Comprehensive Master Drainage Analysis
Hayti, South Dakota

August 2025

STOCKWELL

Project: Comprehensive Master Drainage Analysis
Hayti, South Dakota

SEI Project #: 24255

Date: July 14, 2025

I hereby certify that this report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the state of South Dakota.

DRAFT

Mitchell M. Mergen, P.E.
S.D. Registration No. 9237



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EXECUTIVE SUMMARY

Stockwell Engineers was authorized by the town of Hayti to assess its existing stormwater collection and conveyance system, identify areas of concern, and provide recommendations. Estimated flow rates of existing conditions during minor and major rainfall events are provided in this report to be used as a planning tool for future capital improvement projects within the town.

SCOPE OF STUDY

The scope of services for this project includes the following:

- Review background information provided by the town of Hayti.
- Collect topographic survey data of controlling storm drainage structures with the town limits. Perform drone flight to collect LiDAR elevation data of the town of Hayti.
- Delineate drainage basin boundaries and determine each basin's composite CN value based on land use and soil type.
- Develop a combined Hydrologic and Hydraulic model for each basin to estimate peak flows and runoff routing for the minor and major rainfall events using XPSWMM.
- Prepare a report that includes overall drainage maps with basin boundaries identified, existing stormwater facilities and locations, results of Hydrologic and Hydraulic analysis, and recommendations for improvements.

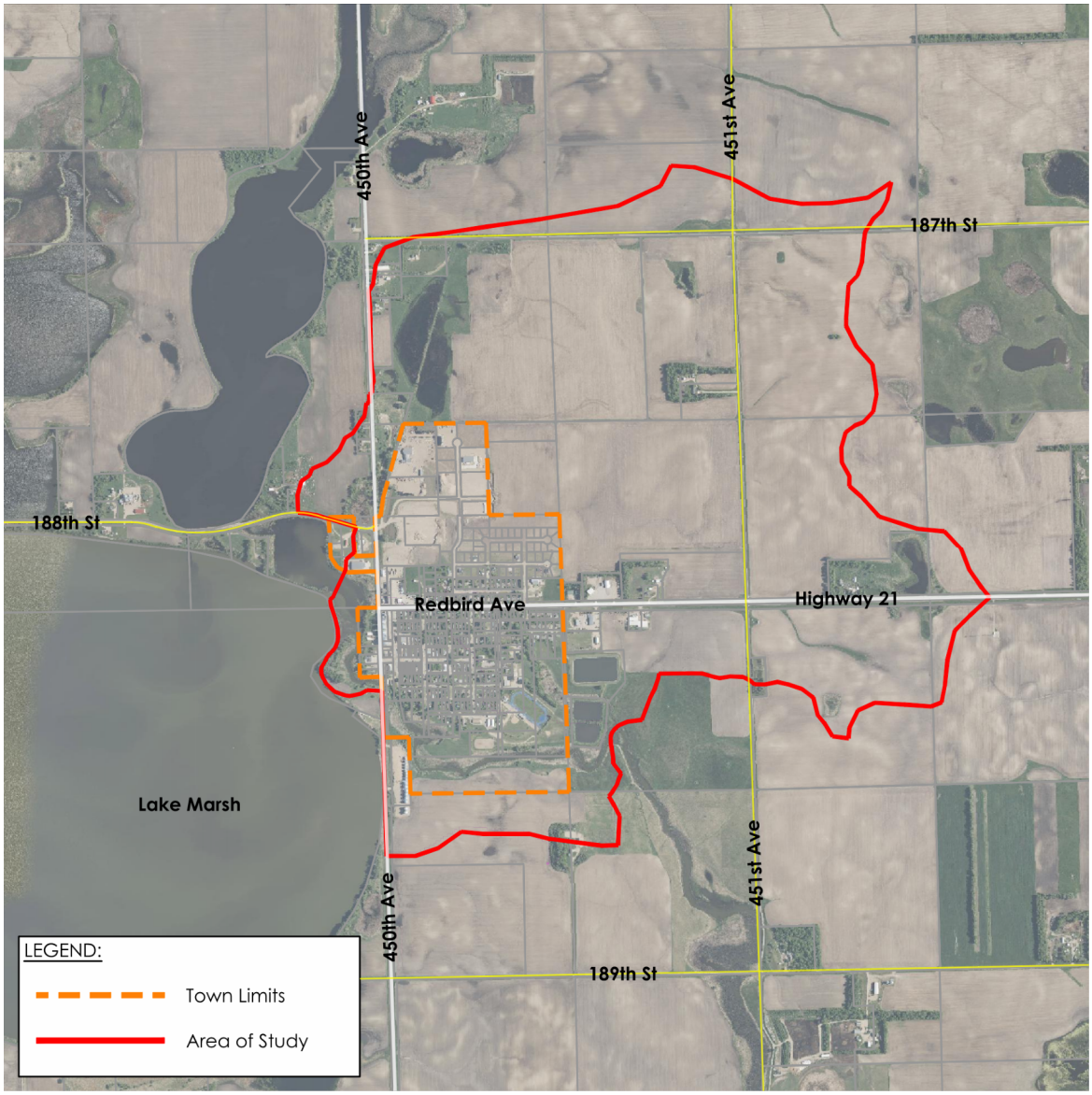
PROJECT OVERVIEW

PURPOSE OF ANALYSIS

The purpose of this study is to evaluate the existing stormwater collection and conveyance system, identify areas of concern, and make recommendations based on the town's current needs. This study incorporates the town's projected growth and land use, based on the 2024 Town of Hayti Comprehensive Land Use Plan prepared by SECOG (South Eastern Council of Governments).

AREA OF STUDY

Hayti, the county seat of Hamlin County, is located in east central South Dakota, along the northeast border of Lake Marsh. This study covers approximately 1,416 acres of land, 290 of which are located within the town limits. The study extends beyond the town to include any areas contributing to Hayti's stormwater drainage. The terrain within town is generally consistent with gentle slopes, while areas outside of the town have greater variance and steeper slopes.

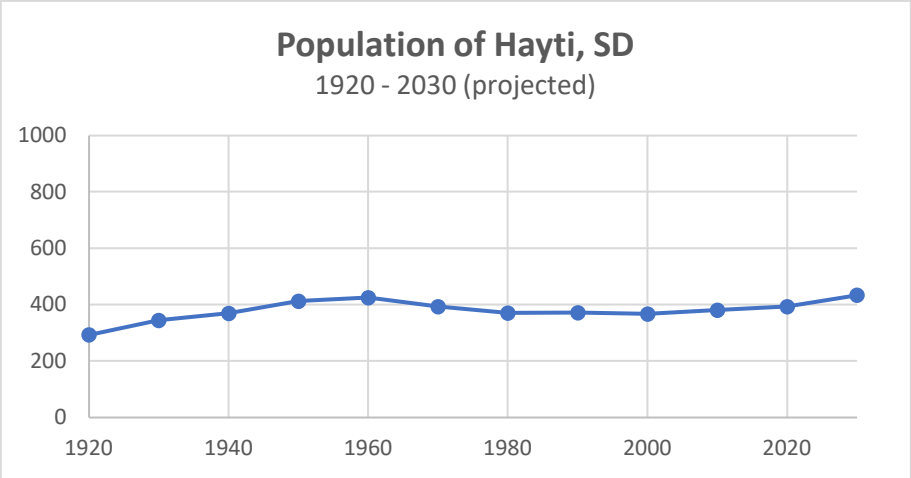


PROJECT BACKGROUND

TOWN DETAILS AND POPULATION

Hayti is governed by a five-member Council and a Finance Officer. According to the 2024 Plan by SECOG, Hayti and its surrounding area is designated primarily as agricultural and low-density residential areas. The estimated population of Hayti in 2023 was 393.

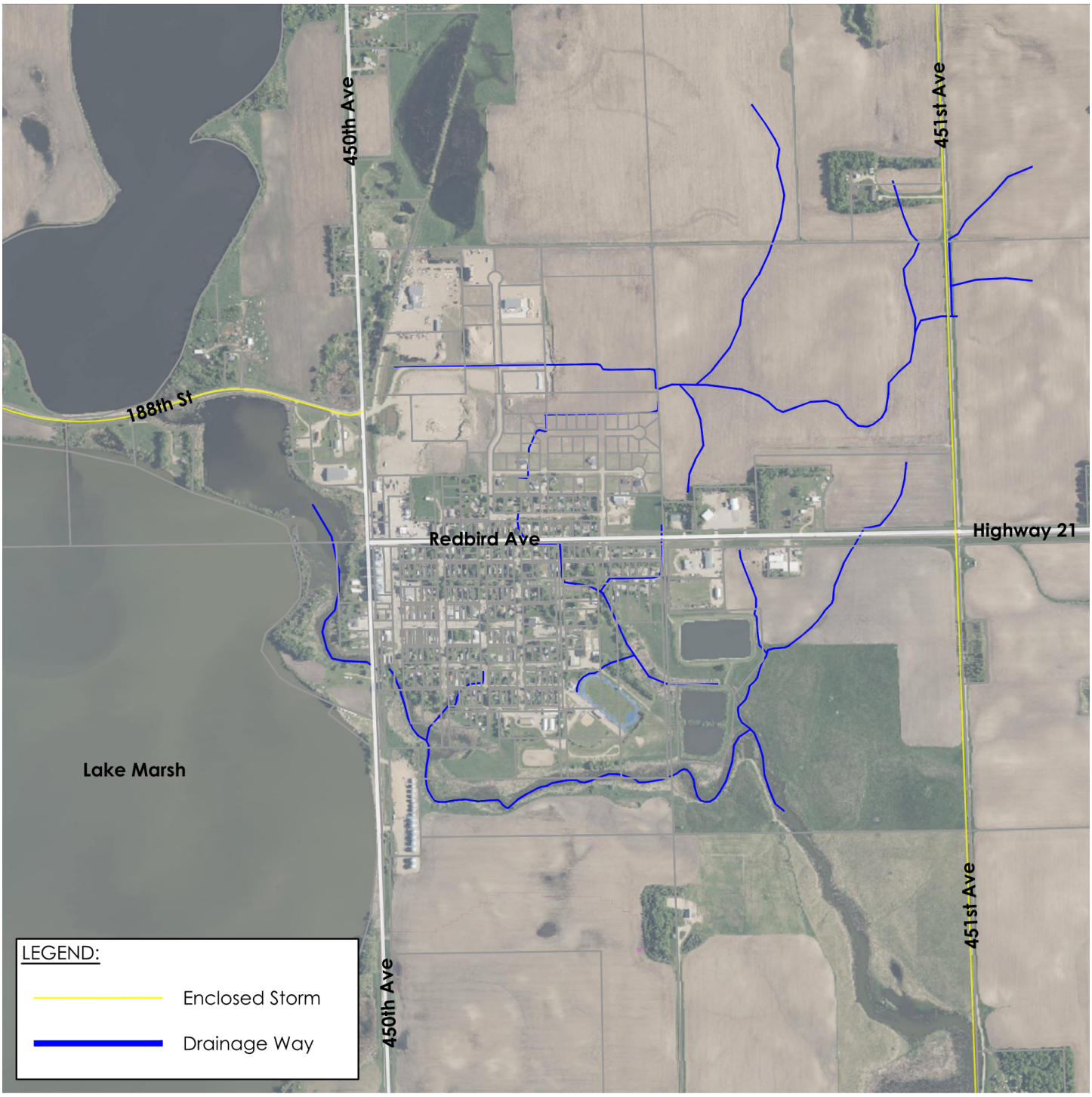
The 2024 Plan includes population and land use projections for the town based on trends observed during the base year of the study. Since the 1940's, the town of Hayti's population has fluctuated slightly, but has generally remained around 400 residents. During that time the highest recorded population was 425 from the 1960 census and the lowest population was 367 from the 2000 census. Hayti is considered to have a stable population and by 2030 the population is anticipated to reach 434.



EXISTING CONDITIONS

The existing drainage infrastructure includes some enclosed storm sewer systems, open channels, culverts and natural detention facilities. Currently, the town of Hayti has minimal enclosed storm sewer networks. The enclosed storm networks are located along Redbird Avenue and 5th Street, within the Hayti Football Field, and within the industrial properties bordering 451st St.

Runoff is mostly conveyed along roadside ditches and small culverts at driveway approaches and road crossings. All storm drainage flowing through or generated by Hayti ultimately drains south through established drainage ways that are tributary to Lake Norden, four miles south of town, which in turn is part of the Big Sioux River watershed.


450th Ave
451st Ave
188th St
Redbird Ave
Highway 21
Lake Marsh
450th Ave
451st Ave
LEGEND:
Enclosed Storm
Drainage Way

PLAN DEVELOPMENT

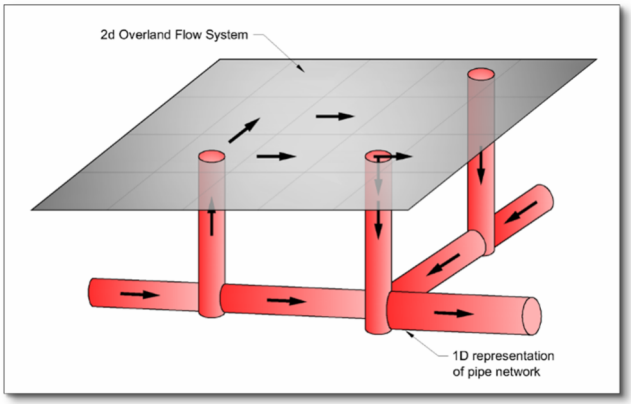
DESIGN PROCEDURE

Stockwell's stormwater models were developed using AutoCAD to create accurate terrain of the area and XPSWMM to simulate and record the results of storm events. This process involved:

- **Defining Basins:** Identifying major watershed boundaries that drain to specific points and dividing them into smaller sub-basins.
- **Land Use and Runoff Analysis:** Utilizing the 2024 Comprehensive Land Use Plan to determine land use data (e.g., residential, agricultural) and surface characteristics data (soil type and imperviousness). This data is used to calculate runoff coefficients, which in turn determines how much rainfall becomes runoff.
- **Time of Concentration:** Calculating the time it takes for runoff to travel from the farthest point in a sub-basin to its discharge point. Time of concentration primarily contributes to each basin's peak flow rate.
- **Existing System Integration:** Incorporating the field survey data of existing storm sewer pipes and culverts into the model. This data includes the sizes, shapes, materials and elevations of the stormwater infrastructure.
- **Storm Event Simulation:** Running simulations for both minor and major rainfall events. The intensity and duration of each event are based on historical records, and are defined as follows:
    - **Minor event:** This scenario simulates a storm event with a 20% annual chance of occurrence, commonly referred to as a 5-year storm.
    - **Major event:** This scenario represents a storm event with a 1% annual chance of occurrence, commonly referred to as a 100-year storm.

1D/2D INTEGRATED MODELING

The models created for this analysis were built using XPSWMM modeling software. Integrated 1D/2D modeling allows for flow to be simulated using both 1D and 2D elements. 1D elements include conveyance elements that transfer flow in one direction, including pipe networks, open channels, detention facilities, culverts, pumps, orifices and weirs. These elements can be located and input into the model based on topographic information gathered in the field. 2D elements include a high-resolution Digital Elevation Model (DEM). The DEM provides a detailed representation of the terrain surface for hydraulic routing through the model area. These are a fundamental component for two-dimensional engineering analyses. 2D elements also include floodplain areas where flows, velocities, and depths can be calculated on the surface. The model integrates the 1D and 2D elements at nodes or links where flow is shared or transferred.



The surface elevation that encompasses the tributary basin used for this analysis was derived from Light Detection and Ranging (LiDAR) data flown for Hayti as part of this project. Stockwell Engineers completed both aerial and ground surveys to collect location and elevation data. LiDAR data was collected with a drone in November of 2024, prior to any snowfall and after foliage had fallen from trees. The LiDAR data was used to develop the DEM, providing a detailed representation of the surface for each revision area. The LiDAR data captured has a vertical and horizontal accuracy of 5 cm.

The 2D models allow for accurate representation of shallow overland flows as well as identifying potential storage in floodplains and low-lying areas throughout each basin. Properly estimating natural detention can have a significant impact on development.

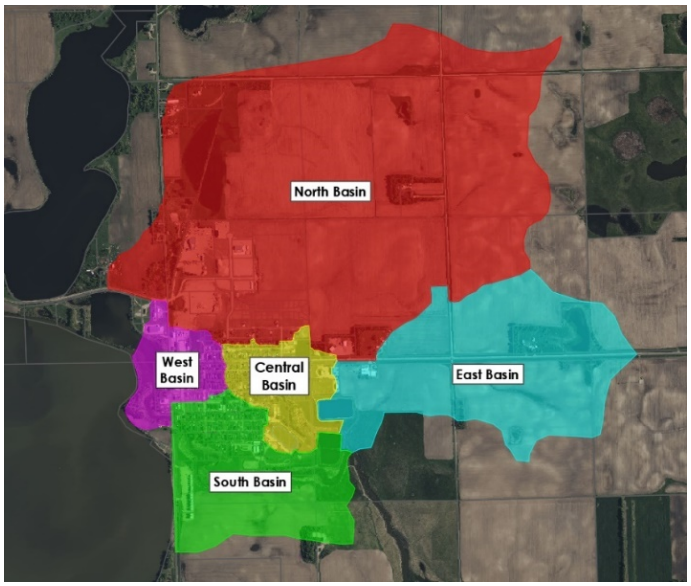


BASIN ANALYSIS

OVERVIEW OF EXISTING BASINS

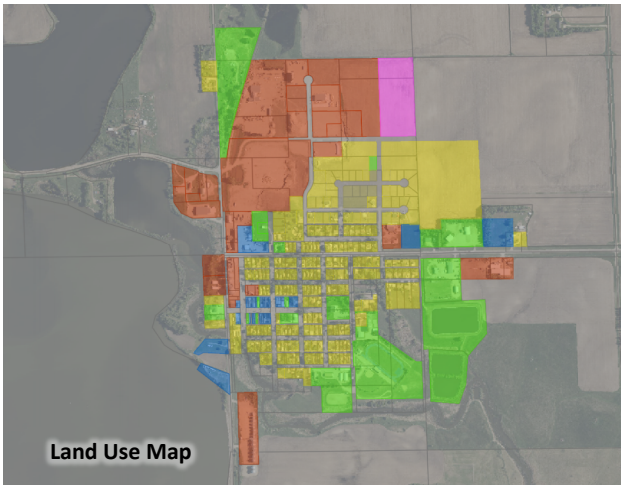
See Drawings 1-5

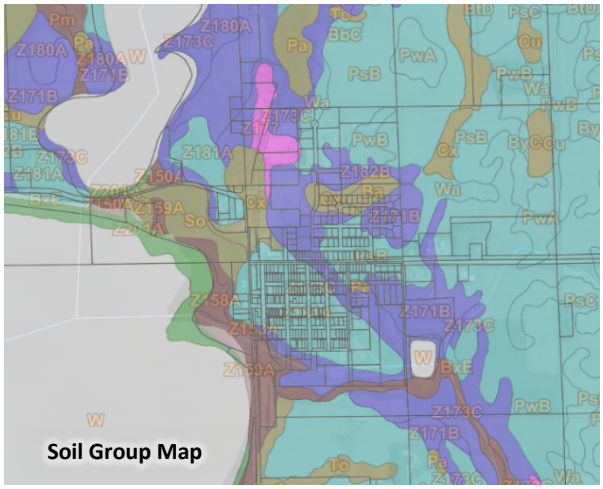
Basin delineation is critical to developing peak flows to properly size enclosed storm sewer systems. There are five primary basins which define drainage in Hayti: **North Basin**, **South Basin, East Basin, West Basin and Central Basin**.



These primary basins encompass the major watershed boundaries within, and adjacent to, the town of Hayti. Each basin has unique drainage features and challenges, which are detailed further in the report, including:

- **Sub-basin Hydrology:** runoff potential was calculated for each sub-basin using the SCS Type II rainfall event, incorporating drainage area, time of concentration, and CN values calculated from the Land Use and Hydrologic Soils Group.
- **Results:** The model provides inundation maps identifying areas where runoff accumulates within each basin. Flow rates, maximum capacities, and high-water elevations at all stormwater infrastructure is also tabulated for the minor and major events.


Land Use Map


Soil Group Map

NORTH BASIN

EXISTING CONDITIONS

The North Basin encompasses approximately 830 acres north of Redbird Ave, primarily consisting of agricultural property. It also includes existing residential, public, commercial, and industrial land use. Future residential developments and mixed-use properties were included with this basin's analysis. The basin drains towards an unnamed tributary channel that runs along 450th Ave on the west side of town.

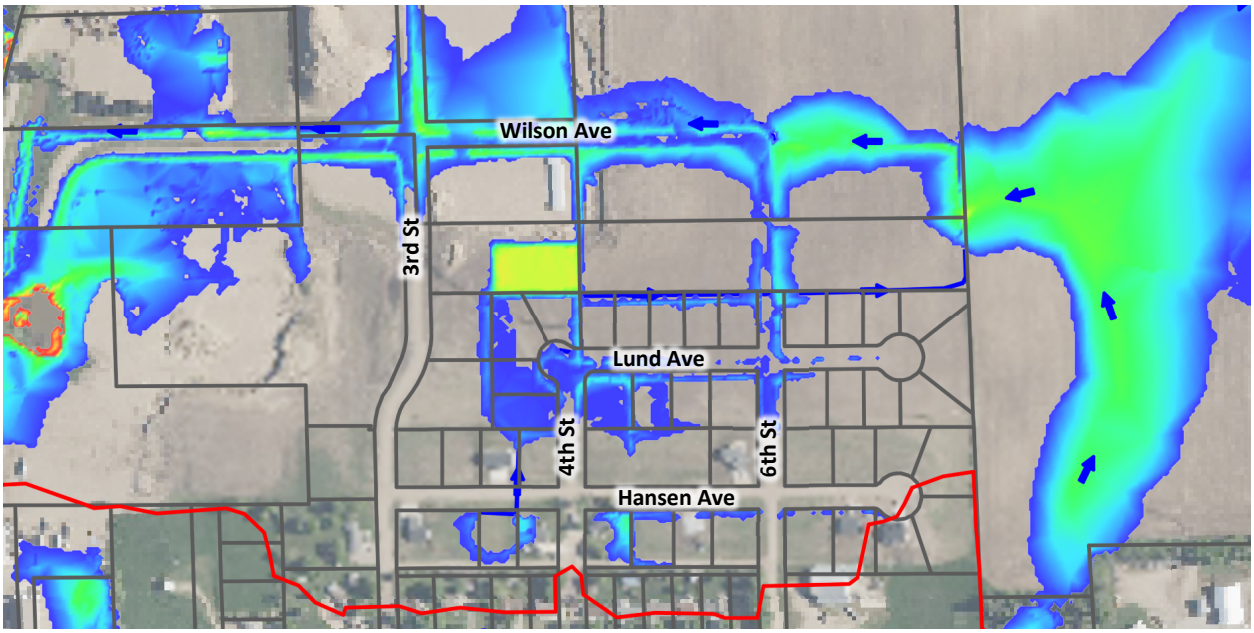
All culverts identified within the North Basin seemed to be in good working condition. Most of the drainage takes place within roadside ditches and small culverts at driveway approaches and road crossings, with some curb and gutter conveyance along 3rd Street and 4th Street. The North Basin has natural storage from multiple small freshwater ponds and wetland areas along 450th Ave and the railroad tracks along the west side of town.



SIMULATION RESULTS AND AREAS OF CONCERN

See Drawings 6-8 for the North Basin inundation map, and tables providing flow rates, maximum capacities, and high-water elevations at all stormwater infrastructure.

The following image identifies areas of excessive inundation during a major storm event. Properties along the 4th Street, Lund Ave and Wilson Ave have the most ponding within the North Basin.



In addition to identifying areas with drainage issues, Hayti staff have inquired if the new residential developments will have a negative effect on the town's runoff. The model does not show any overtopping from the North Basin into other portions of town. However, there is concern of localized ponding at the new residential properties.

RECOMMENDATIONS FOR THE NORTH BASIN

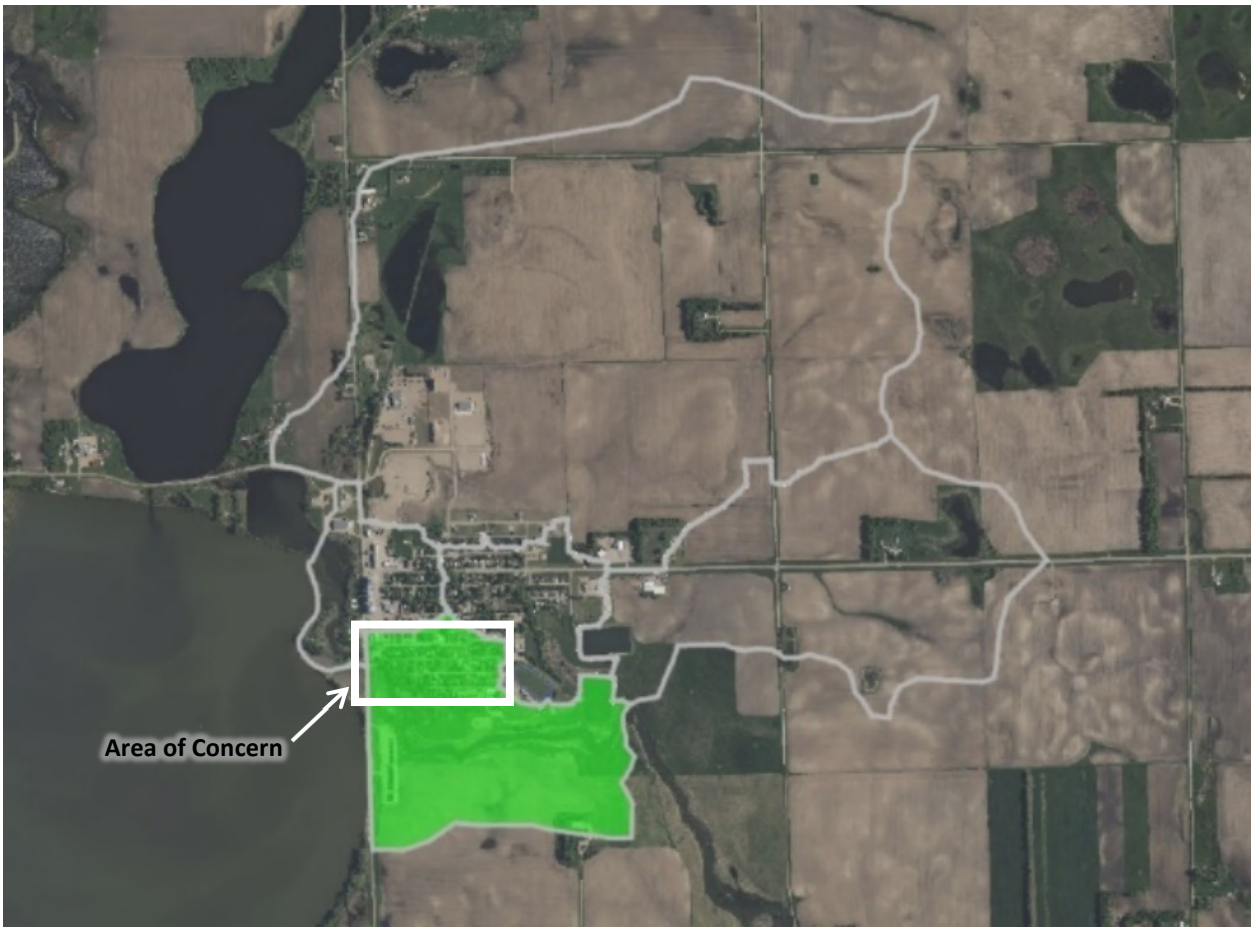
- Using the results of this report, Stockwell recommends developers submit a detailed stormwater mitigation plan. The plan must be approved by Hayti prior to construction.
- Encourage developers to install urban streets with curb and gutter, and reconstruct existing rural streets as funding becomes available.
- Consider upstream detention ponds to limit storm runoff from entering town.
- Property owners experiencing localized flooding (not caused by runoff from the public right of way) should consider installing facilities to manage the runoff.
- Install enclosed storm sewer systems that convey runoff from inundated areas to drainage ways.
- Perform routine ditch maintenance and culvert cleaning during low or no flow periods.

SOUTH BASIN

EXISTING CONDITIONS

The South Basin encompasses approximately 170 acres of mostly agricultural properties, with some residential, commercial, industrial and public land. In town, the basin drains towards the drainage way along the south end of town. Approximately 108 acres of agricultural properties south of town also drain into the same drainage way.

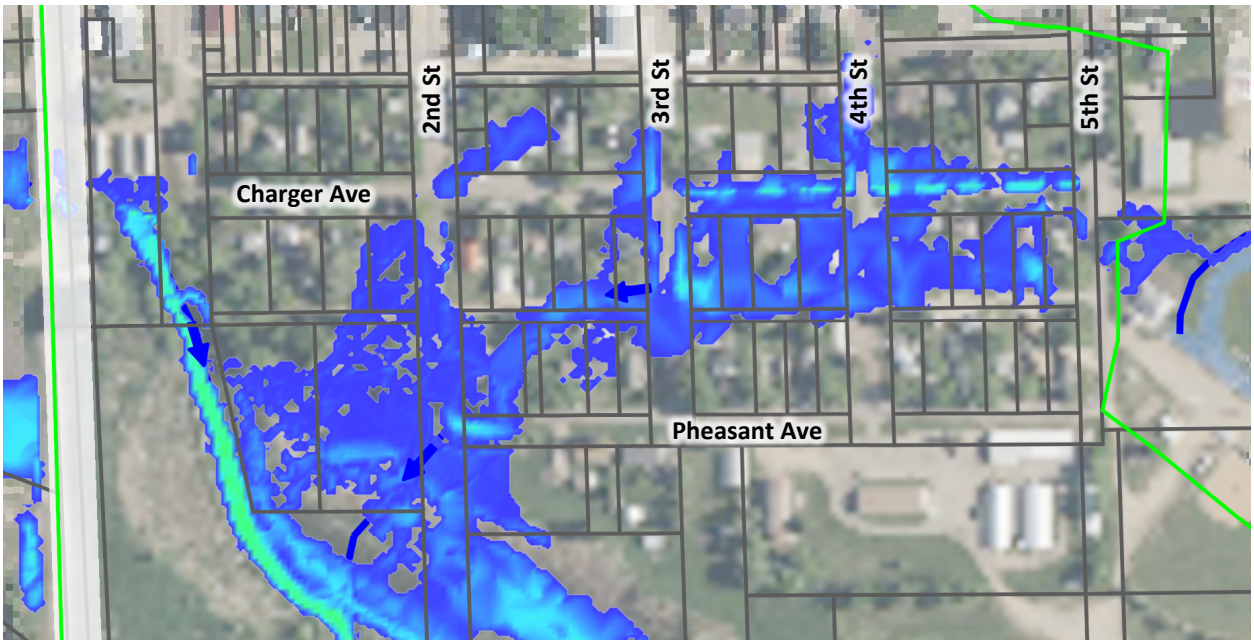
There are several locations within the South Basin with curb and gutter, including along Main Ave and in front of the County Courthouse. Otherwise, the drainage is conveyed in roadside ditches and small culverts at driveway approaches and road crossings.



SIMULATION RESULTS AND AREAS OF CONCNERN

See Drawings 9-11 for the South Basin inundation map, and tables providing flow rates, maximum capacities, and high-water elevations at all stormwater infrastructure.

The following image identifies areas of excessive inundation during a major storm event. Properties along Charger Ave and down 2nd St have the most ponding within the South Basin.



City Staff has also identified Pheasant Ave (between 4th St – 5th St) as an area that historically sees heavy inundations during large storm events.

RECOMMENDATIONS FOR THE SOUTH BASIN

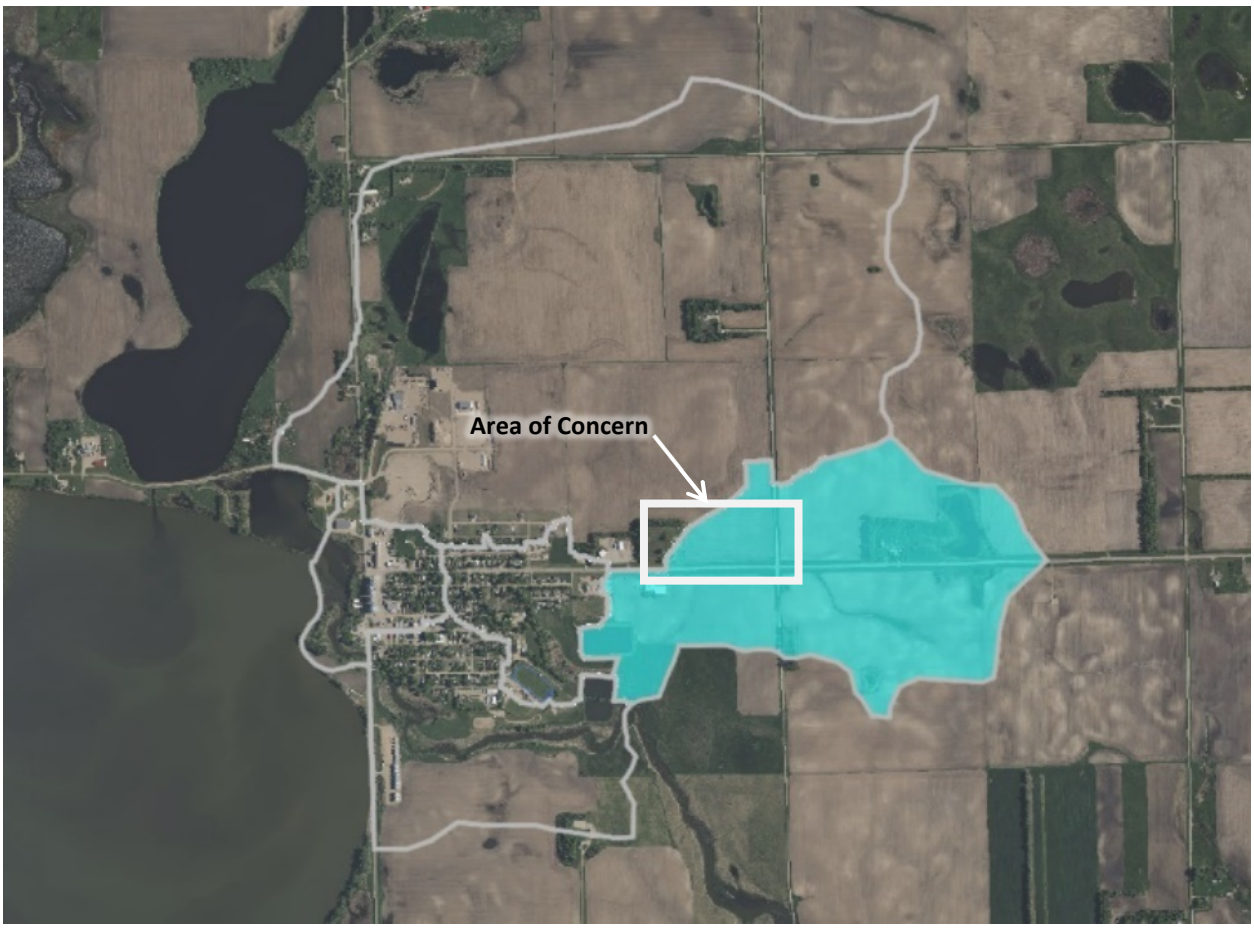
- Reconstruct the residential streets to an urban design with curb and gutter.
- Install enclosed storm sewer systems that convey runoff from inundated areas to drainage ways.
- Property owners experiencing localized flooding (not caused by runoff from the public right of way) should consider installing facilities to manage the runoff.
- Perform routine ditch maintenance and culvert cleaning during low or no flow periods.
- Thirteen culverts were identified in need of repair or replacement at the following locations (see drawing 9):
  - One (1) culvert on 1st St
  - Three (3) culverts along 2nd St
  - One (1) culvert along 3rd St
  - Four (4) culverts along 4th St
  - Four (4) culverts along Pheasant Ave

EAST BASIN

EXISTING CONDITIONS

The East Basin encompasses approximately 280 acres of primarily agricultural properties, with a few residential and industrial properties. The basin drains towards an unnamed tributary along the east edge of town.

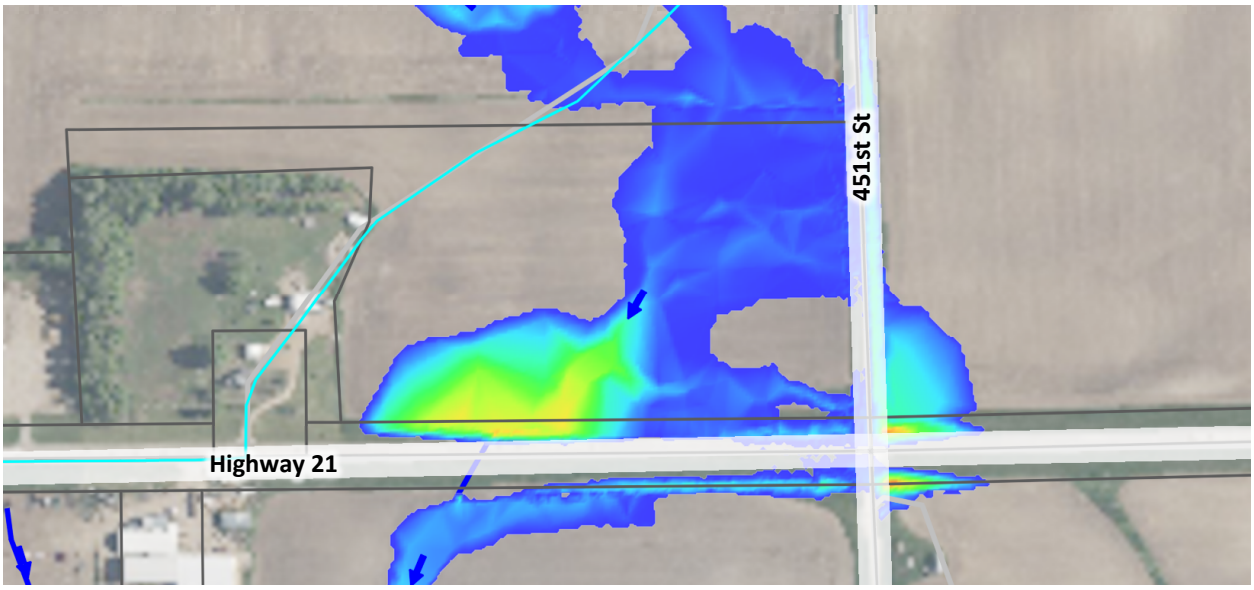
Drainage takes place entirely within roadside ditches and small culverts at driveway approaches and road crossings, as there are no enclosed storm sewer pipes located within the East Basin. There is little natural storage within East Basin, apart from a small wetland area located on the property of 45130 Highway 21.



SIMULATION RESULTS AND AREAS OF CONCNERN

See Drawings 12-14 for the East Basin inundation map, and tables providing flow rates, maximum capacities, and high-water elevations at all stormwater infrastructure.

The following image identifies areas of excessive inundation during a major storm event. The culvert crossing Hwy 21 has the most runoff backup, with potential overflowing on 451st St during a major storm event. However, this is not considered a major concern as the affected area is relatively small and agricultural.



RECOMMENDATIONS FOR THE EAST BASIN

- Perform routine ditch maintenance and culvert cleaning during low or no flow periods.

WEST BASIN

EXISTING CONDITIONS

The West Basin encompasses approximately 60 acres of residential, commercial, industrial, public and agricultural properties. The basin drains into the drainage way that runs along 450th Ave on the west side of town (the same drainage way that North Basin discharges to).

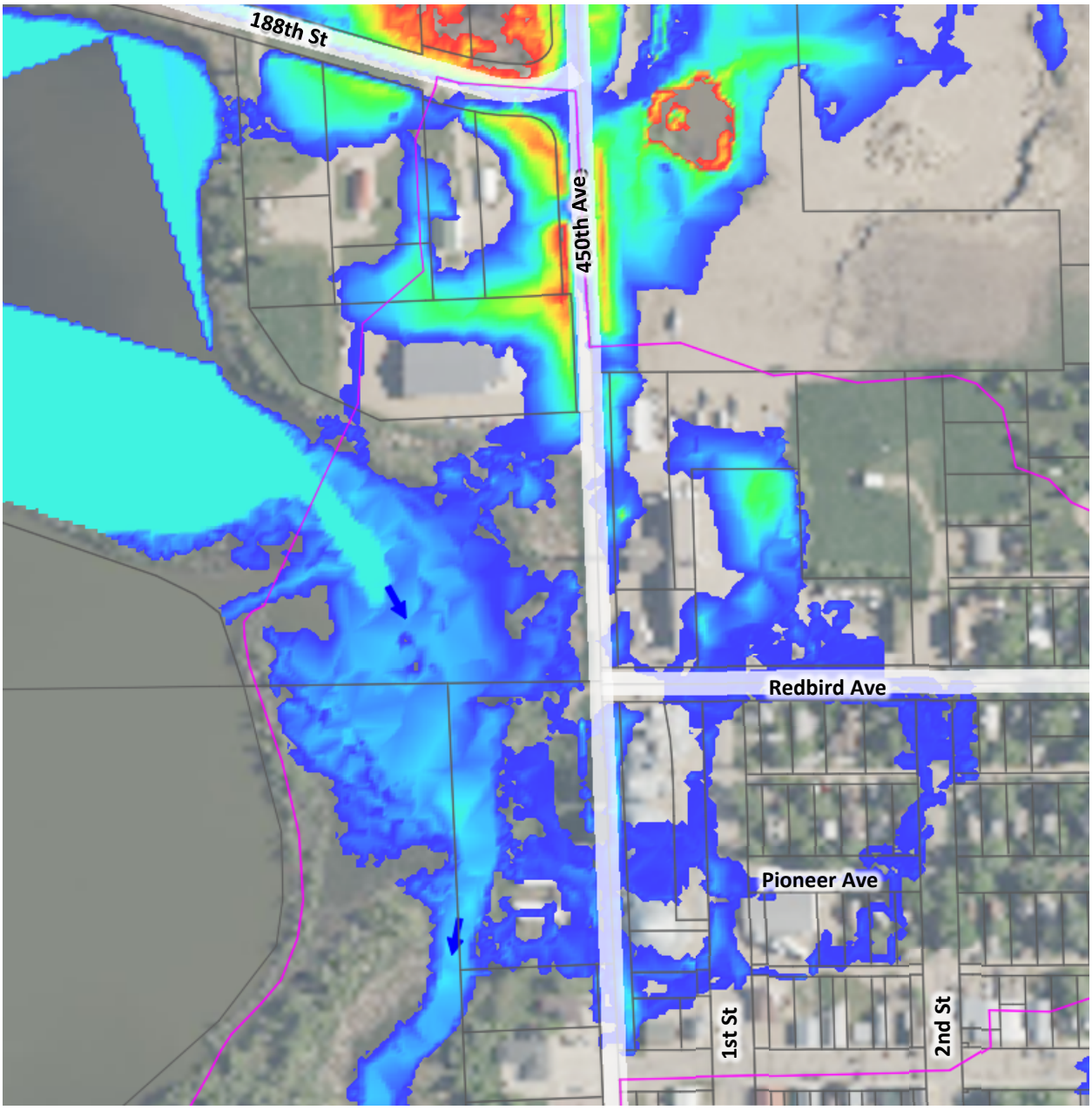
There are several locations within the West Basin with curb and gutter, including Main Ave and in front of the Hayti Lutheran Church of Redbird Ave. There also is a storm sewer system within the industrial properties along 450th Ave that daylights to the previously mentioned stream. Drainage also takes place in roadside ditches and small culverts at driveway approaches and road crossings. There are relatively large areas of freshwater wetlands and ponds within the West Basin along the west side of 450th Ave.



SIMULATION RESULTS AND AREAS OF CONCERN

See Drawings 15-17 for the West Basin inundation map, and tables providing flow rates, maximum capacities, and high-water elevations at all stormwater infrastructure.

The following image identifies areas of excessive inundation during a major storm event. There are significant inundated areas surrounding the wetlands and along the industrial properties along 450th Ave. Some residential properties along Pioneer Ave are also shown to have ponding issues.



Hayti Staff have also identified the following locations that have had drainage problems during large storm events:

- 309 2nd St
- 202 Pioneer Ave
- 211 Rainbird Ave

RECOMMENDATIONS FOR THE WEST BASIN

- Install enclosed storm sewer systems that convey runoff from inundated areas to drainage ways.
- Perform routine ditch maintenance and culvert cleaning during low or no flow periods.
- Property owners experiencing localized flooding (not caused by runoff from the public right of way) should consider installing facilities to manage the runoff.
- One (1) culvert was identified in need of repair or replacement near the intersection of 1st St and 2nd Ave (see drawing 15).

CENTRAL BASIN

EXISTING CONDITIONS

The Central Basin encompasses approximately 75 acres of primarily residential and public use properties, with some industrial and commercial properties. The basin drains into a wetland that runs alongside the Hayti sports fields on the southeast side of town.

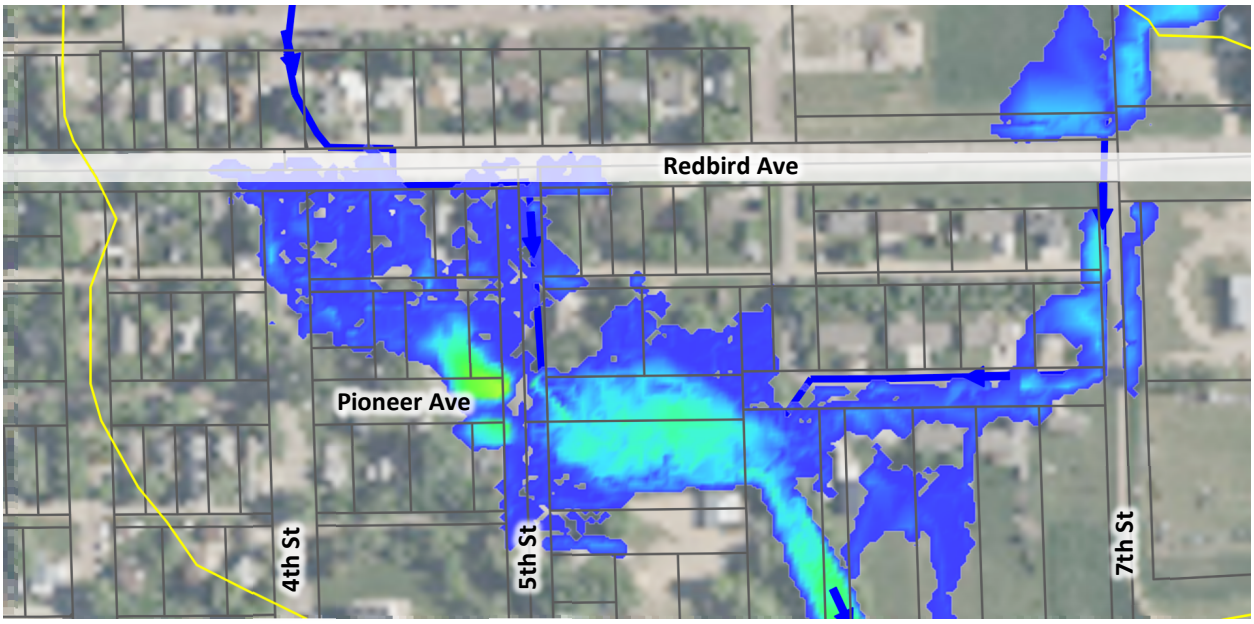
Natural storage within the Central Basin is provided by a freshwater wetland that begins near the intersection of Pioneer Ave and 5th Street. Curb and gutter are located along Redbird Ave and Palmquist Ave. An enclosed storm sewer system runs along Redbird Ave and 5th Street, which daylights into the wetland. Otherwise, drainage takes place in roadside ditches and small culverts.



SIMULATION RESULTS AND AREAS OF CONCERN

See Drawings 18-20 for the Central Basin inundation map, and tables providing flow rates, maximum capacities, and high-water elevations at all stormwater infrastructure.

The following image identifies areas of excessive inundation during a major storm event. Residential properties near the wetland, particularly between Redbird Ave and Pioneer Ave, are shown to experience a significant amount of ponding during a major event.



Hayti Staff have identified the following locations that have drainage problems during large storm events:

- 7th Street
- 405 Dakota Ave

RECOMMENDATIONS FOR CENTRAL BASIN

- Install enclosed storm sewer systems that convey runoff from inundated areas to drainage ways.
- Property owners experiencing localized flooding (not caused by runoff from the public right of way) should consider installing facilities to manage the runoff.
- Perform routine ditch maintenance and culvert cleaning during low or no flow periods.
- Four culverts were identified in need of repair or replacement at the following locations (see drawing 18):
  - Three (3) culverts along the alleyway south of Redbird, between 4th St and 6th St
  - One (1) culvert at the intersection of Redbird Ave and 7th St

CONCLUSION

This analysis provides Hayti with a comprehensive evaluation of its stormwater system and recommendations for addressing both current concerns and future needs. Refer to this report for plan reviews of future developments, or capital improvement projects within the town.

Recommendations in this report are based on engineering standards. This study does not include a detailed design of recommended improvements. Individual areas will require extensive survey and detailed design prior to the construction of any future improvements.

In addition to the recommendations for each basin, Stockwell Engineers also recommends the following items. By implementing these engineering standards and guidelines, Hayti can work towards a more resilient and effective stormwater management system that will:

- Prevent uncontrolled stormwater discharge onto neighboring properties.
- Minimize major property damage or loss of life during storm events.
- Ensure effective transportation and emergency access during storms.

ADOPT NEW STORMWATER ORDINANCES

It is recommended that Hayti adopt ordinances requiring all new developments to match pre-development stormwater flow rates. Stormwater standards from neighboring communities, the state or using industry standards, can serve as a template for the ordinance. All developments must submit detailed plans showing elevation changes and storm discharge volumes for city approval. This ensures future growth does not negatively impact existing conditions or downstream properties.

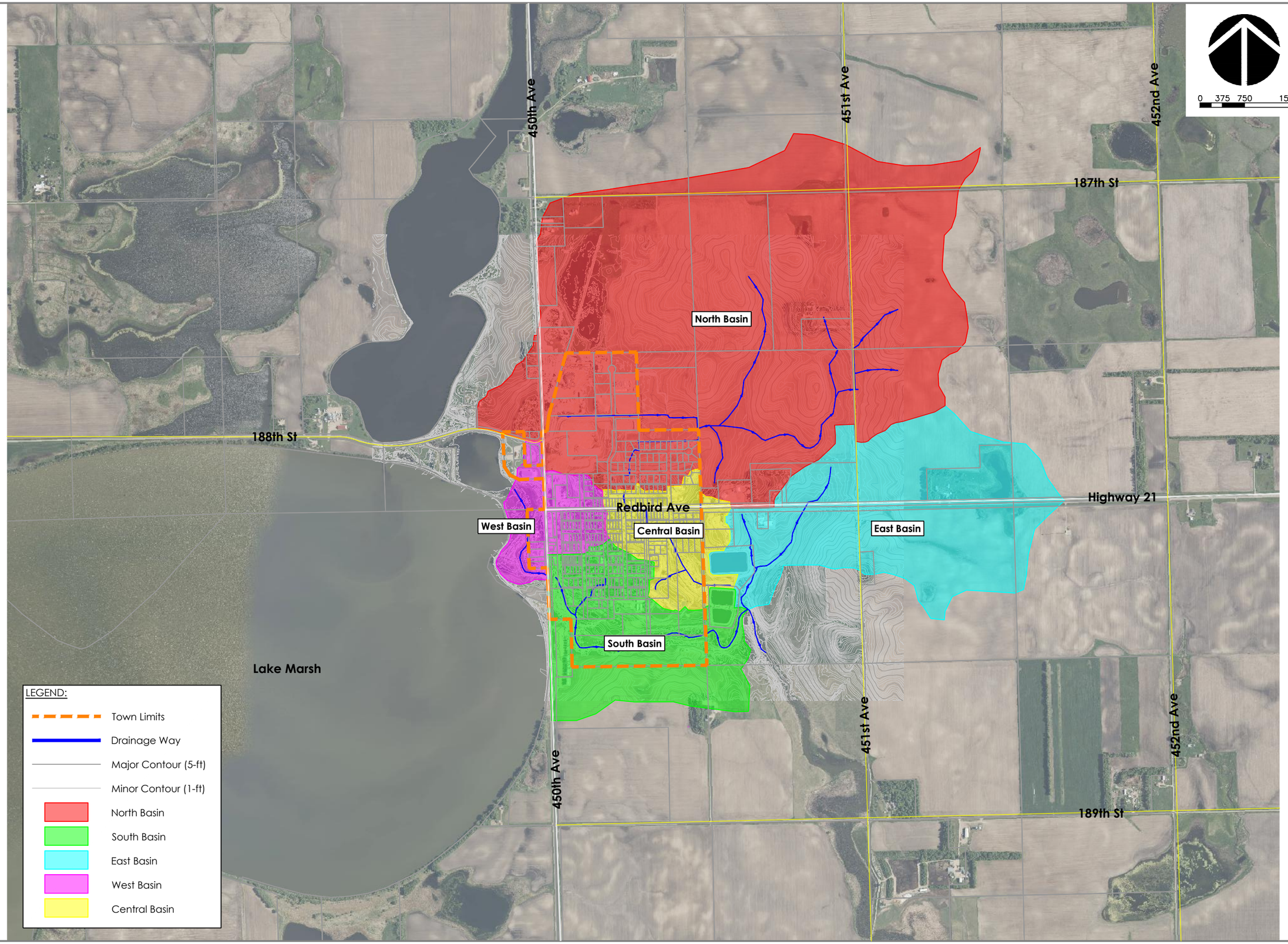
PRIORITIZE STREET RECONSTRUCTIONS

Improving street systems with urban sections (curb and gutter) offers the most effective conveyance for stormwater. These systems allow for enclosed storm sewer networks to convey the minor event and overflow systems such as roadway sections, and drainage easements be designed to convey the major event occurrence without causing damage to property or loss of life. This should be considered in conjunction with any future improvements, such as utility replacement projects.

IMPLEMENT SITE-SPECIFIC DETENTION

New or redeveloping properties should be required to contain runoff onsite and control its release to match existing rates through detention facilities. These facilities are a cost-effective way to manage increased runoff from increased impervious surfaces.

24255 - Report Exhibit.dwg



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Hayti

Comprehensive Master Drainage Analysis

Hayti Survey & Drainage Study

Hayti, SD

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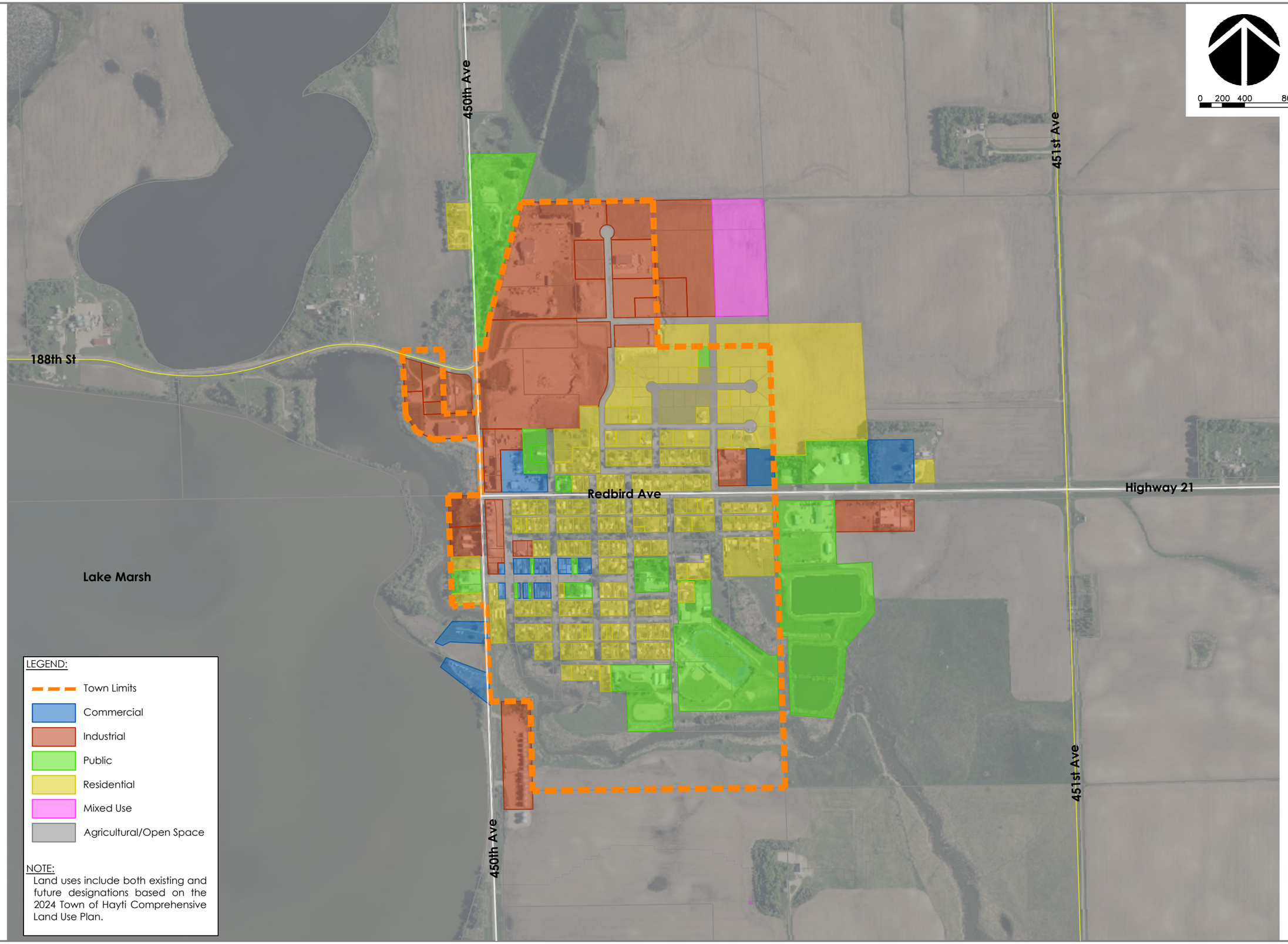
Drainage Basin Boundaries

1

Drafted By:

Reviewed By:

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Drafted By:

Reviewed By:

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Hayti

Comprehensive Master Drainage Analysis

Hayti Survey & Drainage Study

Hayti, SD

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Land Use Map

2

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Hydrologic Soils Group Map

3

0 200 400 800

450th Ave
451st Ave
188th St
Redbird Ave
Highway 21
Lake Marsh

LEGEND:

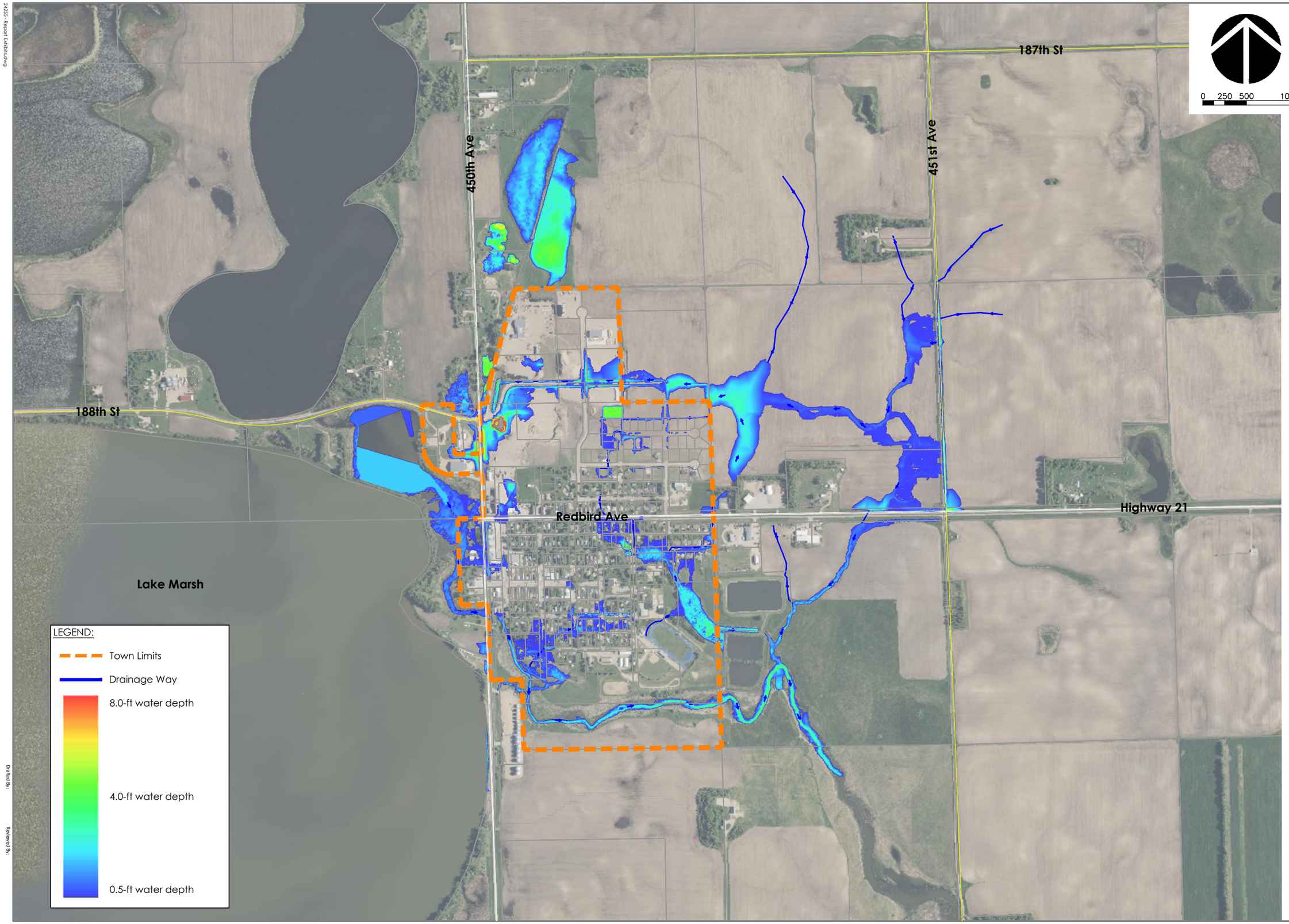
- Town Limits
- Hydrologic Soil Group A
- Hydrologic Soil Group A/D
- Hydrologic Soil Group B
- Hydrologic Soil Group B/D
- Hydrologic Soil Group C
- Hydrologic Soil Group C/D
- Hydrologic Soil Group D
- Null / Open Water

NOTE:
Soil groups shown based on United States Department of Agriculture web soil survey application. Soil group limits shown are approximate.

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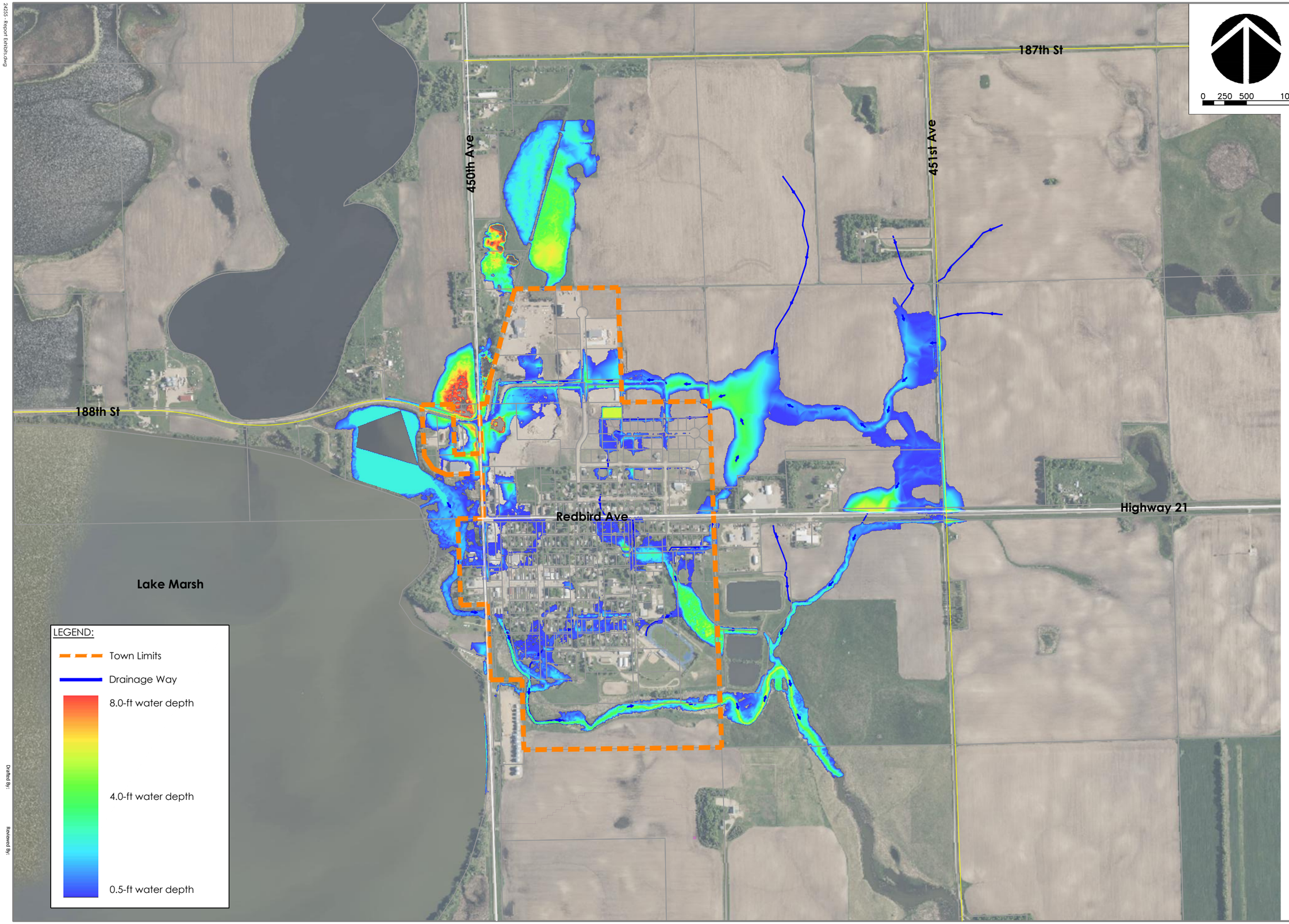
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5-year Inundation

4

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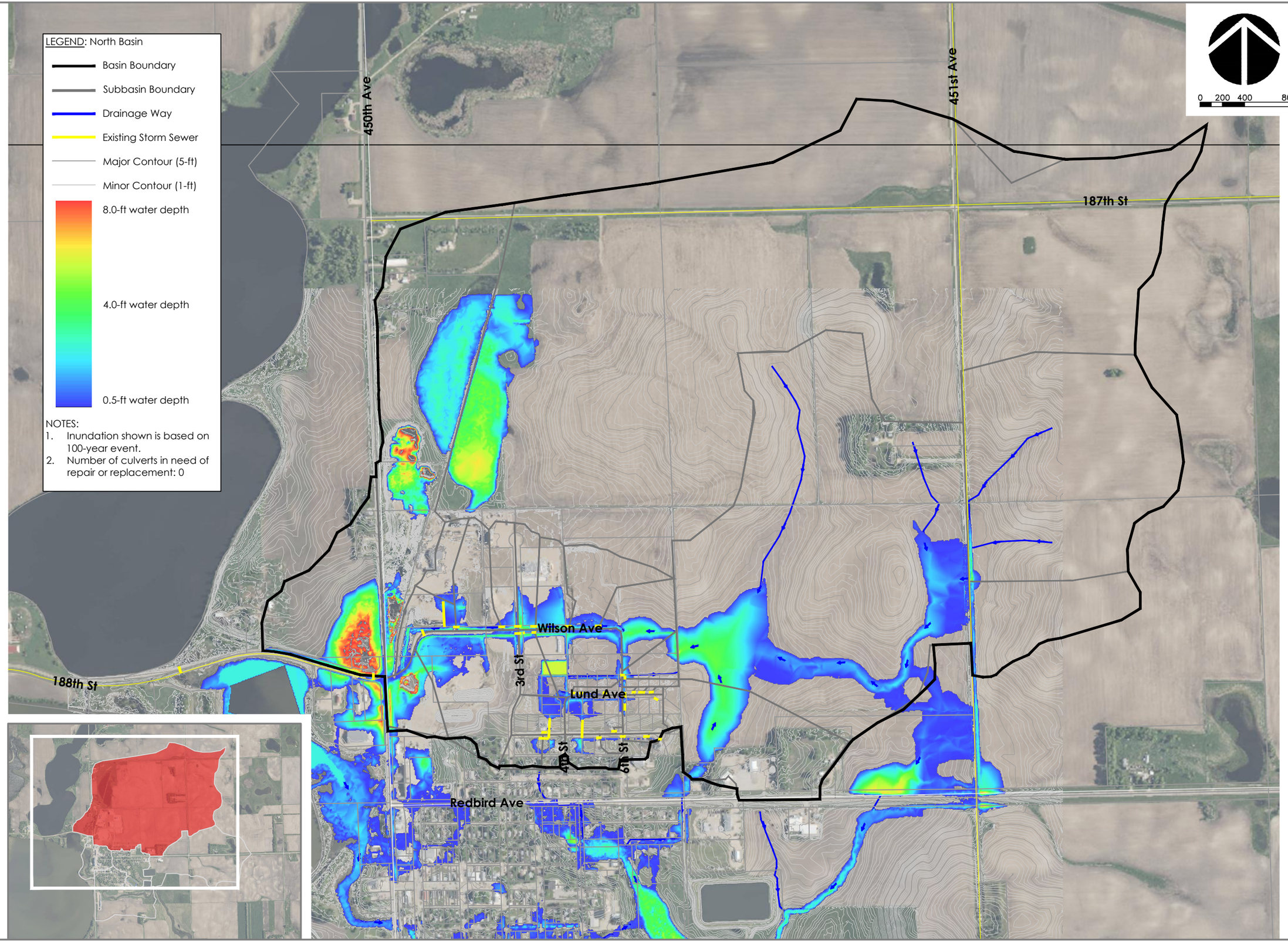
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100-year Inundation

5

Drafted By:

Reviewed By:



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Hayti

Comprehensive Master Drainage Analysis

Hayti Survey & Drainage Study

Hayti, SD

SEI PROJECT #: 24255

PLOT DATE 7/14/2025 4:04 PM

North Basin

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2425 - Report Exhibit.dwg

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Node Name	Area (ac)	CN Value	Time of Concentration (min)	5–YEAR		100–YEAR	
				Max Flow (cfs)	Max Water Elevation (ft)	Max Flow (cfs)	Max Water Elevation (ft)
Node3	0.0	0	0	0.0	1676.5	0.0	1681.2
Node5	0.0	0	0	0.0	1679.9	0.0	1680.1
Node6	18.8	76	25	20.2	1681.3	60.0	1682.4
Node7	3.7	92	15	10.6	1682.4	21.2	1682.8
Node8	0.0	0	0	0.0	1680.0	0.0	1680.9
Node9	0.0	0	0	0.0	1680.1	0.0	1681.2
Node10	7.1	73	18	7.6	1680.7	24.4	1682.7
Node11	0.0	0	0	0.0	1683.3	0.0	1683.6
Node12	4.8	81	34	5.6	1684.8	14.6	1685.3
Node13	0.0	0	0	0.0	1684.8	0.0	1685.4
Node14	4.1	81	31	5.0	1685.7	13.0	1686.1
Node15	0.0	0	0	0.0	1685.7	0.0	1686.1
Node16	5.1	81	40	5.3	1685.8	13.7	1686.3
Node17	0.0	0	0	0.0	1683.7	0.0	1685.0
Node18	3.3	81	16	5.8	1685.6	14.9	1686.0
Node19	0.0	0	0	0.0	1685.6	0.0	1686.0
Node20	0.3	0	0	0.0	1685.7	0.0	1686.0
Node21	0.0	0	0	0.0	1685.7	0.0	1686.0
Node22	8.5	80	31	10.0	1685.8	26.8	1686.3
Node23	0.0	0	0	0.0	1685.9	0.0	1686.3
Node24	8.5	81	23	12.7	1686.4	32.7	1686.7
Node25	0.0	0	0	0.0	1687.2	0.0	1687.5
Node26	8.0	81	20	12.8	1688.3	33.0	1688.5
Node27	0.0	0	0	0.0	1689.7	0.0	1689.8
Node28	2.9	82	60	2.4	1689.9	6.1	1690.8
Node29	0.0	0	0	0.0	1689.9	0.0	1690.8
Node30	0.8	78	15	1.3	1690.2	3.6	1691.1
Node31	0.0	0	0	0.0	1689.0	0.0	1689.3
Node32	0.1	0	0	0.0	1689.1	0.0	1690.0
Node33	0.0	0	0	0.0	1689.1	0.0	1690.0
Node34	0.9	75	15	1.1	1689.3	3.4	1690.0
Node35	0.0	0	0	0.0	1689.7	0.0	1690.0
Node36	0.2	0	0	0.0	1689.9	0.0	1690.0
Node37	0.2	79	15	0.3	1691.2	0.8	1691.3
Node38	1.6	0	0	0.0	1691.4	0.0	1692.0
Node39	0.0	0	0	0.0	1692.4	0.0	1692.5
Node40	3.0	75	25	3.0	1693.8	9.3	1694.1
Node41	0.0	0	0	0.0	1691.6	0.0	1691.6
Node42	0.2	72	15	0.2	1692.1	0.6	1692.5
Node43	0.0	0	0	0.0	1692.9	0.0	1693.0
Node44	0.1	72	15	0.1	1693.2	0.5	1693.4
Node45	0.0	0	0	0.0	1693.7	0.0	1693.7
Node46	0.1	72	15	0.1	1694.7	0.5	1694.8
Node47	0.0	0	0	0.0	1694.6	0.0	1694.6
Node48	1.4	0	0	0.0	1695.2	0.0	1695.2
Node49	0.3	0	0	0.0	1696.7	0.0	1696.7
Node50	0.0	0	0	0.0	1696.3	0.0	1696.3
Node51	3.7	75	25	3.7	1692.7	11.5	1692.9
Node53	0.0	0	0	0.0	1694.5	0.0	1695.3
Node55	2.8	84	15	6.0	1695.3	14.2	1696.7
Node56	4.1	72	25	3.4	1693.0	11.4	1693.2
Node57	0.8	75	15	1.0	1698.0	3.0	1698.6
Node58	0.0	0	0	0.0	1697.7	0.0	1697.8
Node59	0.1	0	0	0.0	1699.9	0.0	1699.9

Node Name	Area (ac)	CN Value	Time of Concentration (min)	5–YEAR		100–YEAR	
				Max Flow (cfs)	Max Water Elevation (ft)	Max Flow (cfs)	Max Water Elevation (ft)
Node60	0.0	0	0	0.0	1699.4	0.0	1699.4
Node61	0.4	72	15	0.4	1701.1	1.4	1701.6
Node62	0.0	0	0	0.0	1701.1	0.0	1701.1
Node63	0.2	72	15	0.2	1703.1	0.7	1703.3
Node64	0.0	0	0	0.0	1702.9	0.0	1702.9
Node66	0.0	0	0	0.0	1703.8	0.0	1703.8
Node67	6.1	79	63	4.1	1681.6	11.4	1682.0
Node214	2.4	79	15	4.0	1697.3	10.7	1697.5
Node215	1.5	84	15	3.1	1694.5	7.4	1695.3
Node216	79.5	62	16	33.9	1718.2	188.1	1719.0
Node217	0.0	0	0	0.0	1713.1	0.0	1713.4
Node246	27.2	70	60	10.3	1691.1	38.9	1692.1
Node247	155.2	82	60	127.3	1691.5	325.4	1693.2
Node248	4.7	85	15	10.3	1677.4	23.9	1677.1
Node249	347.9	70	90	97.5	1678.7	367.2	1680.6
Node250	63.0	70	60	23.9	1679.7	90.1	1682.0

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Hayti

Comprehensive Master Drainage Analysis
Hayti Survey & Drainage Study
Hayti, SD
SEI PROJECT #: 24255

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North Basin
XP Node Tables

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Link Name	Length (ft)	Diameter or Height (ft)	Shape	Conduit Slope (%)	Roughness	Upstream Node Name	Upstream Invert Elevation (ft)	Downstream Node Name	Downstream Invert Elevation (ft)	5–Year Event				100–Year Event			
										Max Flow (cfs)	Max Velocity (ft/s)	Upstream Maximum Water Elevation (ft)	Downstream Maximum Water Elevation (ft)	Max Flow (cfs)	Max Velocity (ft/s)	Upstream Maximum Water Elevation (ft)	Downstream Maximum Water Elevation (ft)
Link115	50	2.00	Circular	1.620	0.013	Node4	1676.54	Node3	1675.73	5.529	6.978	1677.15	1676.49	60.152	19.080	1681.18	1681.17
Link4	50	2.00	Circular	0.320	0.014	Node6	1679.34	Node5	1679.18	20.231	6.624	1681.25	1680.79	34.530	10.974	1682.42	1681.09
Link5	226	1.00	Circular	0.248	0.014	Node7	1679.50	Node8	1678.94	3.566	4.533	1682.48	1680.02	3.525	4.466	1682.82	1680.85
Link6	54	2.00	Circular	0.870	0.014	Node10	1678.61	Node9	1678.14	21.547	6.725	1680.71	1680.15	36.642	11.593	1682.71	1681.16
Link7	56	1.50	Circular	1.196	0.014	Node12	1682.60	Node11	1681.93	16.760	9.631	1684.80	1683.25	17.227	9.687	1685.35	1683.64
Link8	54	1.50	Circular	0.444	0.022	Node13	1683.01	Node14	1682.77	−10.069	−5.824	1684.81	1686.46	−10.070	−5.824	1685.45	1686.46
Link11	60	1.50	Circular	0.400	0.014	Node16	1683.65	Node15	1683.41	12.582	7.134	1685.80	1685.75	13.062	7.542	1686.25	1686.07
Link9	52	2.00	Circular	0.327	0.022	Node18	1682.29	Node17	1682.12	25.858	8.372	1685.65	1683.72	25.983	8.427	1686.03	1684.98
Link10	18	1.50	Circular	0.111	0.014	Node19	1682.23	Node20	1682.21	−12.748	−7.172	1685.65	1685.67	−6.455	−3.635	1686.03	1686.04
Link12	36	1.50	Circular	0.167	0.014	Node22	1682.73	Node21	1682.67	15.882	8.939	1685.83	1685.67	12.460	7.009	1686.29	1686.04
Link13	58	1.50	Circular	0.621	0.014	Node24	1684.54	Node23	1684.18	12.108	6.881	1686.37	1685.85	12.054	6.786	1686.66	1686.34
Link14	58	1.25	Circular	0.483	0.014	Node26	1686.26	Node25	1685.98	8.684	7.196	1688.29	1687.17	8.792	7.237	1688.52	1687.49
Link16	34	1.25	Circular	0.647	0.014	Node28	1688.88	Node27	1688.66	5.274	4.835	1689.93	1689.65	10.527	8.580	1690.84	1689.82
Link15	30	1.25	Circular	1.400	0.014	Node30	1689.50	Node29	1689.08	4.488	6.131	1690.24	1689.93	9.993	8.006	1691.13	1690.84
Link25	30	1.00	Circular	0.567	0.020	Node32	1688.40	Node31	1688.23	1.063	1.815	1689.09	1689.01	3.565	4.517	1690.00	1689.31
Link24	28	1.25	Circular	0.464	0.020	Node34	1688.81	Node33	1688.68	1.037	2.280	1689.31	1689.13	2.126	2.698	1690.04	1690.01
Link23	35	1.00	Circular	0.371	0.020	Node36	1689.85	Node35	1689.72	0.000	0.000	–	–	−0.053	−0.408	1690.04	1690.04
Link21	46	1.50	Circular	0.413	0.020	Node37	1690.34	Node38	1690.15	−3.159	−2.086	1691.24	1691.43	−7.014	−4.090	1691.33	1692.03
Link22	60	1.00	Circular	0.533	0.020	Node40	1692.22	Node39	1691.90	2.996	4.002	1693.80	1692.40	3.391	4.470	1694.06	1692.49
Link20	32	0.83	Circular	1.125	0.020	Node42	1691.81	Node41	1691.45	0.452	2.404	1692.14	1691.57	1.495	3.613	1692.45	1691.63
Link19	56	0.83	Circular	1.589	0.020	Node44	1692.95	Node43	1692.06	0.285	1.728	1693.18	1692.94	0.945	2.728	1693.43	1692.99
Link18	40	1.00	Circular	2.275	0.020	Node46	1694.55	Node45	1693.64	0.148	1.933	1694.71	1693.70	0.488	2.816	1694.84	1693.73
Link17	42	1.00	Circular	1.357	0.020	Node48	1695.15	Node47	1694.58	0.000	0.000	–	–	0.000	0.000	–	–
Link29	48	1.00	Circular	0.854	0.014	Node49	1696.69	Node50	1696.28	0.000	0.000	–	–	0.000	0.000	–	–
Link30	162	1.67	Circular	1.198	0.020	Node55	1694.18	Node56	1692.24	7.118	4.714	1695.31	1692.96	11.747	5.607	1696.67	1693.17
Link31	46	1.25	Circular	1.087	0.020	Node57	1697.51	Node58	1697.01	1.512	2.960	1698.04	1697.70	5.153	4.564	1698.63	1697.85
Link32	46	1.00	Circular	1.000	0.020	Node59	1699.86	Node60	1699.40	0.000	0.000	–	–	0.000	0.000	–	–
Link33	48	1.00	Circular	1.229	0.020	Node61	1700.50	Node62	1699.91	0.624	1.196	1701.10	1701.06	2.315	2.856	1701.57	1701.12
Link34	54	0.83	Circular	0.870	0.014	Node63	1702.89	Node64	1702.42	0.250	2.023	1703.10	1702.87	0.986	3.337	1703.33	1702.94
Link35	28	1.00	Circular	0.464	0.020	Node65	1703.83	Node66	1703.70	0.098	1.121	1704.01	1703.79	0.325	1.793	1704.13	1703.81
Link43	98	1.25	Circular	0.194	0.020	Node68	1678.13	Node67	1677.94	5.125	4.272	1680.72	1681.65	6.071	4.895	1682.01	1682.02
Link27	86	1.25	Circular	2.872	0.020	Node214	1696.74	Node53	1694.27	2.435	4.657	1697.33	1694.53	4.634	6.079	1697.48	1695.35
Link28	179	2.00	Circular	1.095	0.020	Node215	1693.59	Node51	1691.63	6.791	4.642	1694.52	1692.72	16.030	5.635	1695.35	1692.91
Link114	42	1.25	Circular	3.048	0.022	Node216	1713.19	Node217	1711.91	13.685	11.058	1718.21	1713.12	14.285	11.367	1719.00	1713.42

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North Basin
XP Link Tables

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LEGEND: South Basin

- Basin Boundary
- Subbasin Boundary
- Drainage Way
- Existing Storm Sewer
- Repair/Replace Culvert
- Major Contour (5-ft)
- Minor Contour (1-ft)

8.0-ft water depth

4.0-ft water depth

0.5-ft water depth

NOTES:
1. Inundation shown is based on 100-year event.
2. Number of culverts in need of repair or replacement: 13

Redbird Ave
1st St
2nd St
3rd St
4th St
5th St
Main Ave
Charger Ave
Pheasant Ave
450th Ave
Lake Marsh

0 125 250 500

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South Basin

9

Drafted By:

Reviewed By:

Node Name	Area (ac)	CN Value	Time of Concentration (min)	5-YEAR		100-YEAR	
				Max Flow (cfs)	Max Water Elevation (ft)	Max Flow (cfs)	Max Water Elevation (ft)
Node134	1.8	93	15	0.0	1686.8	0.0	1686.8
Node135	0.0	0	0	0.0	1686.5	0.0	1686.5
Node136	1.6	93	16	4.6	1693.3	9.1	1693.7
Node137	0.0	0	0	0.0	1691.5	0.0	1691.6
Node138	1.4	91	16	3.9	1694.0	8.0	1694.9
Node139	0.1	72	15	0.1	1692.7	0.3	1692.9
Node140	0.0	0	0	0.0	1692.7	0.0	1692.9
Node141	0.0	0	0	0.0	1691.8	0.0	1691.9
Node142	0.1	72	15	0.1	1691.8	0.3	1691.9
Node143	0.0	0	0	0.0	1691.0	0.0	1691.2
Node144	1.1	88	36	1.7	1694.8	3.7	1695.2
Node145	0.0	0	0	0.0	1693.8	0.0	1693.9
Node146	0.0	0	0	0.0	1673.6	0.0	1674.2
Node148	0.0	0	0	0.0	1673.6	0.0	1674.2
Node149	0.0	0	0	0.0	1673.6	0.0	1674.2
Node150	0.0	0	0	0.0	1673.6	0.0	1674.2
Node151	0.0	0	0	0.0	1673.6	0.0	1674.2
Node152	0.0	0	0	0.0	1673.6	0.0	1674.2
Node153	0.0	0	0	0.0	1673.6	0.0	1674.2
Node154	0.8	0	0	0.0	1675.4	0.0	1675.4
Node155	0.0	0	0	0.0	1675.1	0.0	1675.1
Node156	0.0	0	0	0.0	1681.1	0.0	1681.2
Node157	0.7	90	15	2.0	1686.6	4.2	1686.8
Node158	0.5	91	15	1.5	1686.5	3.0	1687.1
Node159	0.0	0	0	0.0	1685.4	0.0	1685.4
Node160	0.0	0	0	0.0	1691.6	0.0	1691.6
Node161	0.4	94	15	1.3	1691.7	2.6	1692.2
Node162	0.0	0	0	0.0	1691.4	0.0	1691.4
Node163	0.9	92	15	2.7	1692.1	5.3	1692.9
Node164	0.0	0	0	0.0	1690.8	0.0	1690.9
Node165	0.7	89	15	1.7	1691.5	3.6	1691.5
Node166	0.0	0	0	0.0	1690.9	0.0	1691.0
Node167	0.7	85	15	1.6	1690.8	3.6	1690.9
Node168	0.1	90	15	0.2	1690.9	0.4	1691.0
Node169	0.0	0	0	0.0	1690.9	0.0	1691.0
Node170	0.1	90	15	0.3	1691.0	0.7	1691.2
Node171	0.0	0	0	0.0	1690.9	0.0	1691.0
Node172	1.7	90	23	3.7	1691.1	7.8	1691.4
Node173	0.0	0	0	0.0	1691.0	0.0	1691.2
Node174	0.4	0	0	0.0	1691.1	0.0	1691.4
Node175	0.0	0	0	0.0	1691.1	0.0	1691.4
Node176	0.4	0	0	0.0	1691.1	0.0	1691.4
Node177	0.0	0	0	0.0	1691.1	0.0	1691.4
Node178	0.3	0	0	0.0	1691.1	0.0	1691.3
Node179	0.0	0	0	0.0	1691.1	0.0	1691.4
Node180	0.4	0	0	0.0	1691.1	0.0	1691.3
Node181	0.0	0	0	0.0	1691.1	0.0	1691.3
Node182	0.2	93	15	0.5	1691.1	1.1	1691.3
Node183	1.1	0	0	0.0	1689.8	0.0	1690.0
Node184	0.0	0	0	0.0	1690.8	0.0	1691.0
Node185	1.2	83	23	2.0	1690.8	5.0	1691.0
Node187	0.0	0	0	0.0	1690.1	0.0	1690.1
Node188	0.2	72	15	0.2	1689.0	0.7	1689.8
Node189	0.0	0	0	0.0	1688.1	0.0	1688.2
Node190	1.4	86	15	3.3	1687.9	7.4	1688.1

Node Name	Area (ac)	CN Value	Time of Concentration (min)	5-YEAR		100-YEAR	
				Max Flow (cfs)	Max Water Elevation (ft)	Max Flow (cfs)	Max Water Elevation (ft)
Node191	0.0	0	0	0.0	1687.4	0.0	1687.4
Node192	0.0	0	0	0.0	1680.0	0.0	1680.0
Node193	1.6	89	15	4.1	1681.5	8.6	1681.7
Node194	0.0	0	0	0.0	1680.7	0.0	1680.7
Node195	0.1	93	15	0.0	1681.6	0.0	1681.6
Node196	0.0	0	0	0.0	1691.4	0.0	1691.4
Node197	0.1	0	0	0.0	1692.0	0.0	1692.0
Node198	0.9	89	21	2.1	1678.2	4.4	1678.4
Node199	0.0	0	0	0.0	1678.2	0.0	1678.4
Node200	0.0	0	0	0.0	1677.2	0.0	1677.4
Node201	0.0	0	0	0.0	1677.2	0.0	1677.4
Node202	1.7	86	26	2.9	1677.2	6.7	1677.4
Node203	0.0	0	0	0.0	1677.2	0.0	1677.4
Node204	2.5	91	24	5.6	1680.4	11.5	1680.4
Node205	0.0	0	0	0.0	1680.4	0.0	1680.4
Node206	0.0	0	0	0.0	1677.9	0.0	1677.9
Node207	0.0	0	0	0.0	1674.8	0.0	1674.8
Node208	0.7	94	20	1.8	1677.2	3.6	1677.3
Node209	0.0	0	0	0.0	1676.9	0.0	1677.0
Node225	0.0	0	0	0.0	1689.6	0.0	1689.8
Node226	0.0	0	0	0.0	1688.8	0.0	1688.9
Node228	0.4	90	15	1.0	1690.4	2.0	1690.9
Node229	0.5	93	15	1.6	1692.5	3.1	1692.7
Node241	0.3	90	15	0.9	1690.9	1.8	1691.0
Node242	4.3	75	35	3.4	0.0	10.6	0.0
Node251	139.1	70	90	39.0	1672.9	146.8	1674.3
Node254	2.1	92	15	5.9	1677.0	11.9	1677.2

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Comprehensive Master Drainage Analysis
Hayti Survey & Drainage Study
Hayti, SD
SEI PROJECT #: 24255

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South Basin
XP Node Tables

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Link Name	Length (ft)	Diameter or Height (ft)	Shape	Conduit Slope (%)	Roughness	Upstream Node Name	Upstream Invert Elevation (ft)	Downstream Node Name	Downstream Invert Elevation (ft)	5–Year Event				100–Year Event			
										Max Flow (cfs)	Max Velocity (ft/s)	Upstream Maximum Water Elevation (ft)	Downstream Maximum Water Elevation (ft)	Max Flow (cfs)	Max Velocity (ft/s)	Upstream Maximum Water Elevation (ft)	Downstream Maximum Water Elevation (ft)
Link116	50	1.25	Circular	3.840	0.022	Node132	1679.92	Node133	1678.00	0.859	3.846	1680.21	1678.39	1.694	4.849	1680.32	1678.45
Link53	63	1.00	Circular	0.460	0.014	Node134	1686.78	Node135	1686.49	0.000	0.000	–	–	0.000	0.000	–	–
Link83	206	1.50	Circular	1.029	0.022	Node136	1692.40	Node137	1690.28	3.994	3.558	1693.28	1691.54	6.430	4.013	1693.67	1691.60
Link85	36	1.25	Circular	2.722	0.022	Node138	1693.29	Node139	1692.31	3.886	5.260	1694.05	1692.74	7.481	6.415	1694.89	1692.92
Link86	31	1.00	Circular	2.194	0.022	Node140	1691.19	Node141	1690.51	3.702	4.698	1692.73	1691.78	3.791	4.808	1692.87	1691.90
Link87	50	1.00	Circular	1.440	0.022	Node142	1690.46	Node143	1689.74	2.675	3.304	1691.75	1691.05	2.632	3.289	1691.87	1691.22
Link84	46	1.00	Circular	3.370	0.022	Node144	1694.32	Node145	1692.77	1.655	3.929	1694.81	1693.85	3.633	4.950	1695.19	1693.91
Link56	40	5.70	Rectangular	0.625	0.013	Node147	1672.45	Node146	1672.20	4.402	0.474	1673.65	1673.64	16.826	1.275	1674.18	1674.18
Link57	84	4.50	Circular	1.607	0.013	Node148	1672.17	Node149	1670.82	−2.858	0.758	1673.61	1673.62	−6.328	0.786	1674.17	1674.17
Link58	77	3.50	Circular	0.130	0.013	Node150	1671.76	Node151	1671.66	0.086	0.213	1673.61	1673.62	0.297	0.229	1674.17	1674.17
Link59	77	3.50	Circular	0.364	0.014	Node152	1671.83	Node153	1671.55	−3.631	−0.627	1673.61	1673.61	−10.636	−1.618	1674.17	1674.17
Link60	179	3.00	Circular	0.184	0.022	Node154	1675.44	Node155	1675.11	0.000	0.000	–	–	0.000	0.000	–	–
Link55	71	1.00	Circular	7.423	0.014	Node157	1686.23	Node156	1680.96	2.005	7.851	1686.61	1681.09	4.187	9.597	1686.81	1681.16
Link54	38	1.00	Circular	1.553	0.022	Node158	1685.95	Node159	1685.36	1.449	3.364	–	–	2.930	3.969	–	–
Link61	39	1.00	Circular	0.359	0.022	Node161	1690.86	Node160	1690.72	1.321	1.841	1691.72	1691.58	2.560	3.268	1692.18	1691.63
Link62	41	1.00	Circular	1.195	0.022	Node163	1691.20	Node162	1690.71	2.656	3.660	1692.11	1691.36	3.854	5.013	1692.86	1691.41
Link118	34	1.00	Circular	0.971	0.022	Node165	1689.86	Node164	1689.53	2.963	3.758	1691.48	1690.81	2.992	3.794	1691.54	1690.86
Link89	40	1.00	Circular	0.400	0.022	Node167	1689.44	Node166	1689.28	−1.101	−1.398	1690.80	1690.91	−1.144	−1.451	1690.86	1690.96
Link90	48	1.25	Circular	0.125	0.014	Node168	1689.11	Node169	1689.05	1.438	1.169	1690.93	1690.91	1.444	1.173	1690.99	1690.97
Link91	20	1.50	Circular	0.200	0.022	Node170	1688.84	Node171	1688.80	4.447	2.509	1691.03	1690.93	6.242	3.520	1691.20	1691.00
Link92	32	1.25	Circular	0.344	0.014	Node172	1688.77	Node173	1688.66	2.815	2.281	1691.10	1691.04	4.299	3.480	1691.35	1691.22
Link93	28	1.25	Circular	0.500	0.022	Node174	1689.33	Node175	1689.19	−1.244	−1.008	1691.10	1691.10	−1.100	−0.894	1691.35	1691.35
Link94	20	1.25	Circular	1.200	0.022	Node176	1689.11	Node177	1688.87	−0.943	−0.765	1691.09	1691.10	−1.283	−1.040	1691.35	1691.35
Link95	40	1.25	Circular	0.250	0.022	Node178	1688.85	Node179	1688.75	−0.739	−0.600	1691.08	1691.09	−1.578	−1.277	1691.28	1691.35
Link96	25	1.25	Circular	0.280	0.022	Node180	1689.07	Node181	1689.00	−0.696	−0.564	1691.07	1691.08	−0.908	−0.736	1691.27	1691.28
Link134	40	1.25	Circular	2.325	0.022	Node183	1689.83	Node225	1688.90	0.000	0.000	1689.83	1689.55	0.301	1.520	1690.02	1689.76
Link97	62	1.50	Circular	1.339	0.022	Node185	1689.33	Node184	1688.50	1.439	0.810	1690.85	1690.81	2.401	1.315	1691.00	1690.95
Link99	38	0.50	Circular	2.974	0.020	Node187	1690.13	Node226	1689.00	0.000	0.000	–	–	0.000	0.000	–	–
Link63	41	1.00	Circular	2.268	0.022	Node188	1688.25	Node189	1687.32	2.872	4.500	1689.00	1688.12	4.252	5.456	1689.82	1688.24
Link129	20	1.00	Circular	0.450	0.022	Node190	1686.44	Node191	1686.35	3.413	4.335	1687.86	1687.35	3.850	4.870	1688.07	1687.42
Link64	30	1.00	Circular	2.667	0.022	Node193	1679.30	Node192	1678.50	4.825	6.098	1681.54	1679.99	4.988	6.300	1681.67	1680.00
Link65	34	1.25	Circular	2.794	0.022	Node195	1681.60	Node194	1680.65	0.000	0.000	–	–	0.000	0.000	–	–
Link100	38	1.00	Circular	1.737	0.014	Node197	1692.02	Node196	1691.36	0.000	0.000	–	–	0.000	0.000	–	–
Link101	31	1.00	Circular	0.226	0.022	Node198	1677.35	Node199	1677.28	1.321	2.063	1678.21	1678.21	0.847	1.090	1678.36	1678.36
Link104	41	2.00	Circular	0.512	0.022	Node200	1676.45	Node201	1676.24	0.051	0.657	1677.17	1677.17	0.166	0.510	1677.38	1677.38
Link105	40	2.00	Circular	0.675	0.022	Node202	1676.50	Node203	1676.23	0.029	0.386	1677.17	1677.17	0.169	0.409	1677.38	1677.38
Link106	70	2.00	Circular	2.386	0.022	Node204	1676.47	Node205	1674.80	1.854	3.916	1680.40	1680.40	0.494	2.427	1680.40	1680.40
Link107	64	1.50	Circular	4.828	0.022	Node206	1677.89	Node207	1674.80	0.000	0.000	–	–	0.000	0.000	–	–
Link117	70	2.00	Circular	2.657	0.022	Node208	1676.77	Node209	1674.91	1.833	2.587	1677.16	1676.95	3.563	3.621	1677.34	1676.99
Link98	66	1.50	Circular	1.955	0.022	Node225	1689.83	Node182	1688.54	−0.927	−1.975	1690.19	1691.07	−1.287	−2.351	1690.25	1691.27
Link131	53	1.50	Circular	1.698	0.022	Node225	1688.90	Node226	1688.00	3.142	4.172	1689.55	1688.76	4.962	4.734	1689.76	1688.94
Link132	42	2.00	Circular	1.286	0.022	Node226	1688.00	Node227	1687.46	4.635	4.236	1688.76	1688.22	6.746	4.691	1688.94	1688.38
Link130	46	1.00	Circular	1.652	0.022	Node228	1689.66	Node225	1688.90	2.293	3.865	1690.37	1689.55	3.454	4.440	1690.95	1689.76
Link135	11	0.50	Circular	10.636	0.020	Node229	1690.17	Node226	1689.00	1.567	7.905	1691.51	1689.50	1.987	9.892	1692.74	1689.50

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Hayti

Comprehensive Master Drainage Analysis
Hayti Survey & Drainage Study
Hayti, SD
SEI PROJECT #: 24255

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South Basin
XP Link Tables

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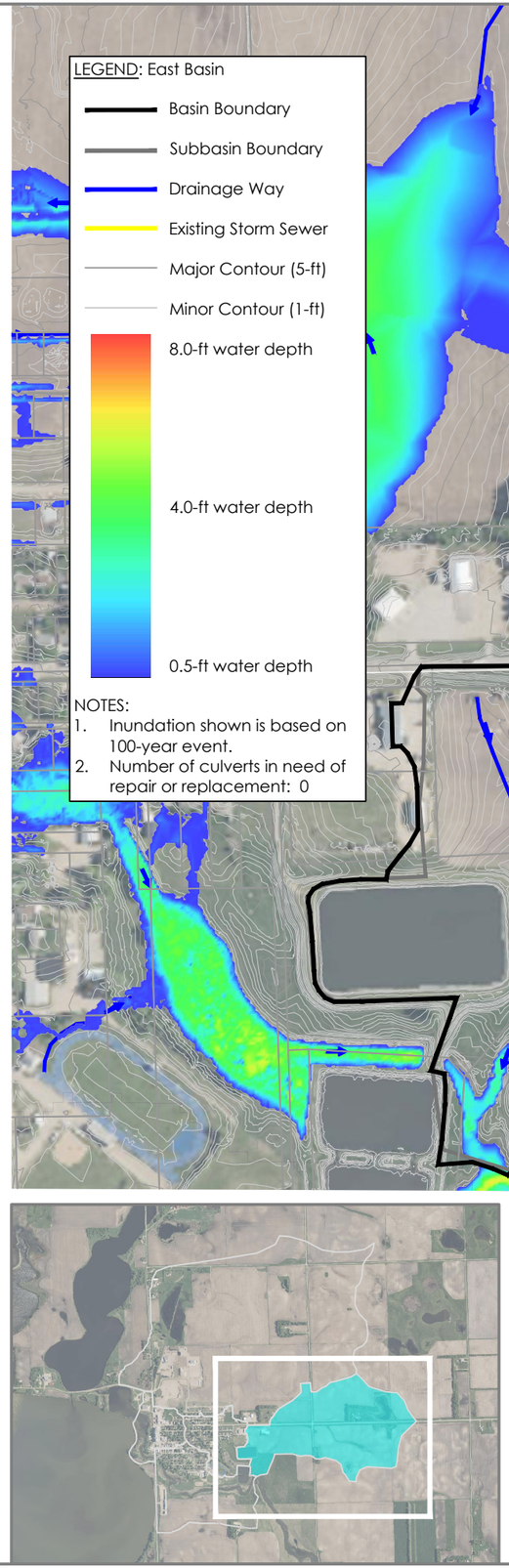
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LEGEND: East Basin

- Basin Boundary
- Subbasin Boundary
- Drainage Way
- Existing Storm Sewer
- Major Contour (5-ft)
- Minor Contour (1-ft)
- 8.0-ft water depth
- 4.0-ft water depth
- 0.5-ft water depth

NOTES:
1. Inundation shown is based on 100-year event.
2. Number of culverts in need of repair or replacement: 0



0 150 250 500

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East Basin

12

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Node Name	Area (ac)	CN Value	Time of Concentration (min)	5–YEAR		100–YEAR	
				Max Flow (cfs)	Max Water Elevation (ft)	Max Flow (cfs)	Max Water Elevation (ft)
Node122	0.0	0	0	0.0	1699.0	0.0	1699.3
Node123	27.6	83	69	21.4	1700.7	53.5	1703.5
Node124	0.0	0	0	0.0	1712.2	0.0	1712.6
Node125	111.9	70	44	53.4	1717.2	200.5	1718.1
Node126	0.0	0	0	0.0	1712.6	0.0	1713.7
Node127	92.7	52	23	3.8	1714.0	94.6	1718.8
Node128	0.0	0	0	0.0	1716.1	0.0	1718.8
Node129	6.0	82	15	11.5	1717.9	28.7	1719.6
Node252	63.9	70	60	24.3	1690.3	91.5	1691.4

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East Basin
XP Node Tables

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Link Name	Length (ft)	Diameter or Height (ft)	Shape	Conduit Slope (%)	Roughness	Upstream Node Name	Upstream Invert Elevation (ft)	Downstream Node Name	Downstream Invert Elevation (ft)	5–Year Event				100–Year Event			
										Max Flow (cfs)	Max Velocity (ft/s)	Upstream Maximum Water Elevation (ft)	Downstream Maximum Water Elevation (ft)	Max Flow (cfs)	Max Velocity (ft/s)	Upstream Maximum Water Elevation (ft)	Downstream Maximum Water Elevation (ft)
Link109	138	3.00	Circular	1.522	0.014	Node123	1698.98	Node122	1696.88	43.168	10.182	1700.68	1699.01	107.749	15.405	1703.46	1699.31
Link110	82	1.50	Circular	2.049	0.014	Node125	1712.69	Node124	1711.01	24.451	13.908	1717.24	1712.17	25.622	14.236	1718.09	1712.63
Link111	83	2.50	Circular	1.976	0.022	Node127	1712.99	Node126	1711.35	12.383	6.129	1714.05	1712.58	60.950	12.366	1718.76	1713.67
Link112	40	1.50	Circular	5.075	0.014	Node129	1717.08	Node128	1715.05	11.544	11.903	1717.86	1716.10	26.074	14.701	1719.65	1718.75

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East Basin
XP Link Tables

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LEGEND: West Basin

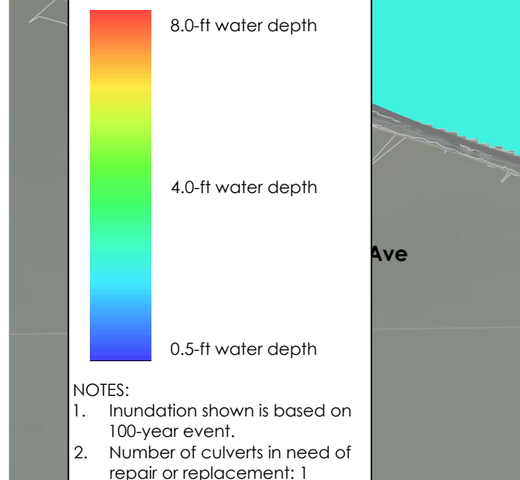
- Basin Boundary
- Subbasin Boundary
- Drainage Way
- Existing Storm Sewer
- Repair/Replace Culvert
- Major Contour (5-ft)
- Minor Contour (1-ft)

8.0-ft water depth

4.0-ft water depth

0.5-ft water depth

NOTES:
1. Inundation shown is based on 100-year event.
2. Number of culverts in need of repair or replacement: 1



188th St

Ave

Redbird Ave

Pioneer Ave

Main Ave

1st St

2nd St

450th Ave

0 75 150 300

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Hayti Survey & Drainage Study

Hayti, SD

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West Basin

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Node Name	Area (ac)	CN Value	Time of Concentration (min)	5–YEAR		100–YEAR	
				Max Flow (cfs)	Max Water Elevation (ft)	Max Flow (cfs)	Max Water Elevation (ft)
Node68	3.2	78	15	5.1	1680.7	13.9	1682.0
Node69	3.4	81	15	6.2	1680.4	15.7	1681.9
Node70	0.6	93	15	1.9	1678.3	3.7	1678.8
Node71	0.0	0	0	0.0	1676.8	0.0	1676.9
Node72	0.6	93	15	1.8	1680.1	3.5	1681.7
Node73	0.4	93	15	1.3	1679.4	2.5	1681.7
Node74	1.7	81	15	3.2	1681.6	8.1	1681.7
Node75	0.4	88	15	1.1	1683.3	2.3	1683.5
Node76	0.5	93	15	1.3	1684.0	2.6	1684.1
Node77	0.3	92	15	1.0	1693.0	1.9	1693.5
Node78	1.2	84	15	2.6	1696.6	6.1	1697.8
Node86	0.2	0	0	0.0	1677.0	0.0	1677.2
Node87	0.0	0	0	0.0	1677.1	0.0	1677.4
Node88	1.1	93	15	3.4	1682.3	6.7	1682.4
Node89	0.0	0	0	0.0	1678.2	0.0	1678.5
Node90	0.2	92	15	0.6	1679.1	1.2	1679.4
Node91	0.0	0	0	0.0	1679.1	0.0	1679.3
Node92	2.8	92	15	8.2	1682.5	16.4	1682.6
Node93	0.0	0	0	0.0	1682.4	0.0	1682.4
Node94	0.0	0	0	0.0	1679.6	0.0	1679.9
Node95	0.4	92	15	1.1	1679.6	2.3	1680.1
Node96	0.0	0	0	0.0	1684.3	0.0	1684.4
Node97	7.1	0	0	0.0	1685.8	0.0	1686.0
Node132	0.3	93	15	0.9	1680.2	1.7	1680.3
Node133	0.0	0	0	0.0	1678.4	0.0	1678.5
Node147	0.0	0	0	0.0	1673.6	0.0	1674.2
Node222	0.0	0	0	0.0	1678.6	0.0	1679.1
Node235	9.0	82	35	10.8	1686.9	27.5	1687.2
Node237	3.7	79	30	4.3	1663.5	11.7	1686.9
Node238	3.3	79	30	3.7	1683.9	10.1	1684.1
Node253	59.9	70	75	19.3	1674.6	72.6	1675.3

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West Basin
XP Node Tables

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Link Name	Length (ft)	Diameter or Height (ft)	Shape	Conduit Slope (%)	Roughness	Upstream Node Name	Upstream Invert Elevation (ft)	Downstream Node Name	Downstream Invert Elevation (ft)	5–Year Event				100–Year Event			
										Max Flow (cfs)	Max Velocity (ft/s)	Upstream Maximum Water Elevation (ft)	Downstream Maximum Water Elevation (ft)	Max Flow (cfs)	Max Velocity (ft/s)	Upstream Maximum Water Elevation (ft)	Downstream Maximum Water Elevation (ft)
Link43	98	1.25	Circular	0.194	0.020	Node68	1678.13	Node67	1677.94	5.125	4.272	1680.72	1681.65	6.071	4.895	1682.01	1682.02
Link44	274	1.25	Circular	0.288	0.014	Node68	1678.13	Node69	1677.34	4.281	3.466	1680.72	1680.36	4.962	3.994	1682.01	1681.88
Link45	108	1.25	Circular	0.083	0.020	Node69	1677.29	Node70	1677.20	5.835	4.738	1680.36	1678.33	7.375	5.930	1681.88	1678.79
Link46	60	2.00	Circular	2.000	0.022	Node70	1677.10	Node71	1675.90	12.918	6.542	1678.33	1676.84	20.076	7.428	1678.79	1676.93
Link119	112	0.83	Circular	0.768	0.020	Node72	1677.96	Node70	1677.10	1.789	3.254	1680.08	1678.33	2.388	4.297	1681.71	1678.79
Link40	104	0.83	Circular	0.115	0.020	Node73	1677.72	Node222	1677.60	1.261	2.292	1679.40	1678.60	2.453	4.405	1681.75	1679.08
Link122	131.7	0.83	Circular	0.334	0.020	Node74	1678.04	Node222	1677.60	2.271	4.117	1681.57	1678.60	2.244	4.059	1681.71	1679.08
Link39	110	0.83	Circular	2.100	0.020	Node75	1680.40	Node74	1678.09	1.992	3.599	1683.34	1681.57	1.849	3.340	1683.48	1681.71
Link38	42	0.83	Circular	1.023	0.020	Node76	1680.79	Node75	1680.40	1.837	3.314	1683.96	1683.34	1.830	3.302	1684.11	1683.48
Link37	162	0.83	Circular	5.969	0.020	Node77	1690.51	Node76	1680.84	3.409	6.173	1693.02	1683.96	3.495	6.310	1693.49	1684.11
Link36	114	0.83	Circular	4.123	0.020	Node78	1695.27	Node77	1690.57	2.523	5.723	1696.55	1693.02	2.814	5.789	1697.82	1693.49
Link47	40	2.00	Circular	0.125	0.014	Node86	1676.02	Node87	1675.97	−2.747	−1.568	1677.04	1677.07	−9.158	−3.955	1677.19	1677.39
Link127	50	0.16	Circular	2.080	0.013	Node88	1677.99	Node89	1676.95	0.087	3.765	1682.41	1678.23	0.088	3.786	1682.59	1678.48
Link49	75	2.00	Circular	0.240	0.013	Node90	1677.96	Node91	1677.78	3.150	1.623	1679.13	1679.11	7.746	3.188	1679.40	1679.29
Link128	48	2.00	Circular	0.625	0.014	Node92	1679.36	Node93	1679.06	5.021	1.593	1682.50	1682.37	5.025	1.594	1682.50	1682.37
Link50	97	2.00	Circular	0.897	0.014	Node95	1678.93	Node94	1678.06	2.459	2.358	1679.61	1679.63	9.947	4.782	1680.14	1679.91
Link51	47	1.00	Circular	3.234	0.014	Node97	1685.20	Node96	1683.68	3.608	7.894	1685.76	1684.26	5.611	8.639	1685.98	1684.43
Link116	50	1.25	Circular	3.840	0.022	Node132	1679.92	Node133	1678.00	0.859	3.846	1680.21	1678.39	1.694	4.849	1680.32	1678.45
Link123	158	1.50	Circular	0.316	0.014	Node222	1677.60	Node70	1677.10	3.430	2.883	1678.60	1678.33	4.637	3.426	1679.08	1678.79

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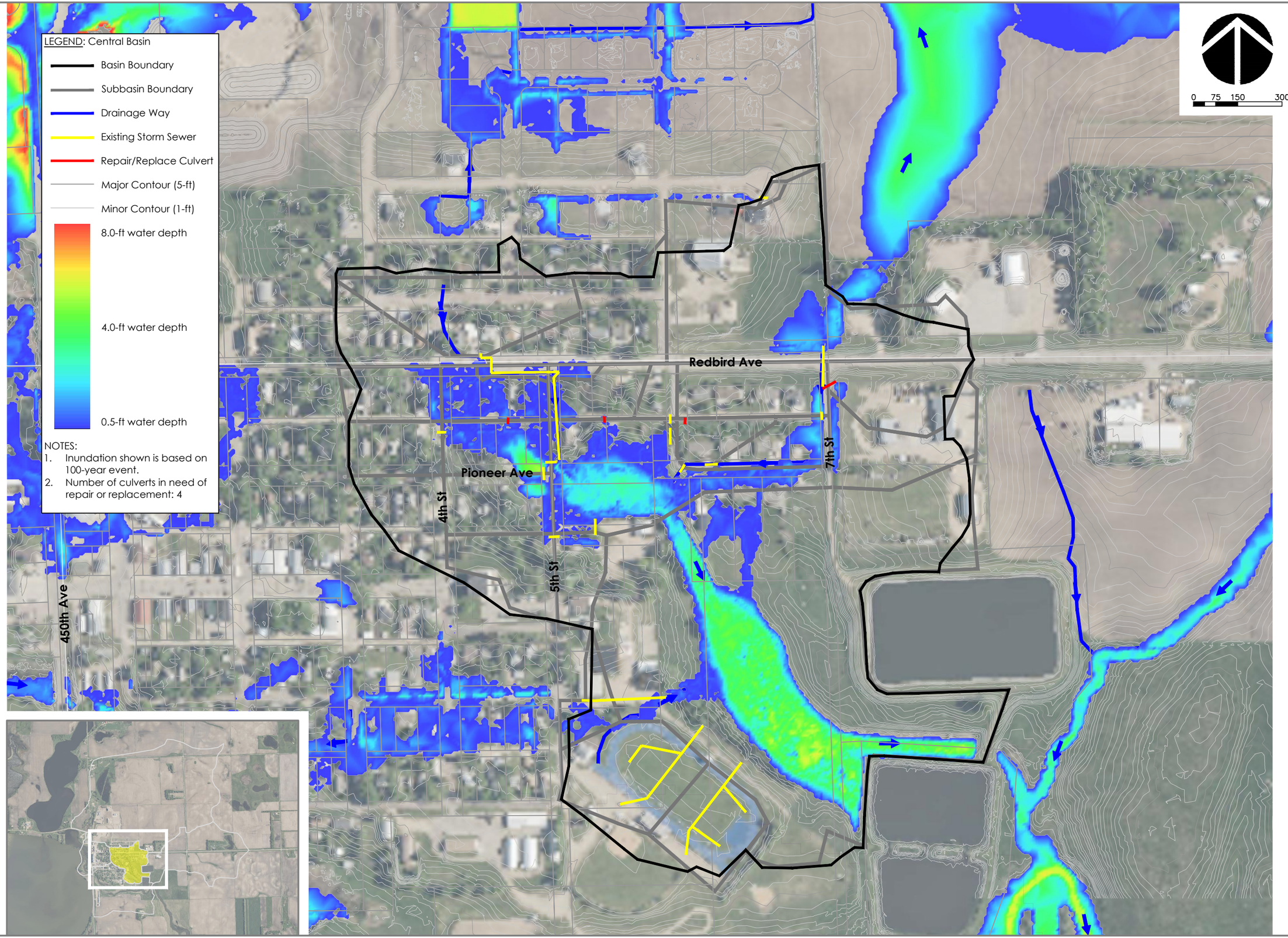
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West Basin
XP Link Tables

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Central Basin

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Node Name	Area (ac)	CN Value	Time of Concentration (min)	5–YEAR		100–YEAR	
				Max Flow (cfs)	Max Water Elevation (ft)	Max Flow (cfs)	Max Water Elevation (ft)
Node65	0.1	72	15	0.1	1704.0	0.3	1704.1
Node79	3.4	89	15	8.8	1689.8	18.8	1692.2
Node80	1.5	85	15	0.0	1689.8	0.0	1691.8
Node81	2.9	90	19	0.0	1689.5	0.0	1691.4
Node82	0.2	93	15	0.7	1689.1	1.4	1690.7
Node83	0.2	0	0	0.0	1686.1	0.0	1686.3
Node84	0.2	90	15	0.5	1683.5	1.1	1683.9
Node85	0.0	0	0	0.0	1679.7	0.0	1680.1
Node98	1.4	86	15	3.1	1689.4	7.1	1689.7
Node99	0.0	0	0	0.0	1689.0	0.0	1689.1
Node100	1.3	91	15	0.0	1682.6	0.0	1684.4
Node101	0.0	0	0	0.0	1682.5	0.0	1682.8
Node102	1.2	91	15	3.3	1684.7	6.7	1685.3
Node103	0.0	0	0	0.0	1684.0	0.0	1684.0
Node104	0.5	92	15	1.5	1687.8	2.9	1688.0
Node105	0.0	0	0	0.0	1686.8	0.0	1686.9
Node106	0.0	72	15	0.0	1685.9	0.1	1686.0
Node107	0.0	0	0	0.0	1684.5	0.0	1684.6
Node108	1.5	87	15	3.7	1681.5	8.1	1681.8
Node109	0.0	0	0	0.0	1678.1	0.0	1678.8
Node110	0.0	0	0	0.0	1681.5	0.0	1681.8
Node111	1.7	88	15	4.3	1681.5	9.3	1681.7
Node112	0.0	0	0	0.0	1681.0	0.0	1681.2
Node113	0.9	77	15	1.4	1682.8	3.8	1683.0
Node114	0.0	0	0	0.0	1684.5	0.0	1684.5
Node115	1.1	86	15	2.6	1685.2	6.0	1685.5
Node116	9.1	81	34	10.6	1692.9	27.6	1693.2
Node117	0.0	0	0	0.0	1692.8	0.0	1693.0
Node118	2.2	88	15	5.5	1693.4	12.0	1693.9
Node119	0.0	0	0	0.0	1692.8	0.0	1693.0
Node120	2.2	85	15	4.8	1692.8	11.2	1693.0
Node121	0.0	0	0	0.0	1691.5	0.0	1691.6
Node130	1.7	80	15	3.0	1683.7	7.7	1684.6
Node131	0.0	0	0	0.0	1683.0	0.0	1683.0
Node219	0.0	0	0	0.0	1686.6	0.0	1686.7
Node220	0.7	0	0	0.0	0.0	0.0	0.0
Node221	0.0	0	0	0.0	0.0	0.0	0.0
Node223	0.0	0	0	0.0	1679.5	0.0	1679.5
Node224	1.1	88	15	2.8	1681.5	6.1	1681.9
Node227	0.0	0	0	0.0	1688.0	0.0	1688.2
Node236	1.4	72	25	1.2	1691.7	4.0	1691.8
Node239	1.5	75	25	1.6	1695.2	4.7	1695.3
Node240	2.9	75	25	3.0	1694.9	9.1	1695.0
Node243	0.8	72	15	0.9	0.0	3.0	0.0
Node244	7.0	65	25	3.1	0.0	14.8	0.0
Node245	25.1	65	35	8.9	0.0	42.9	0.0

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Central Basin
XP Node Tables

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Link Name	Length (ft)	Diameter or Height (ft)	Shape	Conduit Slope (%)	Roughness	Upstream Node Name	Upstream Invert Elevation (ft)	Downstream Node Name	Downstream Invert Elevation (ft)	5–Year Event				100–Year Event			
										Max Flow (cfs)	Max Velocity (ft/s)	Upstream Maximum Water Elevation (ft)	Downstream Maximum Water Elevation (ft)	Max Flow (cfs)	Max Velocity (ft/s)	Upstream Maximum Water Elevation (ft)	Downstream Maximum Water Elevation (ft)
Link68	12	1.50	Circular	4.167	0.014	Node79	1688.29	Node80	1687.79	8.786	7.973	1689.84	1689.77	17.254	9.665	1692.18	1691.82
Link69	32	1.50	Circular	0.281	0.014	Node80	1687.69	Node81	1687.60	8.782	5.173	1689.77	1689.51	11.733	6.572	1691.82	1691.38
Link70	48	1.50	Circular	2.000	0.014	Node81	1687.60	Node82	1686.64	8.784	6.098	1689.51	1689.12	11.725	6.576	1691.38	1690.71
Link71	226	1.50	Circular	0.323	0.014	Node82	1686.54	Node83	1685.81	9.473	5.420	1689.12	1687.00	12.475	7.031	1690.71	1687.14
Link72	24	2.00	Circular	12.292	0.014	Node83	1685.56	Node84	1682.61	11.785	15.616	1686.10	1683.51	20.285	17.980	1686.28	1683.94
Link73	274	2.00	Circular	1.635	0.014	Node84	1682.56	Node85	1678.08	12.263	7.666	1683.51	1679.74	21.035	9.051	1683.94	1680.10
Link66	26	2.00	Rectangular	0.607	0.014	Node98	1689.05	Node99	1688.88	3.118	4.390	1689.43	1689.01	7.073	6.270	1689.65	1689.10
Link67	21	1.00	Circular	1.714	0.022	Node100	1682.51	Node101	1682.15	0.019	0.465	1682.57	1682.50	5.508	7.189	1684.39	1682.81
Link124	20	1.00	Circular	0.350	0.014	Node102	1684.07	Node103	1684.00	3.254	6.601	–	–	5.785	8.096	–	–
Link76	31	1.25	Circular	2.065	0.022	Node104	1687.35	Node105	1686.71	1.449	3.701	1687.83	1686.81	2.911	4.666	1688.03	1686.87
Link77	54	1.25	Circular	4.259	0.020	Node106	1685.86	Node107	1683.56	0.029	1.147	1685.91	1684.54	0.097	0.717	1685.95	1684.56
Link74	38	1.50	Circular	0.947	0.022	Node109	1678.07	Node108	1677.71	−0.428	−2.401	1678.07	1681.51	−14.499	−8.589	1678.77	1681.79
Link75	43	1.25	Circular	0.395	0.022	Node111	1678.07	Node110	1677.90	1.934	1.568	1681.48	1681.51	3.553	2.865	1681.72	1681.79
Link78	33	1.50	Circular	3.576	0.022	Node113	1682.12	Node112	1680.94	3.897	5.701	1682.78	1681.04	6.904	6.753	1683.03	1681.16
Link79	40	1.00	Circular	0.875	0.022	Node115	1684.23	Node114	1683.88	2.565	3.395	1685.25	1684.51	3.043	3.976	1685.48	1684.53
Link80	134	2.00	Circular	0.530	0.013	Node116	1691.59	Node117	1690.88	8.347	3.666	1692.93	1692.81	12.485	4.524	1693.24	1693.00
Link81	52	1.50	Circular	3.654	0.022	Node118	1692.58	Node119	1690.68	5.498	4.901	1693.44	1692.79	8.887	5.404	1693.94	1692.99
Link82	26	1.25	Circular	1.769	0.022	Node120	1691.30	Node121	1690.84	7.525	6.182	1692.78	1691.49	8.076	6.803	1692.98	1691.62
Link125	36	1.25	Circular	0.361	0.022	Node130	1682.88	Node131	1682.75	2.968	3.713	1683.72	1682.98	5.604	4.965	1684.60	1683.04
Link121	10	0.05	Circular	0.000	0.014	Node220	0.05	Node221	0.00	0.000	0.000	–	–	0.000	0.000	–	–
Link126	54	1.50	Circular	2.537	0.014	Node224	1680.83	Node223	1679.46	5.726	7.828	–	–	11.564	9.668	1681.89	1679.51
Link133	240	2.00	Circular	0.588	0.014	Node227	1687.24	Node219	1685.83	4.635	4.396	1687.97	1686.61	6.759	4.833	1688.16	1686.67

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Central Basin
XP Link Tables

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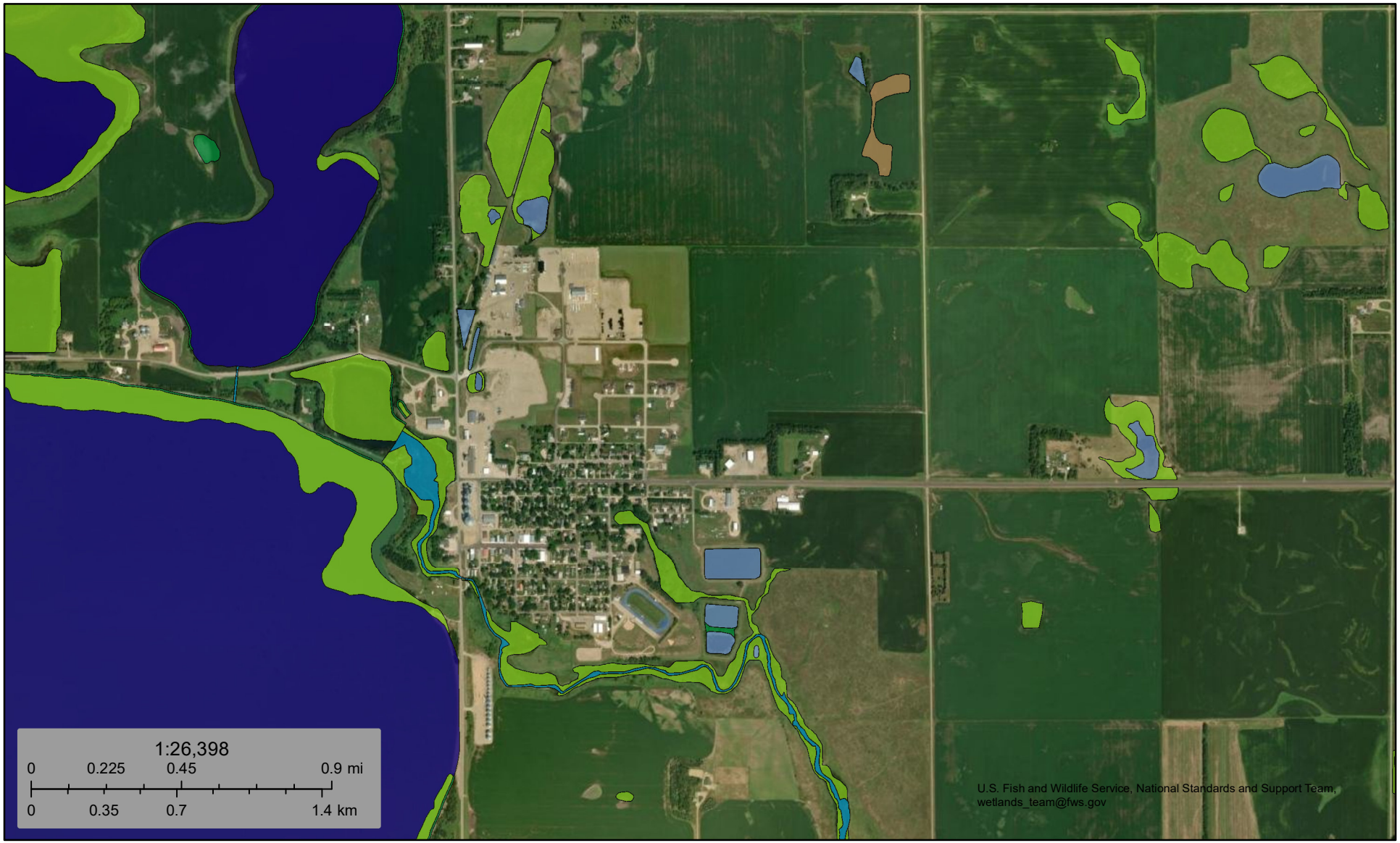
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APPENDIX A

National Wetland Map

U.S. Fish and Wildlife Service
National Wetlands Inventory

National Wetlands Inventory



June 5, 2025

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.