2020 UPDATED GULLY INVENTORY AND CONDITION ASSESSMENT

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Lower Minnesota River Watershed District
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LOWER MINNESOTA RIVER
WATERSHED DISTRICT

Young Environmental Consulting
Group, LLC

2020 Updated Gully Inventory and Condition Assessment

prepared for

Lower Minnesota River Watershed District

Chaska, Minnesota

Revision 0
10/12/2020

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LIST OF ABBREVIATIONS

Abbreviation	Term/Phrase/Name
2008 Inventory	2008 Gully Inventory
CIP	Capital Improvement Plan
District	Lower Minnesota River Watershed District
GIS	Geographic Information Systems
GPS	Global Positioning System
HPR	High-Priority Region
ID	Identifier
Inventory	2008 Gully Inventory
LiDAR	Light Detection and Ranging
LMRWD	Lower Minnesota River Watershed District
LWP	Local Water Plan
MnDNR	Minnesota Department of Natural Resources
N/A	Non-applicable
NRCS	Natural Resource Conservation Service
OSHA	Occupational Safety and Health Administration
PPE	Personal Protective Equipment
Presentation	Young Environmental Gully 101 Presentation
Project	Gully Inventory and Condition Assessment Project
RPBCWD	Riley-Purgatory-Bluff Creek Watershed District
USDA	United States Department of Agriculture
Young Environmental	Young Environmental Consulting Group

EXECUTIVE SUMMARY

In the summer of 2020, the Lower Minnesota River Watershed District (LMRWD or District) retained Young Environmental Consulting Group (Young Environmental) to complete a gully and pipe outfall condition assessment and inventory (Project). The cities included in the study were: Bloomington, Carver, Chaska, Chanhassen, Eden Prairie, Jackson Township, Lilydale, Mendota, and Mendota Heights. The other cities within the District will be presented in a companion document. This study builds on a previous 2008 inventory collected by the Minnesota Conservation Corps for the District. The project aimed to provide information to municipalities on the current conditions of gullies and pipe outfalls identified in 2008 as well as collecting new locations that may be contributing sediment into the Minnesota River.

The project consisted of three components: desktop assessment, fieldwork, and data evaluation.

1. Desktop Assessment

This phase of the project included an in-depth review of the 2008 inventory to review the previous data collected for applicability to the current study, assessment of the conditions at the time of survey based on the photographs collected, and additional data requests to partner cities to determine if any of the 2008 locations had been further studied or corrected in the interim. The primary goal of this desktop assessment was to establish the foundation for the fieldwork component and create the list of sites that needed to be surveyed over the summer. It was also used to establish a benchmark condition for each site that could be used to assess the current conditions and the progression of trends for individual gullies and pipe outfall locations.

2. Fieldwork

The fieldwork component was used to assess the current conditions of the gullies identified in 2008 from the list of sites developed in the desktop analysis. Additional sites were added to the overall list as new gullies. Pipe outfall locations were encountered in the field that had not been identified in 2008 or as part of the desktop analysis. In the field, Young Environmental assessed the current conditions using the same benchmarking criteria established for the desktop analysis, with standard data collection forms. For gully sites, the current condition was summarized by the erosion potential, or the general likelihood that the site would contribute sediment to the Minnesota River without intervention. Areas with high erosion potential were actively eroding and contributing sediment downstream, while areas with low erosion potential were relatively stable and not in need of immediate restoration. For sites that contained a pipe outfall, this

condition was summarized by whether the outfall needed immediate attention or repairs to continue functioning as intended.

3. Data Evaluation

The data collected in the field and developed during the desktop analysis were used to develop a list of high-priority regions (HPRs), or areas that contained more than one high-priority site, and high-priority sites within the District's boundaries. From the data collected, these high-priority sites were determined to be contributing large amounts of sediment downstream to the lower Minnesota River. For gullies, high-priority sites were determined to be those that had progressed in severity since 2008 or were newly identified as having a high erosion potential. For pipe outfalls, high-priority sites were those that in 2020 were determined to need immediate repairs. The high-priority sites were grouped by city and are generally summarized, by City, below.

Full descriptions of each high-priority site and HPR are detailed in the individual city sections of the report, but the following offers a brief summary of each community evaluated, including the conditions encountered in the field and areas of concern.

Bloomington

The City of Bloomington is located in Hennepin County on the north side of the Minnesota River. Heavy vegetation consistently made access conditions difficult; in addition, many gullies were located on or directly behind private property, making residential interactions more common in the city. Most gullies in Bloomington were rated as low to moderate erosion potential. A common gully type found in Bloomington was a bowl-shaped groundwater seep emerging as a head cut, which would go on to form a small stream that would either destabilize the soil and lead to channel incision or become vegetated and show few problem indicators. Pipe outfalls types were found to have more variety, but the pipes generally either drained water beneath trails or discharged into streams, lakes or wetlands surrounding the Minnesota River. Out of all the gullies evaluated, Bloomington had 24 high-priority sites; separated into six HPRs and eight stand-alone sites.

Carver

The City of Carver is located in Carver County along the north side of the Minnesota River. In Carver, access conditions were restricted in some severe gullies due to steep slopes and instability. Residential interactions occurred when the team visited gullies whose head cuts backed into residential properties. Carver contained some of the deepest gullies and the highest concentration of high erosion potential sites, particularly within the Spring Creek watershed. Many gullies contained groundwater-fed streams with

water flowing in the channels at the time of the visit. Additionally, many gullies branched out and connected at various points. The pipe outfalls fell into variable categories such as larger pipes around the downtown area of Carver, new pipes feeding into retention ponds on construction sites, and residential drainage pipes. Carver had 41 high-priority sites, which are separated into nine HPRs and two stand-alone sites.

Chanhassen

The City of Chanhassen is located in Carver County along the north side of the Minnesota River. Chanhassen did not have any access condition issues or residential interactions. Groundwater seeps and streams seemed to be the cause of most of the gullies, and in some sites, unstable drainage features appear to have exacerbated the erosion. Most gullies surveyed in Chanhassen were rated as having high erosion potential, most likely as a result of the groundwater seepage and steep slopes around the area. Several new pipe outfalls were found around the highway, the result of a recently finished road construction project along Flying Cloud Drive. Additional construction projects around Great Plains Boulevard were also noted and may have affected the hydrology in this area. The City of Chanhassen was found to have 10 high-priority sites separated into three HPRs.

Chaska

The City of Chaska is located in Carver County along the north side of the Minnesota River. Chaska did not have any difficult access conditions or interactions with residents. Groundwater seeps and groundwater-fed streams were common in the area, especially around Seminary Fen, with many flowing through the small tributaries of the Minnesota River. Many of the pipe outfalls in Chaska were found concentrated around the point where East Creek flows through the downtown area. There were four general areas where gullies were located: Clay Hole Lake, Seminary Fen, East Creek near downtown Chaska, and the Minnesota River floodplain, but only four high-priority sites. There was one HPR in the Minnesota River floodplain and two stand-alone high-priority sites.

Eden Prairie

The City of Eden Prairie is located in Hennepin County along the north side of the Minnesota River. Access conditions in the Eden Prairie were not challenging outside of sporadic sections of heavy vegetation. Additionally, there were no residential interactions in the city. Steep hillslopes and groundwater springs throughout Eden Prairie resulted in many high erosion potential sites. The most extensive erosion in the city was found at Richard T. Anderson Conservation Area, but some sections of Purgatory Creek were also found to be heavily eroded. Various types of pipe outfalls were observed in the city, but commonly, the stormwater from these outfalls was discharged into the wetlands of the Minnesota

River. Along Flying Cloud Drive, steep slopes drain towards the Minnesota River, but these showed little signs of active erosion as they are stabilized by vegetation along the channel and banks. Eden Prairie had 13 high-priority sites, which are separated into two HPRs and two stand-alone sites.

Jackson Township and Shakopee

Shakopee was not specifically included as part of the study, but three previously identified sites were evaluated in the 2020 study and have been included in the Jackson Township data. Jackson Township is located south of the Minnesota River in unincorporated Scott County, across the river from the City of Carver and to the west of the City of Shakopee. In Jackson Township, access conditions were restricted for certain sites due to steep slopes. Some residential interactions occurred with sites located near private property. Of the five gullies investigated in Jackson Township, unstable drainage features are assumed to be the cause of two, while the causes of the remaining three remain undetermined. Most of the pipe outfalls in Jackson Township allowed flow underneath a walking trail or discharged into a tributary of the Minnesota River. Jackson Township had only one high-priority site and contained no HPRs.

Mendota, Mendota Heights, and Lilydale

Mendota, Mendota Heights, and Lilydale are neighboring communities located south of the Minnesota River within Dakota County. The conditions in these three cities were similar: access to and visibility of many of the gullies and pipe outfalls were made difficult by their proximity to the Union Pacific railroad, steep slopes along the valley wall and riverbanks, and heavy buckthorn thickets throughout the region. Mendota Heights contained the most sites at 62 locations, while only six sites were found in Mendota and four in Lilydale. Very few seeps or groundwater-fed streams were observed in the area; in general, most gullies formed from weathering bedrock, with a head cut cutting into St. Peter sandstone underlain by Platteville limestone. As the head cut progresses backwards, the limestone weathers more quickly, causing the limestone layer to collapse into the gully as the sandstone is eroded underneath it. Due to this, most gullies in the area were bowl-shaped head cuts forming weathered slumps and not actual gullies. Many of the pipe outfalls in the region drained from the road on the bluff and flowed down a chute, ultimately draining beneath the railroad and into the Minnesota River. This region had very few high erosion potential sites, Mendota Heights had six high-priority sites, separated into three HPRs and three stand-alone sites. Neither Lilydale nor Mendota contained any high-priority sites or regions.

The results from this study will be shared with each community at a future collaborative work session. The goal of this work session will be to identify areas for potential partnership and develop a list of priority sites for future study.

A second phase of the project will occur in 2021 to identify gullies and collect baseline condition assessments on the south side of the Minnesota River, in the communities of Burnsville, Eagan, Savage, and Shakopee, following the same methodology outlined in this report. The results from the second phase of the project will be appended as Volume 2 of the Updated Gully Inventory and Condition Assessment. A summary document in plain language and with simple graphics will also be developed to provide a high-level summary of Volumes 1 and 2 and refer readers to the technical volumes for more detail.

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Both University of Minnesota students, Philip (a PhD student) and Katherine (a senior in Biosystems Engineering) conducted the nearly 3-month field survey component of the project.