

Draft Stormwater Geospatial Data Standard

Pilot and Proof-of-Concept

Final summary report submitted to:

University of Minnesota Water Resource Center
1985 Buford Avenue | 173 McNeal Hall
Saint Paul, Minnesota 55108

April 4, 2020

Project Principal Investigator: Geoffrey Maas AICP GISP
Ramsey County Information Services
geoffrey.maas@co.ramsey.mn.us

Project Co-Coordinators: Carrie Magnuson
Ramsey-Washington Metro Watershed District
carrie.magnuson@rwmwd.org

Alex Blenkush
Hennepin County Public Works
alex.blenkush@hennepin.us

On behalf of the
Metro Stormwater Geodata Project Steering Committee
<https://metrogis.org/projects/stormsewers.aspx>

Water Resources Center

UNIVERSITY OF MINNESOTA
Driven to DiscoverSM



This project was supported by the Minnesota Stormwater Research and Technology Transfer Program administered by the University of Minnesota Water Resources Center through an appropriation from the Clean Water Fund established by Minnesota Clean Water Land and Legacy Amendment and from the Minnesota Stormwater Research Council with financial contributions from:

- Capitol Region Watershed District
- Comfort Lake-Forest Lake Watershed District
- Mississippi Watershed Management Organization
- Nine Mile Creek Watershed District
- Ramsey-Washington Metro Watershed District
- South Washington Watershed District
- City of Edina
- City of Minnetonka
- City of Woodbury
- Wenck Associates
- Minnesota Cities Stormwater Coalition

For more information about the Center and the Council, visit:

<https://www.wrc.umn.edu/projects/storm-waste-water>

For more information about the Minnesota Clean Water, Land and Legacy Amendment, visit

<https://www.legacy.mn.gov/about-funds>

Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the Water Resources Center or the Minnesota Stormwater Research Council.

Water Resources Center

UNIVERSITY OF MINNESOTA

Driven to DiscoverSM



Context and deliverables. This summary report is provided to describe how our project efforts have satisfied the requirements and conditions of the 'Advancing Stormwater Science Technology and Management in Minnesota' grant provided by the University of Minnesota Water Resources Center to the Metro Stormwater Geodata Project (MSWGP) for the 'Draft Stormwater Geospatial Data Standard Pilot and Proof-of-Concept' effort as originally granted in July 2018 and by its revised scope-of-work as approved on December 30, 2019.

Materials submitted to the Water Resources Center accompanying this summary report to satisfy the grant deliverables include the following:

- The draft standard documents and materials developed with grant funding including:
 - [Draft Inlet, Outlet and Stormwater Pond Inspection Schema](#) (41 pages)
 - [Draft Stormwater Geodata Transfer Standard](#) (161 pages)
 - Excel spreadsheet versions of both the [Inspection Schema](#) and [Draft Transfer Standard](#)
 - The [MSWGP Sample Pilot Dataset](#) (in both geodatabase and shapefile formats)
 - Supporting materials for the [MSWGP Sample Pilot Dataset](#) including 'Quick Guide', formal metadata record and legal disclaimer language

All these materials are publicly available here: <https://metroqis.org/projects/stormsewers.aspx>

The grant funding provided by the University of Minnesota Water Resources Center to create the above listed materials provides the Metro Stormwater Geodata Project team the enhanced ability to conduct outreach and solicit stakeholder feedback from the entire statewide water resources, engineering, planning, asset management, public works and geospatial professional community during calendar 2020. This forthcoming outreach will assist us greatly in satisfying the unmet need of an agreed-upon authoritative data transfer standard for geospatial data representing stormwater infrastructure.

The Metro Stormwater Geodata Project is grateful to the Water Resources Center for the support and looks forward to future productive partnerships to understand and enhance the state's stormwater infrastructure and ultimately protect the quality of the water which is the shared resource of all Minnesotans.

Executive Summary. In April 2018, a gathering of over sixty (60) professionals at the Hennepin County Public Works Facility in Medina, Minnesota representing engineering, water quality, water resources, regulatory services, asset management, urban planning and geospatial profession convened and agreed that the lack of an approved geospatial data transfer standard for stormwater infrastructure presented an on-going challenge to efficient mapping, flow modeling efforts and inter-jurisdictional data federation in Minnesota. Shortly after this event, a steering team formed and the [Metro Stormwater Geodata Project \(MSWGP\)](#) was 'born'.

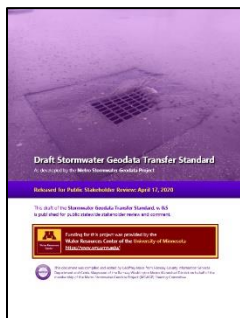
During mid-2018 through late 2019, the MSWGP Steering Team convened numerous times in various venues around the Twin Cities metro region and developed a draft data transfer standard with broad inter-disciplinary input to articulate, document and meet the diverse set of data needs for stormwater geospatial data. The steering team felt that one of the best means of soliciting further input would be to not only develop a standard but also to select a pilot study area within the Twin Cities metro and create a pilot dataset in the draft standard. This pilot dataset would be shared with the entire professional community as a means of viewing, testing and trying out the standard. Creation of this pilot was funded by the

Grant funding Water Resources Center. In July 2018, the Metro Stormwater Geodata Project was informed that it would be the recipient of a grant totaling **\$18,785.00** from the Water Resources Center for the development of a draft standard and pilot dataset. At the conclusion of our project, we are pleased to report that our effort was completed successfully—with all deliverables created—without using the entire allotted amount of funds as originally granted; final expenditures for the effort came to a total of **\$13,837.50**.

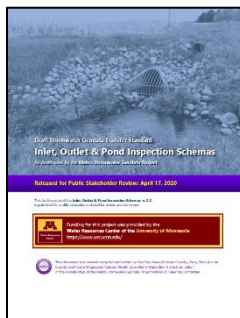
Summary of deliverables. The following narrative describes how each aspect of the agreed upon scope of work for the grant funding was met.

Deliverable #1:

Completion of an initial draft prototype stormwater geodata transfer standard



The MSWGP Steering Team and its constituent work teams began developing a draft stormwater geodata transfer standard in mid-2018 and completed their work in early 2020. The results are two comprehensive documents, the first: **'Draft Stormwater Geodata Transfer Standard, v. 0.5'** (161 pages) which contains the full detailed breakdown of every attribute, feature, domain value and content measure needed for creating an effective and complete geospatial data set representing stormwater infrastructure.



The second document prepared is the **'Draft Inlet, Outlet and Pond Inspection Schema, v. 0.2'** (41 pages) which contains a detailed breakdown of the attributes, features, domain values and content measure for field inspection and collection data formatting. This was identified as an emerging need by municipal interests and regulatory interest for having a consistent template for collecting MS4 compliance data in the field. Prior to this resource, each city was using their own format and no consistent authoritative statewide standard template existed.

Deliverable #2

Determination of a suitable pilot study area



Members of the MSWGP Steering Team working to determine and select suitable pilot data sites around the Twin Cities Metro Maple Grove, March 2019 (photo: G. Maas)

One of the most effective means of getting the larger stakeholder community to review and test out an emerging data standard is to prepare a sample dataset in the proposed format. Professionals can then download, test, map, translate, build test applications and explore the data and determine what modifications might be necessary for the eventual standard to meet their needs.

During the project sessions during 2018-2019, the MSWGP Steering Committee originally selected twelve (12) initial sites around the Twin Cities metropolitan area it deemed as suitable for the potential collection of municipal stormwater geospatial data to test and assemble for its pilot study. The original pilot concept conceived by the group was to try to meet the following criteria:

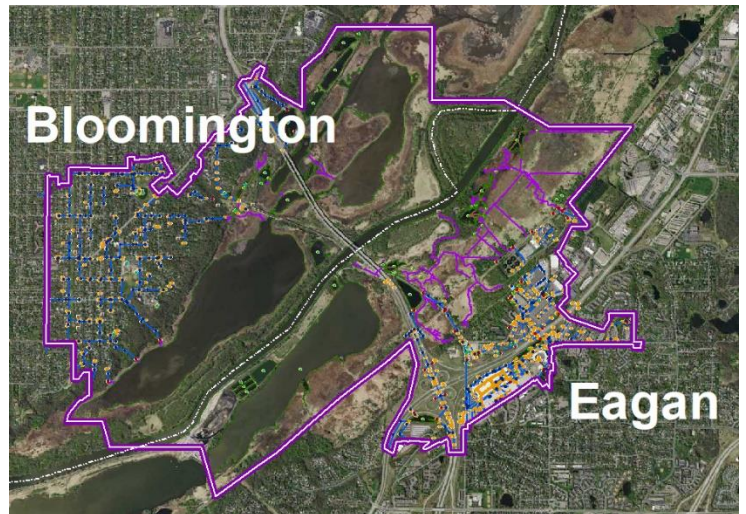
- The pilot study area should encompass all or parts of three to five (3 to 5) adjoining municipalities in the Twin Cities Metropolitan region; to incorporate and tackle the problem of alignment of sub-surface features at boundaries;
- Contain a variety of municipal, county, state and/or private campus stormwater infrastructure features;
- Encompass a diverse set of landscape conditions, including, but not limited to variable soils, slopes, wetlands and natural watercourses acting as receiving waters;

During Summer 2019, members of the project's Pilot Team contacted, and successfully acquired existing stormwater geodata from the over thirty-six (36) of the various municipal entities and agencies who maintain stormwater fixtures and assets within the twelve select pilot sites. Upon review of this collected data by the project team, the sheer volume, the complexity and the diverse (non-uniform) nature of the data forced the MSWGP Steering Committee and its various technical working groups to reconsider its approach to the pilot project selection process and to consider revising its pilot work to something more realistic and manageable.

Considering this needed modification, the southern portion of two of the original twelve pilot sites (encompassing portions of the cities of Bloomington and Eagan, including the MnDOT

State Trunk Highway 77 bridge) was chosen as the desired pilot site for testing the data schema to move the project forward.

While smaller than originally conceived by the Steering Team, this 5.87 square mile site contains two distinct drainage areas ('storm-sheds') and a diverse mixture of stormwater fixtures and infrastructure (including municipal, regional and state-owned features, containing outfalls, inlets, pipes, channels, ponds, best management practices, etc.) which drain to the receiving water of the Minnesota River and the adjacent surface waters. This study area, with this mix of landscape and stormwater fixtures was selected as both a realistic and manageable testing site for the forthcoming data standard.



The map at right provides a basic geographic context on the project's final agreed-upon pilot site; straddling the Minnesota River into portions of Bloomington and Eagan and centered on the State Highway 77 bridge.

Deliverable #3

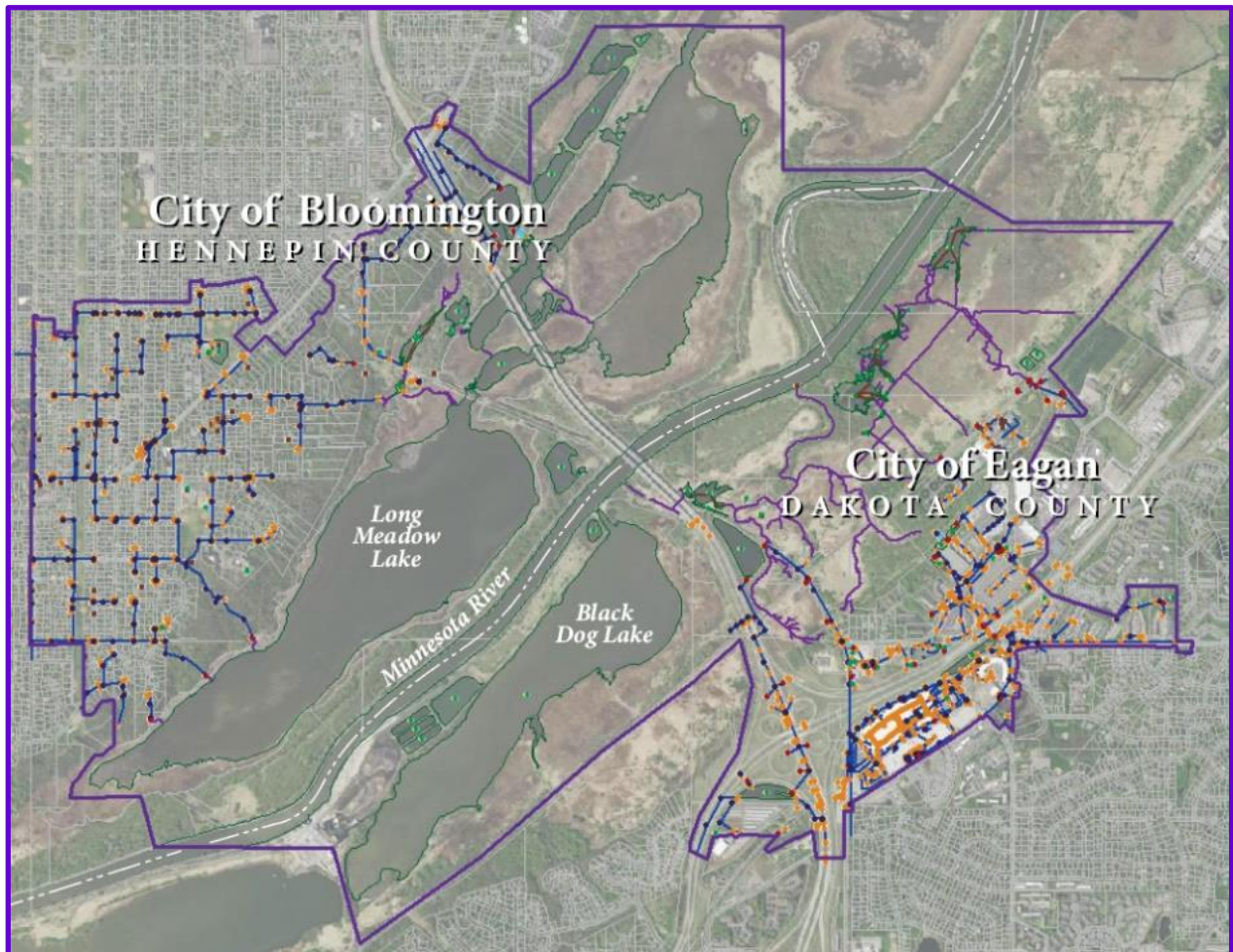
Acquisition and translation of data and creation of pilot dataset

One of the most involved—and ultimately valuable deliverables—of the effort was to acquire and translate existing data from several jurisdictions and translate them from their native format to the draft standard. This sample dataset will be used primarily as a resource for the review and testing of the wider stakeholder community for so they can provide detailed and informed suggestions for the augmentation, improvement and revision of the standard.

The study area encompasses 5.87 square miles (3,762 acres) of the cities of Bloomington and Eagan and is bisected by the Minnesota River. The study area contains a total of 49,279 linear feet (9.3 miles) of natural and man-made channels, 154,919 linear feet (29.3 miles) of pipes, 1122.08 acres of basins and open water, a total of 58 identified outlet points, 1042 inlet points, 348 manholes, 16 examples of best management practice installations and an accompanying set of 7 lift stations.

The Metro Stormwater Geodata Project: Pilot Study Area

Portions of the cities of Bloomington and Eagan totaling 5.87 square miles



The two participating municipalities took on the task of translating their stormwater data from their native format into the draft Metro Stormwater Geodata Transfer Standard during December 2019-March 2020. This work included some field verification and ground truthing activity where data and attribution were absent from existing data, and the creation of needed geometry by digitizing them from aerial imagery; particularly for natural features absent in existing datasets. Final assembly, editing and assembly of the dataset was performed by project team members from Ramsey County GIS staff.

Members of the project Pilot Team also assisted in providing data for assets represented by Dakota County, Hennepin County, the Minnesota Department of Transportation and the Metropolitan Council within the study area. This entire effort provided an opportunity to see how well the draft standard could accomplish one of its main objectives—to federate data from various agencies.

Value of the above deliverable materials to the on-going effort.

With the pilot sample dataset and accompanying documentation prepared, the project team looks forward to a summer (2020) of robust stakeholder review and input. The pilot dataset and accompanying materials will be made publicly available from the project website <https://www.metrogis.org/projects/stormsewers.aspx>.

A formal notice will be directed to the statewide community on Friday, April 17th—the exact date of the two-year anniversary of the original kickoff meeting—announcing their availability and the opening of the comment collection period. The MSWGP Steering Team look to use these materials to engage the engineering, planning, landscape architecture, water quality, natural resource and infrastructure/asset management community across Minnesota and to encourage these interests to review and comment on the proposed data transfer schema so that we can further improve its development and refinement and eventual adoption and usage.

Acknowledgements:

In the past two-year period—since the initial project kick off “Stormwater Data Summit” (*held in Medina, Minnesota on April 17, 2018 to determine if there was sufficient interest or viability in the project*)—many individuals from around the metro region have contributed their valuable time, insights, energy and experience to create the draft standard and thanks are due to all of them. There are several key individuals, without whose specific focus and dedication, key aspects of the project would not have been possible, and they deserve special acknowledgement:

- Carrie Magnuson, Ramsey Washington Metro Watershed District
- Alex Blenkush, Hennepin County Public Works
- Ann Houghton, Hennepin County GIS Office (retired)
- Perry Clark, Carver County Public Works
- Erik Madland, City of Bloomington
- Brian Gruidl, City of Bloomington
- Tami Maddio, City of Eagan
- Kyle Seifert, WSB Engineering
- Brian Pittman, WSB Engineering
- Kellie Thom, Minnesota Department of Transportation

Also, huge thanks are due to John Bilotta and Jeff Peterson of the University of Minnesota Water Resources Center for their flexibility, keeping the channels of communication clear and wide open and, not least, their enormous generosity of spirit in support of the effort.

