|
| Geotechnical | \$ 10,000.00 |
| Engineering (Design and Const. Mgmt Services) | \$ 184,896.44 |
| Administration (ROW, Legal, Admin) | \$ 82,176.19 |

Total Levee Cost \$ 1,304,275.07

Township/County Paving Cost

| Item No. | Description | Quantity | Unit | Unit Price | Amount |
|----------------------------|-------------------------------|----------|-------|--------------|----------------------|
| 1 | Contract Bond | 1 | L SUM | \$ 18,607.06 | \$ 18,607.06 |
| 2 | Mobilization | 1 | L SUM | \$ 37,214.12 | \$ 37,214.12 |
| 3 | Hot Bituminous Pavement CL 29 | 2989 | TON | \$ 45.00 | \$ 134,508.87 |
| 4 | Asphlat Cement | 179 | TON | \$ 600.00 | \$ 107,607.09 |
| 5 | Aggregate Base Course CL 5 | 4484 | TON | \$ 29.00 | \$ 130,025.24 |
| Construction Cost = | | | | | \$ 427,962.37 |

| | |
|---|--------------|
| Engineering (Design and Const. Mgmt Services) | \$ 77,033.23 |
| Administration (ROW, Legal, Admin) | \$ 34,236.99 |

Total Roadway Cost \$ 539,232.59

Total Project Cost \$ 1,843,507.66

Oahe Bend Levee

Oahe Bend to Dogwood Drive - Alternative #1

Opinion of Probable Cost - Feasibility

HEI# 6025-014

Tuesday, September 26, 2013

| Item No. | Description | Quantity | Unit | Unit Price | Amount |
|----------------------------|--------------------------------------|----------|-------|--------------|----------------------|
| 1 | Contract Bond | 1 | L SUM | \$ 37,084.40 | \$ 37,084.40 |
| 2 | Mobilization | 1 | L SUM | \$ 74,168.80 | \$ 74,168.80 |
| 3 | Pipe Conduit 18" | 871 | LF | \$ 112.00 | \$ 97,546.40 |
| 4 | Sluice Gate & Connection | 21 | EA | \$ 6,500 | \$ 133,503.50 |
| 5 | Remove, Stockpile, & Replace Topsoil | 8.78 | Acre | \$ 2,800 | \$ 24,596.44 |
| 6 | Excavation Waste | 4161 | CY | \$ 11.00 | \$ 45,766.52 |
| 7 | Levee Embankment - Fat Clay | 17756 | CY | \$ 8.90 | \$ 158,032.52 |
| 8 | Tree Removal | 194 | EA | \$ 750.00 | \$ 145,388.25 |
| 9 | Erosion Control Levee | 16145 | SY | \$ 3.50 | \$ 56,506.61 |
| 10 | Seeding & Hydromulch | 8.90 | Acre | \$ 5,005 | \$ 44,533.46 |
| 11 | Silt Fence | 13023 | LF | \$ 2.75 | \$ 35,814.35 |
| Construction Cost = | | | | | \$ 852,941.25 |

| | |
|--|---------------|
| Geotechnical | \$ 10,000.00 |
| Engineering (Design and Const. Mgmt Services) | \$ 153,529.42 |
| Administration (ROW, Legal, Admin) | \$ 68,235.30 |

Total Levee Cost \$ 1,084,705.97

Oahe Bend Levee

Oahe Bend to Briardale Drive - Alternative #2

Opinion of Probable Cost - Feasibility

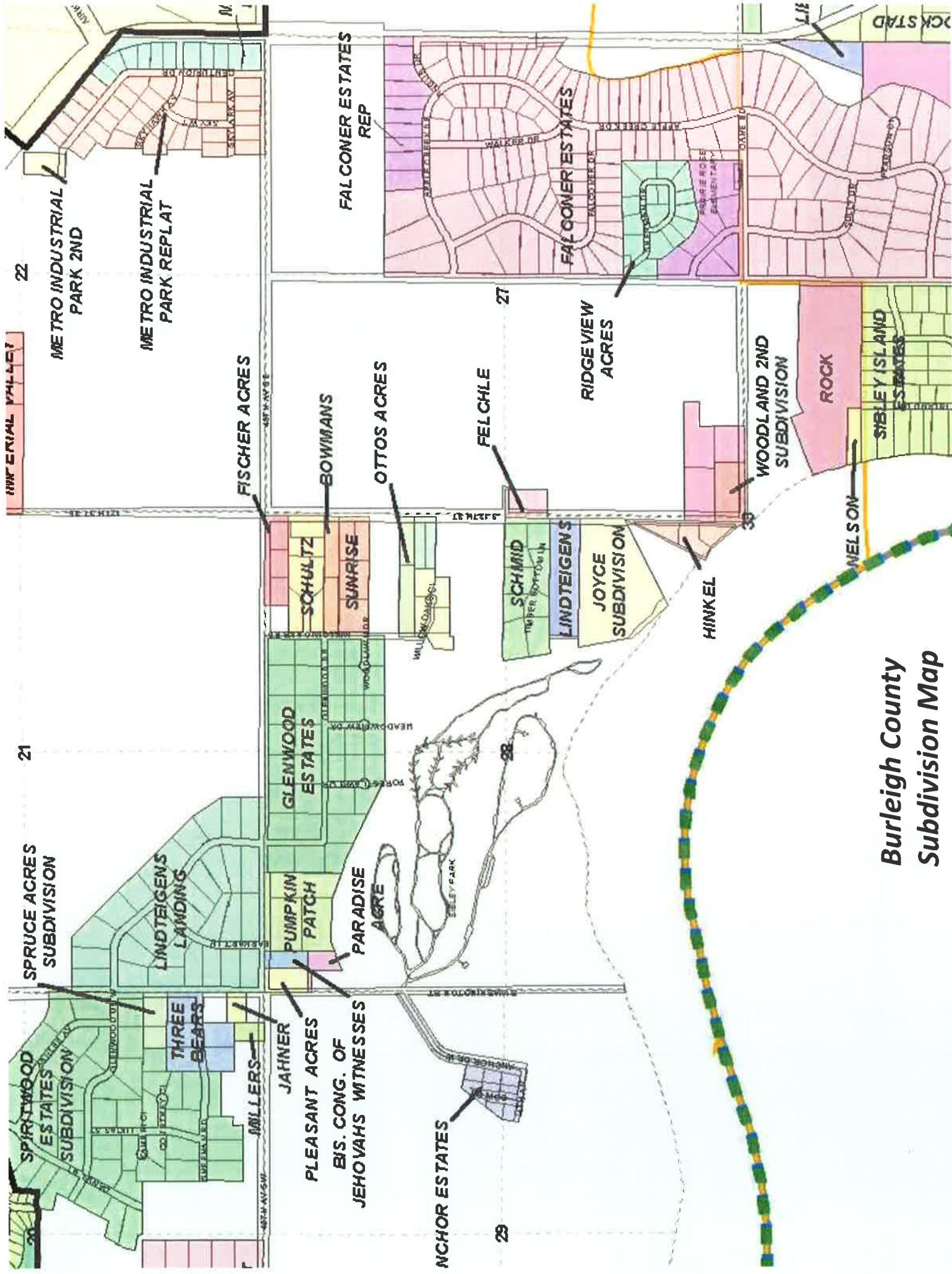
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Tuesday, September 26, 2013

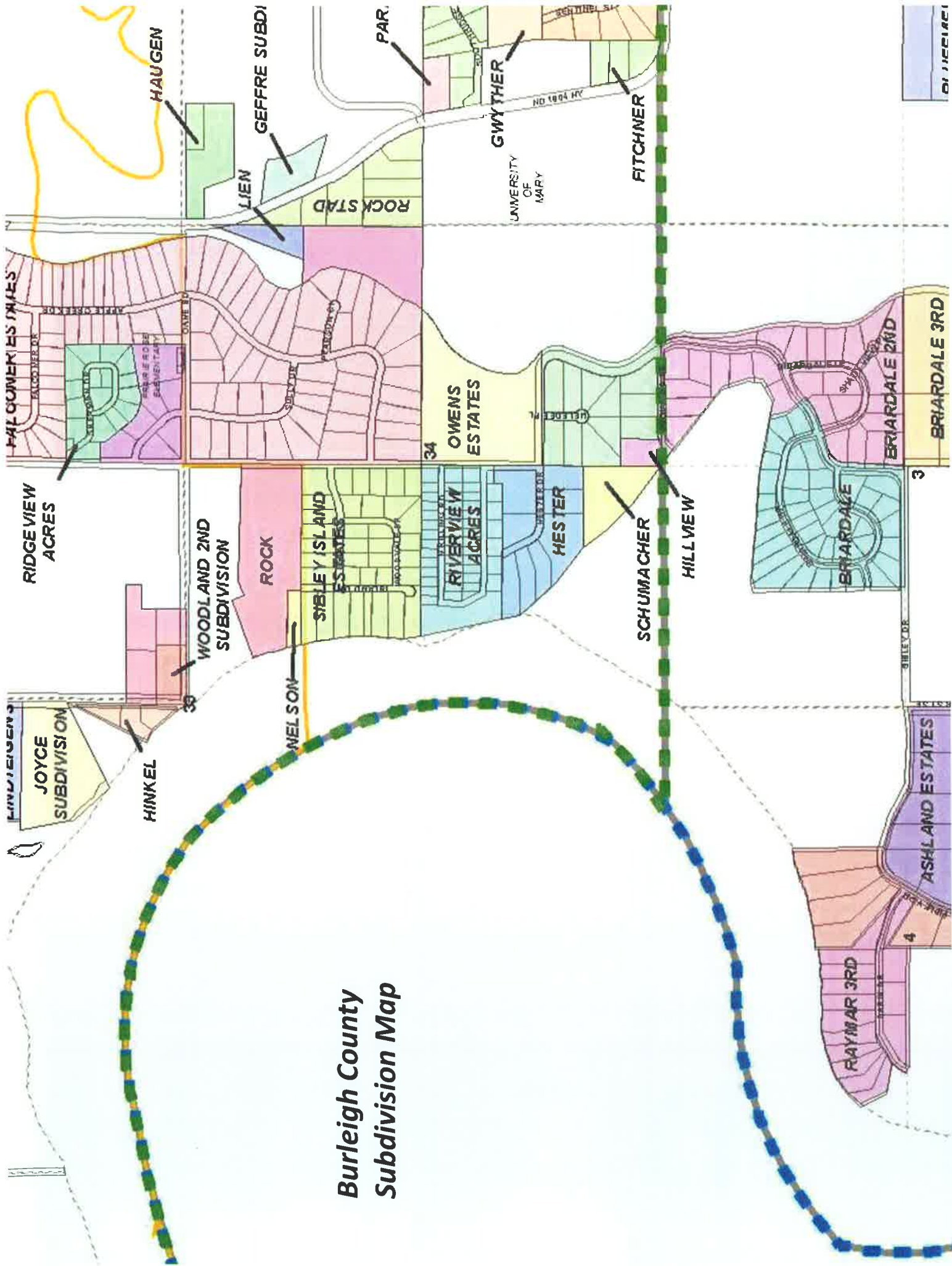
| Item No. | Description | Quantity | Unit | Unit Price | Amount |
|----------------------------|--------------------------------------|----------|-------|---------------|------------------------|
| 1 | Contract Bond | 1 | L SUM | \$ 59,041.87 | \$ 59,041.87 |
| 2 | Mobilization | 1 | L SUM | \$ 118,083.73 | \$ 118,083.73 |
| 3 | Pipe Conduit 18" | 1,517 | LF | \$ 112.00 | \$ 169,879.73 |
| 4 | Sluice Gate & Connection | 33 | EA | \$ 6,500 | \$ 217,461.83 |
| 5 | Remove, Stockpile, & Replace Topsoil | 13.85 | Acre | \$ 2,800 | \$ 38,792.73 |
| 6 | Excavation Waste | 5437 | CY | \$ 11.00 | \$ 59,809.04 |
| 7 | Levee Embankment - Fat Clay | 27774 | CY | \$ 8.90 | \$ 247,191.67 |
| 8 | Tree Removal | 310 | EA | \$ 750.00 | \$ 232,575.75 |
| 9 | Erosion Control Levee | 25082 | SY | \$ 3.50 | \$ 87,786.77 |
| 10 | Seeding & Hydromulch | 14.03 | Acre | \$ 5,005 | \$ 70,212.96 |
| 11 | Silt Fence | 20773 | LF | \$ 2.75 | \$ 57,126.85 |
| Construction Cost = | | | | | \$ 1,357,962.94 |

| | |
|---|---------------|
| Geotechnical | \$ 10,000.00 |
| Engineering (Design and Const. Mgmt Services) | \$ 244,433.33 |
| Administration (ROW, Legal, Admin) | \$ 108,637.04 |

Total Levee Cost \$ 1,721,033.31



Burleigh County
Subdivision Map



**Burleigh County
Subdivision Map**

MEMO

Meeting Summary



HoustonEngineering Inc.

To: Burleigh County Water Resource District

**From: Craig Odenbach, P.E.
Michael Gunsch, P.E.**

Date: October 30, 2012

**Subject: Sibley Island Flood Control Project
Public Informational Meeting**

The Burleigh County Water Resource District hosted a Public Informational Meeting for the proposed Sibley Island Area Flood Control Project on October 25, 2012 in the Tom Baker Meeting Room in the City/County Building. The meeting related to the Sibley Island project was held from 7:00 pm to 8:30 pm, immediately following a similar meeting for the Missouri River Correctional Center Flood Control Project which was held from 5:30 pm to 7:00 pm.

A total of 30 people signed the attendance roster for the Sibley Island meeting. In addition to members of the public, Gordon Weixel of the Burleigh County Water Resource District was in attendance along with Michael Gunsch and Craig Odenbach of Houston Engineering.

Michael opened the meeting with a presentation outlining potential alternative configurations for a project that would include the construction of a levee system from Washington Street across Sibley Island Park to a proposed grade raise at Oahe Bend and from Oahe Bend southward to a proposed grade raise at 76th Avenue. Michael explained that the project would be funded through the establishment of an assessment district with cost share assistance potentially being provided by the ND State Water Commission.

The process of forming an assessment district including the public hearing and vote process was also explained. The WRD will proceed with development of a preliminary engineering assessment that will include an opinion of probable cost and anticipated assessments. A second public informational meeting will be conducted after which the WRD would look to the residents to file petitions for development of a project.

Michael also noted that we do not know whether the SWC would provide conditional approval for the eligible cost share prior to the vote. If they did, the residents would then be able to vote on the reduced assessment.

After Michael's presentation the meeting was opened to questions from the public. Several questions had to do with the scope of the benefited area and the assessment district. Many questioned whether the area east of Sibley Drive and the area along Apple Creek would benefit from the project and should thus be assessed. It was noted that the breakout flows from the Missouri River to Apple Creek would be eliminated, thus those living along Apple Creek would also benefit. Others felt that the entire area south of Burleigh Avenue would benefit and should thus be assessed.

Other questions dealt with the petition process. They questioned what level of support needed to be shown in the petition process. Michael responded that since the project would require a 50% favorable vote, it would be good to see greater than 50% of the landowner's names on the petitions. Others were concerned about the level of commitment associated with signing of the petition. It was explained that signing the petition does not commit anyone to any sort of assessment, as only the actual vote can do that. Signing the petition is simply an indication that you support proceeding further with development of a project. However, they were urged to only sign the petition if they are truly supportive, as this will be the means whereby the WRD assesses the level of support for the project.

MEMO



Others questioned why we were proposing 0.7 feet of freeboard. Michael explained that this was the level of protection identified during the Burleigh County Flood Control Master Planning effort. This would provide real protection up to the levels experienced during the 2011 flood event. Although some might argue that protecting up to the 2011 flood levels is unreasonably conservative, given the infrequency of the event, this level was also chosen to provide protection in the case of future ice jam events. Michael also explained that the proposed project would not result in a certified levee, thus neither flood insurance requirements nor base flood elevations would change.

There was continued discussion of the risks associated with potential ice jam events. Some residents expressed a significant level of concern. Some suggested that perhaps the money being spent on the various flood control projects would be better spent in an effort to dredge the Missouri River channel. The fact that additional instrumentation is being installed to detect ice jam events was also noted.

Other concerns dealt with the details of how the levees would be constructed in the areas where they would be crossing residential lots. The usual concerns with impacts to irrigation systems, rip rap and existing trees were expressed. Michael explained that the levee area would remain private property, and the landowners would be allowed to mow and to irrigate the area, but they would not be allowed to bury irrigation systems within the levee, and the levee, in its entirety, would need to remain free of trees and shrubs. The general public would have no right to access the levee. Michael also noted the possibility of incorporating flood walls in those areas where the levee would be difficult to fit within the residential lot. However, these sorts of detailed decisions would not be made until the final design stage. Similarly, in those areas where roadways are being raised, the re-grading of driveways would be included in the cost of the project.

It was suggested that those residents owning lots where the levee would be located should receive no assessment as compensation for the impacts to their property. Michael explained that we have taken those impacts into account when determining assessments for other projects.

In spite of one person's attempt to re-direct the conversation to right of way issues associated with the 48th Avenue Grade Raise, this was a good discussion. It was clear that the public is generally supportive of continuing work toward developing a project in this area. Although the extent of the assessment area and the resulting costs to the residents will be key issues in receiving a positive vote.