Minne Lusa and Papillion Creek South Basins – Data Gap Analysis TM

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Purpose

The purpose of this Technical Memorandum (TM) is to present the findings of the Data Gap Analysis conducted as part of Task 2 of our scope of work and Protocol No. 3. The data and information provided by the Program Management Team (PMT) and the City were reviewed to identify data gaps and information requiring confirmation. The identified data gaps will be listed and a description will be provided proposing how the data gaps can be addressed.

As directed by the City and the PMT, this document also includes data gaps related to the model. Furthermore, the Data Gap Analysis TM contains no specific recommendations regarding fieldwork to address data gaps. All recommendations for fieldwork will be included in TM2 – Field Data Collection.

Data Received

Numerous documents, files, databases, drawings, memoranda, and Geographic Information System (GIS) have been reviewed as part of this analysis. A listing of the relevant material reviewed is included in Appendix A.

Data Gaps

The data gaps that were identified apply to information relevant to both the Minne Lusa and Papillion Creek South basins. Gaps have been grouped into the following three sections: *Clarifications on Program Procedures, Gaps in GIS/Model Data, and General Data Requests*. Table 4 at the end of this technical memorandum provides a comprehensive summary of the identified data gaps, the reason the data gap is significant to the project, and recommended approach for addressing the gap.

GIS/ InfoWorks Model Data – Minne Lusa Basin

Background

The InfoWorks model has a total of 11,636 Acres in the Minne Lusa Basin which have been sub divided into 81 catchments. The catchments range from 21.0 acres to 2,822 acres in size. These catchments have been assigned a contributing area ranging from 10% to 50%. Currently there are 2 catchments identified at 10% (separated), 2 at 20.3% (special), 1 at 33.5% (half partial/half combined), 1 at 36.8% (special) and the remaining 75 catchments at 50% (combined). These percentages result in the model identifying a total of 3,583 acres contributing flow into the modeled system.

Data Gaps

The sub catchments through the Forest Lawn Cemetery, Fontenelle Golf Course, Adams Park, Miller Park as well as other small parks throughout the basin should be assigned a more accurate Land Use value to properly model storm water runoff. There is currently only one Land Use identified in the InfoWorks model, (standard road/roof/pervious). Minne Lusa basin has various areas of land use and development which could be differentiated. The entire Forest Lawn area has been assigned a single sub catchment and point loaded onto the modeled pipes at a single manhole. This results in inaccurate peaks on the system at that point and downstream.

The catchments included in the model should be redefined and subdivided and assigned the appropriate contribution acreage taking into account sewer separation projects previously completed. The catchment area assignments in the model do not address the separation projects which the city has undergone. The city estimates that 21% of the Minne Lusa basin has undergone separation work. This would more accurately model the existing combined sewers in those locations to identify capacity issues in order to develop water in basement resolutions.

In addition to modifying the catchments, it is preferable that the storm water pipes in the separated sewer areas be added to the model. The runoff for those areas should then be applied to the storm water system, which ties back into the combined system at downstream locations. Inspections at the storm water system overflow locations and surface water storage locations which have overflows back to the combined system throughout the basin should be done. The surface storage locations with overflows to the combined system should be included in the model. This is necessary to properly model storm water runoff attenuation, as well as capacity of the pipe downstream of the separation projects.

The pipes currently in the model are 24 inch and larger which do not extend into the upper reaches of the system. Some of the complaint data (water in basement) provided shows problem areas which have no modeled pipes. It will be necessary to review city GIS, city maps, as well as field investigate these areas. Pipes can then be added to the model in order to run simulations and provide resolutions for these areas.

GIS/InfoWorks Model Data – Papillion Creek South Basin

Background

The InfoWorks model has a total of 385.8 Acres in the Papillion Creek South Basin which have been sub divided into 6 catchments. The catchments range from 23.8 acres to 141.3

acres in size. These catchments have been assigned a contributing area ranging from 17% to 50%. Currently there is 1 catchment identified at 17% (separated), 2 at 33.5% (half partial/half combined), and 3 catchments at 50% (combined). These percentages result in the model identifying a total of 163.5 acres contributing flow into the modeled system.

Data Gaps

The complaint data indicates water in basement issues in the largest catchment (141 acres) in the northern portion of the basin.

General Data Requests – Minne Lusa and Papillion Creek South Basins

1. A list of items in the Basin Characterization Packets is provided in Protocol three, Appendix A. Some of this information has not been posted to the FTP site. Specifically, the information Black & Veatch (B&V) requires includes the excerpt from TM No. 13, and the list of Capital Improvements Projects.

2. The record plans appear to be complete as far as the combined sewer program. Other significant projects not in the RNC(L) program will be needed. Specifically drawing and details for the Sorenson Parkway project storm sewer system, the 108 inch Sprague Street Relief Tunnel, the Minne Lusa outfall grit facility, and the North Interceptor would be useful to obtain.

3. Based on review of the city GIS and Quarter section mapping, and a cursory field review of several random quarter sections, it appears that there are a significant number of storm water inlets that are not included in the mapping information. This number has been estimated at 1500 to 2000, for the Minne Lusa and Papillion Creek South basins. This information is useful in analyzing potential effectiveness of BMP's in source control as well as water-in-basement (WIB)/Street flooding issues. The level of effort and detail in analysis of these issues required by the PMT will ultimately determine the necessity of gathering this information and the method(s) by which it should be gathered.

4. An evaluation of sewer condition is requested and may be obtained by assessment during other field surveys, or by interviewing the maintenance foremen with the City.

5. The Program Management Team and B&V will work together to update the percent of impervious areas in the model to develop more accurate simulations. If available, B&V requests the following GIS data for this activity: Rooftops (building foot prints), Edge of Pavement, and Driveways. However, the City has informed the team that this information is not available.

6. Hydrographs will be requested in order to estimate system flows and evaluate combined sewer overflow (CSO) controls alternatives. Individual locations will be listed in TM 2 - Field Data Collection.

7. Corrected simulations will be needed after the model has been modified to include the storm water improvements made in conjunction with the addition of the Sorenson Parkway.

8. It is requested that storm sewer as-built drawings for the Sorenson Parkway, the North Freeway, and the Storz Expressway be provided. This information is important since there are quite a few separated areas upstream in the Sorensen Parkway watershed that originally tied back into the old combined sewer system. If the Sorensen storm sewer picked up these separate storm sewers, taking them out of the combined system will make a difference in the model. The N. Freeway and Storz storm sewers are important because they provided a separate storm sewer outlet for the Sorensen storm sewer.

9. A review of InfoWorks data flags was undertaken in order to improve the confidence levels of data used in the development of the InfoWorks hydraulic model. Based on a review of assumed and/or interpolated data flags in the InfoWorks model, B&V has identified low confidence data sources for specific pipe and manhole information. Table 1 identifies the data flags that were considered to be low confidence.

Table 1
Low Confidence Data Flags

Data Flag	Model Feature	Description
AG	Node	Assumed ground elevation 10 ft above invert
AI	Pipe	Assumed invert of 10 ft below surface
AS	Pipe/Node	Assumed
DD	Pipe	Invert calculated from GIS down depth "manhole_depth"
HY	Pipe/Node	Hydra model files from 1990's
IM	Pipe/Node	Inferred in model using Info Works automatic routines
IN	Pipe/Node	Interpolated from Hydra files
IN	Pipe/Node	Interpolated from Quarter Section Elevations

Table 2 and Table 3 summarize manholes and pipe information that have been assigned one or more "low confidence" data flags. A comprehensive list of "low confidence" pipes and manholes and recommended inspection program for resolving confidence issues will be provided in Technical Memorandum No. 2 - Field Data Collection.

Table 2
Summary of Low Confidence Modeled Manhole Data

Basin	Chamber Dimension (quantity)	Ground Level (quantity)	Assumed Rim and Invert Elevations (quantity)
Minne Lusa	7	49	30
Papillion Creek South	73	1	0

Table 3
Summary of Low Confidence Modeled Pipe Data

Basin	Downstream Depth (quantity)	Downstream Invert (quantity)	Upstream Invert (quantity)	Assumed Upstream Rim and Invert Elevation (quantity)
Minne Lusa	0	355	363	21
Papillion Creek South	1	8	4	0

Table 4
Summary of Data Gaps

Item	Data Gap	Significance	Resolution
1	Standard layout/Border for Maps, Drawings and Figures	Standardization with other BC's	PMT to provide
2	Field Data Collection Form	Standardization with other BC's	PMT to provide
3	Gaps in Model Inventory Data (Manhole-rims, depths) (Pipe-size, material, inverts)	Improvement to InfoWorks model, GIS data and alternative evaluation and development	Field Investigations / Review of as-built drawings
4	Data on Surface Water Detention Basins	Modeling of storm water storage capacity and flow attenuation in InfoWorks and alternative evaluation and development	Shapefiles
5	Land use in the model versus actual	Improve resolution of InfoWorks model parameters	Shapefiles
6	Impervious Data - Road, Parking and Rooftops	Improve resolution of InfoWorks model pervious/impervious parameters	Shapefiles
7	Infrastructure Condition – Sewers, Manholes, Pump Stations, Inlets, Grit Basin	Alternatives evaluation and identifying potential reasons and resolutions to WIB problem areas	Field Investigations/Meeting with City Staff/Sewer Maintenance Database
8	Connectivity and Capacity of the Sorenson/Storz Expressway Drainage Project	Correct InfoWorks model and identify any available capacity and alternative evaluation and development	Obtain As-Built drawings from City or State of Nebraska, and possibly fieldwork
17	Updated InfoWorks Model	Model needs to represent the Sorenson storm water project	PMT to provide
9	Capital Improvements Projects	Improve resolution of InfoWorks model parameters	Shapefiles
10	CH2MHill's TM No. 13	Understanding of Initial thoughts on CSO Control	PMT to provide
11	Geodatabase data dictionary for CSO_Contractors.mdb	Understanding geodatabase fields and use	PMT to provide

Table 4
Summary of Data Gaps

Item	Data Gap	Significance	Resolution
15	Previous results from smoke testing near Bridge Street	For model refinement / condition assessment	City to provide
16	Location, capacity, and condition of inlets – basin wide	WIB/Flooding assessment, model refinement, condition assessment, and alternative evaluation and development.	City to provide current data / additional field investigations
18	Model Hydrographs	Estimating system flows during alternative controls evaluation	PMT to provide
	Water Quality of overflows at all CSO points	Alternative evaluation and development	PMT to provide
	Water Quality Limits	Alternative evaluation and development	PMT to provide
	Roof Leaders Connectivity	Alternative evaluation and development	Field Investigation

Appendix A – Data Received Summary

	Description	File/Format	Date	Revision #
1	Aerial Photos - color 10in.	.tif	May 6, 2006	0
2	Aerial Photos - grayscale 2.5in.	.tif	May 6, 2006	0
3	Basin Study area shapefile	basin.shp	July 6, 2006	0
4	Cole Creek area shapefile	extbasin.shp	July 6, 2006	0
5	Description of CSO Inventory	Description_CSO_provided_BCs.pdf	August 14, 2006	0
6	City of Omaha CSO Basin Study (HGM Project No. 76-05)	.shp, .dgn, .dbf, .xls, .apr, .pdf		
	Drainage	.shp	May 2, 2005	0
	Majors	.shp	May 2, 2005	0
	Parcel	.shp	May 2, 2005	0
	Railroads	.shp	May 2, 2005	0
	Sections	.shp	May 2, 2005	0
	Sewer	.shp	May 2, 2005	0
	Street	.shp	May 2, 2005	0
	Zoning	.shp, .apr	May 2, 2005	0
7	Proposed CSO Study Area	ProposedCSOBasinStudyAreas.pdf	May 6, 2006	0
8	Minne Lusa inventory plan & profile drawings	.pdf, .tif, .xls (709 drawing .tif files)	July 31, 2006	0
9	Papillion Creek S inventory plan & profile drawings	.pdf, .tif, .xls (24 drawing .tif files)	July 31, 2006	0
10	Minne Lusa inventory CSO drawings-data sheets (4 CSO sites)	.xls, .pdf	July 31, 2006	0
11	Papillion Creek S inventory CSO drawings-data sheets (3 CSO sites)	.xls, .pdf	July 31, 2006	0
12	NICET Certified logo	image.jpg / image.png	May 6, 2006	0
13	2004 Flow Data	flow and rainfall data .csv files	August 14, 2006	0
14	2005 Flow Data	flow and rainfall data .csv files	August 14, 2006	0
15	Flow Metering Locations	.shp	August 14, 2006	0
16	Stakeholders List and Panel	.pdf	August 14, 2006	0
17	Environment Plan	Environment_CIP.pdf	August 14, 2006	0
18	Transportation CIP Plan	Transportation_CIP.pdf	August 14, 2006	0
19	MAPA_Long_Range_Transportation_Plan	MAPA_Long_Range_Transportation_Plan.pdf	August 14, 2006	0
20	USGS Plan of Study	USGS Sampling Sites.pdf	August 14, 2006	0
21	MAPA 2004 contour data		May 6, 2006	0
22	Hanging Files Section Maps 1"=100' (sewer plans)	.pdf (851 drawings)	June 6, 2006	0
23	Basin Autocad Drawing	BasinOverlay.dwg	May 6, 2006	0
24	Omaha InfoWorks Model	Omaha2005calibration.iwc	July 31, 2006	0

	Description	File/Format	Date	Revision #
25	Omaha InfoWorks Model	Phase2-CorrectedOutlets.iwc	August 22, 2006	1
26	CH2M Hill TM#7	TM7v5.pdf	July 31, 2006	0
27	Pump curves	XXX.pdf	July 31, 2006	0
28	Design Storm Simulation Results	2005DesignStorm-2mo15min.iwc	August 6, 2006	0
28-1	Design Storm Simulation Results	2005rev1DesignStorm-2mo15min.iwc	August 22, 2006	1
29	Design Storm Simulation Results	2005DesignStorm-2yr24hr.iwc	August 6, 2006	0
29-1	Design Storm Simulation Results	2005rev1DesignStorm-2yr24hr.iwc	August 22, 2006	1
30	Design Storm Simulation Results	2005DesignStorm-3mo1hr.iwc	August 6, 2006	0
30-1	Design Storm Simulation Results	2005rev1DesignStorm-3mo1hr.iwc	August 22, 2006	1
31	Design Storm Simulation Results	2005DesignStorm-6mo6hr.iwc	August 6, 2006	0
31-1	Design Storm Simulation Results	2005rev1DesignStorm-6mo6hr.iwc	August 22, 2006	1
32	Omaha InfoWorks Model, 2005 Calibration (CH2M Hill)	readme.doc	August 6, 2006	0
32-1	Omaha InfoWorks Model, 2005 Calibration (CH2M Hill)	readme_v2.doc	August 22, 2006	1
33	Protocol No 1 Program Overview Rev. 0	.pdf	August 14, 2006	0
34	Protocol No 2 Data & Information Collection & Coordination Rev. 0	.pdf	August 14, 2006	0
35	Protocol No 3 System Characterization Rev. 0	.pdf	August 14, 2006	0
36	Protocol No.4 Alternatives Development & Evaluation Rev. 0	.pdf	August 14, 2006	0
37	USGS Water Quality Sampling	USGS Sample Sites.shp	August 14, 2006	0
38	Planning Department Information	tif.shp & pending_TIF.shp	August 14, 2006	0
39	Planning Department Information Maps	.pdf, .dgn	August 14, 2006	0
40	Work Orders Data Base	.dbf, .pdf	August 29, 2006	0
41	CSO_contractors	.mdb (geodatabase)	May 6, 2006	0
42	MinneLusa_packet	.pdf	September 11, 2006	0
43	PapioSouth_packet	.pdf	September 11, 2006	0
44	All Basin Studies & Reports 7-06	.xls	September 11, 2006	0
45	CH2M Hill Phase I - Final Report	.pdf	September 11, 2006	0
46	CSO Permit	.doc	September 11, 2006	0
47	Interceptor 2005 report all report files	.pdf	September 11, 2006	0
48	Plant NPDES discharge permit	.doc	September 11, 2006	0

	Description	File/Format	Date	Revision #
49	Stormwater Permit	.doc	September 11, 2006	0
50	GIS Data (Updated & New files)	.shp	September 11, 2006	0
51	GIS Data (Updated & New files)	.shp	September 11, 2006	0
52	Burt-Izard Basin Narrative-TM-Final	.pdf	September 14, 2006	0
53	Program Management Plan	.pdf	September 18, 2006	0
54	Private Program Website User Information	.xls	September 18, 2006	0