2018 Sanitary Sewer Collection System Comprehensive Plan

New Prague Comprehensive Plan

New Prague, Minnesota

NEWPR 144946 December 28, 2018

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December 28, 2018

RE: New Prague Comprehensive Plan
2018 Sanitary Sewer Collection System Comprehensive Plan
New Prague, Minnesota
SEH No. NEWPR 144946 4.00

Michael Johnson
City Administrator
City of New Prague
118 Central Avenue North
New Prague, MN 56071

Dear Michael,

Please find enclosed our initial draft copy of the City of New Prague Sanitary Sewer Collection System Comprehensive Plan for 2018. As you know, the City's Comprehensive Plan is part of a long-range planning document for future development of New Prague. This document replaces the previous 2003 New Prague Sanitary Sewer Comprehensive Plan and subsequent 2007 and 2008 area specific reports.

Our staff developed this report based on conversations with your staff, our knowledge of the system and information from the previous comprehensive plan. In addition, we used the following information: the City's GIS database, current and future land use plans, water records, and I/I data to update and model the City's current sanitary sewer collection system. The sanitary sewer model software (InfoSWMM) product licensed by Innovyze was used to determine design capacity in the existing collection system and any changes needed to handle future development.

Please review the enclosed draft and after reviewing the document, we can schedule a meeting to review your comments and discuss any future recommendations needed to complete the plan. If you have any questions relating to this document, please contact me by email at ccavett@sehinc.com or at 507.237.8381.

Sincerely,

Christopher M. Cavett, PE
Project Manager
(Lic. MN)

c: Glen Sticha, Public Works Director
Ken Ondich, Planning/Community Development Director

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2018 Sanitary Sewer Collection System Comprehensive Plan

New Prague Comprehensive Plan
New Prague, Minnesota

SEH No. NEWPR 144946

December 28, 2018

I hereby certify that this report was prepared by me or under my direct supervision, and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Christopher M. Cavett, PE

Date: December 28, 2018 License No.: 24719

Reviewed By: William Lueck, PE Date: December 28, 2018

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507.388.1989

Executive Summary

The City of New Prague operates and maintains an independent sanitary sewer collection system. The City of New Prague accepts sewage from the Cedar Lake Sanitary Sewer District, but the City does not own or maintain any of the infrastructure associated with this area.

The treatment facility in New Prague has capacity to accommodate the City of New Prague with additional growth as well as the Cedar Lake District as of 2018.

The sanitary sewer system will require additional capital improvements to maintain the existing level of service.

A five part study of the New Prague sanitary sewer collection system has been developed and identified in the following sections:

- Introduction
- System Inventory and Analysis
- Comprehensive Plan with System Needs
- Operation and Maintenance Plan
- Capital Improvement Plan

This report supersedes the 2003 Comprehensive Sanitary Sewer Plan (also completed by SEH), dated December 23, 2003.

This report complements the following Area Engineering Reports:

1. NW Development Area – Review of Infrastructure Requirements to Service Area, dated November 14, 2007
2. Proposed Alton Avenue Site – Engineering Review of Infrastructure Requirements to Service Area, dated November 14, 2007
3. Public Infrastructure Improvements – Southwest Area Commercial Development, dated November 3, 2008

Introduction

The City of New Prague is a growing city located southwest of the Minneapolis/Saint Paul metropolitan area on the border between Scott and Le Sueur Counties. The estimated 2017 population is 7,725 with 2,825 households. Population is projected to reach 12,990 residents by 2035, based on projections of the population data from the 2015 City of New Prague Comprehensive Plan. This Sanitary Sewer Comprehensive Plan will aid the City in future planning and development.

Sanitary sewage is collected in approximately 42 miles of sewer pipe ranging in size from 4 inches to 36 inches in diameter. There are nine sewage lift stations which serve areas distributed across the sanitary sewer collection system.

System Inventory and Analysis

The existing City gravity sewer system is comprised of approximately 42 miles of pipe (excluding private systems) ranging in size up to 36 inches in diameter. A majority of the system is relatively new with approximately 80% of the collection system being polyvinyl chloride (PVC) pipe. The system contains approximately 5 miles of clay pipe which is commonly associated with I/I (inflow/infiltration)

problems due to the number of pipe joints in the system. The number of joints also adds to its susceptibility to root intrusion.

The nine existing sewage lift stations in the City were inspected as a part of this update and were found to be in adequate condition but work is still needed on lift station repair and rehabilitation. Each lift station has recommended improvements of varying degrees which should be included in future capital improvement planning.

The sanitary collection system was evaluated using a sanitary sewer system model licensed by Innovyze, called InfoSWMM. A model was created and used to simulate wastewater flow conditions by routing sewer flows through the developed sewer infrastructure comprised of pipes, manholes and lift stations. The model calculated the various hydraulic parameters during normal flow, surcharge, flooding and pumping conditions. The model was used to evaluate current and future sewer capacities and required system improvements.

The City's existing GIS sewer structure data, record drawing information, lift station information and lift station inspections were compiled into a GIS database to configure the model. The model was then used to evaluate current and future sewer capacities and required system improvements.

The land use method was used to generate initial sanitary sewer flows. Parcel acres were multiplied by the sanitary load rate per existing land use and then assigned to the nearest manhole considered most likely to receive those flows. Sanitary land use loading rates were initially used to determine base flow rates throughout the City. Using the land use method to calculate total flow from the City resulted in total flow on par with metered values as the average flow. In order to determine future wastewater flow projections, the same land use method was used again, using future land use, to determine future flows.

Comprehensive Plan with System Needs

The population of the City of New Prague is projected to steadily increase over the next twenty years. In 2000, the population was 4,559 people and in 2010 the population was 7,321 people. If the City continues to grow at a similar rate, the population is estimated to be 11,900 by 2030 and 12,990 by 2035.

For modeling activities, anticipated wastewater flows from the various sanitary districts were determined by applying flow rates based on land use in each area, calibrated to the metered flows. Future flows were calculated using the land use method with the calibrated loading rates from the existing land use calculations. Loading rates were calibrated and applied to the future land use to determine future system flows. Flows from future areas anticipated to undergo development were assigned based on the current land use plan and preliminary development plans available from the City.

The results from the sanitary sewer modeling efforts indicate that the majority of the City's system does have the capacity to convey the anticipated peak flows for current and future conditions. There are four areas on the "watch list" where the system is either near capacity or may not have adequate capacity to handle future flows.

These areas of concern include:

- 7th Street NE from the County Rd 37 Lift Station to Philipp Parkway (See Figure 12)
- The parallel trunk sanitary sewer mains running north from 2nd Street NW alongside the railroad tracks and then east over to 1st Avenue NW (See Figure 13)
- 1st Street SE/SW from Columbus Avenue S to 1st Avenue SW (See Figure 14)
- Columbus Avenue S from 8th Street SE to 3rd Street SE (see Figure 15)

These areas of concern will need either infrastructure improvements or to remain under observation during wet weather events and future growth. Rerouting some areas to future trunk systems and/or future sewer improvements (i.e., reducing I/I by replacing clay mains) may help to alleviate some of these areas as well.

Operation and Maintenance Plan

The operation and maintenance plan portion of the study is to serve as a guide to monitor, maintain, and rehabilitate the City's sanitary sewer collection system. Specific recommendations in the plan include rehabilitation of system components with concerns related to safety, welfare of City residents and employees; rehabilitation of system components to improve system condition; development or expansion of maintenance programs to help ensure periodic maintenance of the sewer system; establishing policies and ordinances to protect the City's sewer infrastructure; and equipment and staffing needs of the City.

Capital Improvement Plan

The Capital Improvement Plan (CIP) portion of the study identifies deficiencies which exist within the sanitary sewer collection system and associated lift stations. The plan identifies both operation and maintenance and capital expenditures to correct the deficiencies within the collection system and the associated lift stations. A summary of costs are included in Table 14.

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2018 Sanitary Sewer Collection System Comprehensive Plan

New Prague Comprehensive Plan

Prepared for City of New Prague, Minnesota

1 Introduction

The City of New Prague is an established city located southwest of the Minneapolis/St. Paul metropolitan area with an estimated 2017 population of 7,725 with 2,825 households. Population is projected to reach 12,990 residents by 2035. This Sanitary Sewer Comprehensive Plan will aid the City in future planning and development.

Sanitary sewage is collected in approximately 42 miles of sewer pipe ranging in size from 4 inches to 36 inches in diameter. There are nine sewage lift stations which serve areas distributed across the sanitary sewer collection system.

Treatment of wastewater from the City of New Prague takes place at its wastewater treatment plant north of the City. The average daily flow for 2017 was 0.85 million gallons per day (MGD). Flow from the western, eastern, and southern portions of the City converges at the Main Lift Station and flows to the treatment plant. Flow north of the Main Lift Station converges at the 12th and Columbus Lift Station and flows directly to the treatment plant. During wet weather events, excessive flows are pumped via the bypass lift station to the treatment plant. When flows from the three lift stations (Main, Bypass and 12th/Columbus) exceed the capacity of the treatment plant, staff has the ability to divert excessive flows to the equalization basin adjacent to the treatment plant.

2 System Inventory and Analysis

2.1 Existing Sanitary Sewer Collection System Gravity System

An inventory of pipe based on the material and size of the pipe is shown in Table 1. Maps of the existing collection system and of the material types are illustrated in Figures 1 and 2.

Table 1 – Pipe Size, Material and Length

Pipe Material	Diameter (in)	Length (miles)	Length (feet)
CLAY	6	0.03	171
	8	3.60	19,028
	10	0.64	3,365
	12	0.69	3,639
	15	0.32	1,708
	18	0.19	1,024
	21	0.03	150
CLAY Total		**5.51**	**29,085**
DIP	6	0.06	315
	12	0.10	534
	18	0.01	33
DIP Total		**0.17**	**882**
PVC	6	0.17	901
	8	25.23	133,210
	10	2.03	10,709
	12	2.49	13,155
	15	1.82	9,616
	18	0.09	480
	24	0.11	603
	30	0.46	2,414
	36	0.05	252
PVC Total		**32.45**	**171,340**
RCP	15	0.19	1,016
	18	0.21	1,095
	24	0.09	458
	30	0.82	4,311
	36	0.47	2,500
RCP Total		**1.78**	**9,380**
TRUSS	8	0.87	4,569
	10	0.09	464
	12	0.39	2,069
	15	0.55	2,916
TRUSS Total		**1.90**	**10,018**
UNKNOWN	8	0.03	175
	30	0.13	703
	36	0.03	175
	UNKNOWN	0.08	414
UNKNOWN Total		**0.28**	**1,469**
Grand Total		**42.08**	**222,174**

2.2 Lift Stations

The City of New Prague's sanitary sewer system contains nine sewage lift stations. Table 2 identifies the capacity and the total detention time, from the inspections performed in October 2018.

Flow from the western, eastern, and southern portions of the City converges at the Main Lift Station and flows to the treatment plant. During wet weather events, excessive flows are able to bypass the Main Lift Station and be pumped via the Bypass Lift Station to the treatment plant. Flow north of the Main Lift Station converges at the 12th and Columbus Lift Station and flows directly to the treatment plant.

The capacity and physical condition at each station was inspected for this Comprehensive Plan. The purpose of the inspections was to identify deficiencies of each station and to establish a priority for improvements to the stations. Appendix A contains the results of the inspections for each lift station.

The adequacy of each station was evaluated against the following nine parameters:

- Station Hydraulic Capacity
- Safety
- Potential for Sewer Back-up
- Pump Review and Capacity
- Wet Well Physical Condition
- Valve Vault or Dry Well, Physical Condition
- Electrical Components
- Instrumentation/Control Issues
- Suitability of Location

An acceptability rating scale of 1 to 5 was established for the evaluation criteria described above for each of the nine stations. A rating of 1 is excellent; a rating of 2 is good, meaning the station is better than the average lift station in the metropolitan area; a rating of 3 means it is similar to an average station in the metropolitan area; a rating of 4 is below average, and a rating of 5 is unacceptable and the condition should be corrected in the near future. It must be understood that rating scores are subjective and different individuals would likely give different scores for any given parameter. Also, no universal standard exists. However, since the goal of the rating system is to establish a sense of relative need rather than concise determinations, the evaluations are deemed suitable for this study. A summary of the ratings is displayed in Table 3.

2.2.1 Station Hydraulic Capacity

The criteria for determining the adequacy of the hydraulic capacity is based on the conformance with the Ten States Standards which the Minnesota Pollution Control Agency has adopted as the State's guidelines. This standard requires a 30 minutes hydraulic wet well detention at average daily flow.

Lift station wet well capacities and detention times at each lift station are presented in Table 2.

Table 2 – Lift Station Detention Time Calculations

Lift Station Name	Average Max Daily Flow Rate	Wet Well					
		Depth	Surface Area	Floor to Influent Sewer Invert	Volume	Detention Time	
	(gpd)	(ft)	(ft^2)	(ft)	(gal)	(min)	(hr)
12th & Columbus	59,968	26.1	50.26	6.64	2,497	60	1.0
County Rd 37	148,049	30.4	78.54	13.49	7,927	78	1.3
Bypass	N/A	20.8	144.00	9.00	9,694	N/A	N/A
Central	19,366	12.6	28.27	5.85	1,237	90	1.5
Chalupsky	8,569	17.8	28.27	6.00	1,269	210	3.5
Homefield	5,600	35.1	78.54	8.43	4,952	8,052	134.2
Lady Slipper	24,902	23.5	28.27	5.53	1,170	66	1.1
Library	48,314	17.4	19.64	5.54	814	42	0.4
Main	681,514	18.3	78.54	9.15	5,375	12	0.2

2.2.2 Safety

Safety issues affect both the permanent constructed facility and operational procedures. Construction items address ladders, fall protection devices, presence of safety harnesses, safety grating, railings, the need to access subsurface structures during operation, and whether service vehicles and operating personnel can remain off the public streets during maintenance activities.

The operational procedures which the City employs do not necessarily require construction of permanent facilities, but may include use of portable equipment.

2.2.3 Potential for Sewer Back-up

The evaluation of the potential for sewer back-ups include three items: (1) is a review of the history of problems at the station, (2) is whether the stations contain standby power capability (either a generator or a receptacle for plugging in to a standby generator) and (3) whether the volume of the wet well plus the influent sewer contains adequate storage capacity to allow the sewer utility staff time to connect an emergency generator before wastewater would back-up into houses, in the event of a power outage.

A detention time of one hour for the wet well plus gravity sewer is considered excellent. A detention time of 50 to 60 minutes is considered good, time of 40 to 50 minutes considered average, 30 to 40 minutes undesirable, and less than 30 minutes unacceptable. The previously presented Table 2 shows the calculated detention time for each station. It should be noted that the Main Lift Station has a detention time much less than desired minimum of 30 minutes, however the Main Lift Station is backed up by the Bypass lift station. The Library Lift Station also

has a detention time of less than 30 minutes and has been recommended for abandonment (see Section 3.3 below).

2.2.4 Pump Review and Capacity

Pump review is a review of pump capacity, pump age and maintenance record.

Pump capacity is a determination of whether the station has capacity to pump the peak hourly flow with the largest pump out of service.

Pumps are typically designed to operate for a period of fifteen years. Any pumps older than 15 years are subject to failure due to age.

Maintenance review is a summarization by the City staff of the amount of maintenance required on each pump.

2.2.5 Wet Well Physical Condition

The station physical condition evaluation addresses the physical condition of each station's concrete, hatches and miscellaneous metals. Steps into wet wells are considered unacceptable because they can become corroded and are not capable of being retrofitted with fall restraints.

2.2.6 Valve Vault or Dry Well, Physical Conditions

The physical condition of the valve vault addresses the condition of the concrete, the steps, access into the station, piping and valves and the overall cleanliness of the structure.

The physical condition of the dry well addresses the condition of the chamber, the ladder, access into the station, piping and valves, and the overall cleanliness of the structure.

2.2.7 Electrical Components

The electrical review evaluates the adequacy of the electrical service to each station, the adequacy of standby power, and the condition and accessibility of the pump control panel. Adequacy of electrical service considers the number of power outages and whether operation of the pumps causes dimming of lights in neighborhood. An unacceptable rating (rating of 5) is given to any station which requires an operator to enter a below ground structure to operate the pumps.

2.2.8 Instrumentation/Control/SCADA

For this parameter, each station was reviewed against the following criteria:

- Whether the station has alarms for station high and low levels
- Whether back-up pump controllers exist
- Whether SCADA transmits to the central control station

2.2.9 Suitability of Location

The suitability of location addresses:

- Each station's service area, maintenance accessibility, aesthetics, visibility and proximity to adjacent homes
- Potential for damage by the public

- Position within right-of-ways, easements or City owned property

Accessibility from a public street is considered very important. The potential for public damage is a consideration of whether the station is susceptible to being struck by an automobile or to vandalism.

A private driveway to the stations is deemed important to allow operation and maintenance staff to function without being threatened by passing traffic.

For the visibility to neighbors and proximity to homes criteria, it is assumed that a lift station detracts from value or desirability of an adjacent home, and aesthetic treatment at the lift station mitigates this detriment.

2.2.10 Acceptability Ratings

Table below ranks the condition of each station against the nine general parameters, based. The detailed review of all criteria for each of the 9 stations is contained in Appendix A.

Table 3 – Lift Station Acceptability Rating

Rating System									
1 – Excellent									
2 – Good									
3 – Average									
4 – Below Average									
5 – Unacceptable									
Station Name	Hydraulic Capacity	Safety	Back-Ups	Pump Review	Wet Well Physical Condition	Valve Vault Physical Condition	Electrical	SCADA	Location
12th & Columbus	1	3	3	2	2	2	2	1	1
37 (County Rd 37)	1	1	1	1	2	2	2	1	1
Bypass Lift Station	1	3	1	3	3	NA	2	1	1
Central	1	3	1	1	2	2	2	1	2
Chalupsky	1	3	1	1	2	NA	1	1	1
Homefield	1	1	1	1	2	3	1	1	1
Lady Slipper	1	3	1	2	3	NA	2	1	1
Library	3	4	1	4	4	2	2	1	2
Main	2	1	4	1	1	1	1	2	2

2.3 System Analysis

2.3.1 Sewer Infrastructure

2.3.1.1 Existing System

Treatment of wastewater is provided by the City's wastewater treatment plant located in the northern part of the City. The majority of the City's wastewater (Districts 2–5) converges at the Main Lift Station. Flow is pumped from the Main Lift Station to the wastewater treatment plant. During peak times, excessive flow bypasses the Main Lift Station and flows to the Bypass Lift Station to avoid overloading the Main Lift Station. The collection system in District 1 (see Figure 1), flows to the 12th and Columbus Lift Station prior to being conveyed to the plant. The plant receives additional flow from the Cedar Lake Sanitary District by a force main directly to the plant. If flows to the treatment plant exceed the capacity of the plant, treatment plant staff have the ability to direct the excess flows into an outside equalization basin at the plant.

The approximate undeveloped areas which are anticipated to be able to be served by gravity to existing collection system are shown in Figure 17.

2.3.1.2 Future System Expansion / Staged Growth

Expansion of the existing sanitary sewer network is proposed to support future growth. (See staged growth and future network configurations in Figure 3).

On the western side of the City, proposed expansion of the system would include the eventual installation of two permanent lift stations – one in the northwest (NW Lift Station) and one in the southwest, (SW Lift Station). In the early stage 1 and stage 2 of growth, it is assumed that the force main from the NW Lift Station would be directed south on an interim basis to the 6th Street NW gravity sewer until eventual development in the west and northwest would require the installation of a permanent force main along the 12th Street NW alignment to redirect flow from the NW Lift Station to the treatment plant.

Along the east side of the City, expansion of the system must include the eventual construction of the Alton Avenue Trunk Sanitary Sewer Main and Alton Avenue Lift Station and Force Main. Interim and/or permanent lift stations may direct flow into the existing system until the construction of the Alton Avenue Trunk Sanitary Sewer Main. Once complete, the areas served by a temporary lift station would be redirected by gravity to the Alton Trunk Sanitary Sewer Main or by gravity to a permanent lift station location (SE Lift Station). These potential network configurations were built and analyzed in the model. The configurations and staging can be seen in Figures 3–11.

In addition, there are currently plans to reconstruct and upgrade the sanitary sewer main along Main Street in year 2020, and to abandon Library Lift Station, redirecting the respective flow west along Main Street. The current 2020 Main Street sanitary sewer design along with the removal of the Library Lift Station were assumed in all scenarios of the model.

2.3.2 Sewer System Modeling

In order to provide the City of New Prague with existing and future planning information, the existing sewer system was evaluated using a hydraulic flow simulation model, InfoSWMM. This model was used to route sewer flows through the developed sewer structure of pipes, manholes,

and lift stations. The model calculates various hydraulic parameters during normal flow, surcharge, backflow, flooding and pumping conditions.

The City's existing GIS sewer structure data, record drawing information from previous sanitary sewer projects, lift station information and lift station inspections were compiled into a GIS database to configure the model. The model was then used to evaluate current and future sewer capacities and required system improvements.

For the purpose of the analysis, the land use method was used to generate sanitary sewer flows. Parcel acres were multiplied by the sanitary load rate per existing land use and then assigned to the nearest manhole considered most likely to receive those flows. Sanitary land use loading rates, listed in Table 4 were initially used to determine base flow rates throughout the City. The loading rates were calibrated so that the total flow throughout the model matched the metered average daily flow at the plant. In order to determine future wastewater flow projections, the same land use method was used again with future land use plans.

Table 4 – Sanitary Loading Rates

Land Use Code	Sanitary Loading Rate (Gal/Acre/Day)	Land Use Description
AG_VAC	2	Agricultural / Vacant
COM	1020	Commercial
GOLF	4	Golf Course
INDUSTRIAL	933	Industrial
PARK	4	Park
PUBLIC	310	Public
RED_MED	990	Medium Density Residential
RESINGLE	512	Low Density Residential
RESMULTI	1350	High Density Residential
ROW	0	Right-of-way

3 Comprehensive Plan with System Needs

3.1 Future Land Use

The information contained in this Comprehensive Sanitary Sewer Plan Update is based on the projected growth in the 2015 Comprehensive Plan. For the analysis, the future land use plan was broken down into three hypothetical development stages to model progressive growth. Stage One representing areas likely situated for more immediate growth, Stage Two as the intermediate growth stage, and Stage Three representing the build out growth boundary, as described in the Comprehensive Land Use Plan. The stages of growth and associated infrastructure are shown in Figure 3.

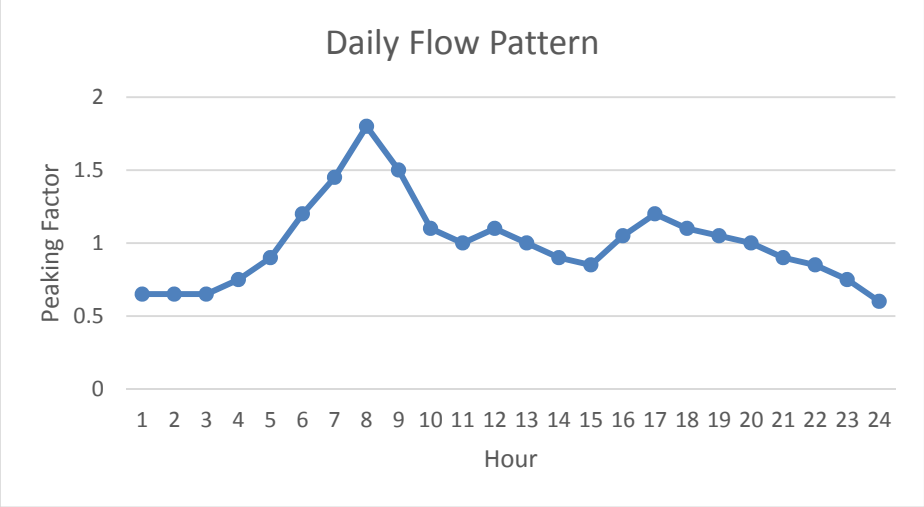
3.2 Sanitary Sewer Design Criteria

3.2.1 Flow Rates

Anticipated wastewater flows were determined by calculating flow rates based on land use and size of parcel. Sanitary loading rates were calibrated based upon flow monitoring per district and the density of sanitary loading type per district. Loading rates for future expansion were determined by assigning the average of existing loading rates to future parcels at the loading rates as summarized in Table 4.

3.2.2 Peak Flow Factors

The sanitary sewage conveyance system must be capable of handling the anticipated peak flows. Peak flows occur during both dry and wet conditions. The dry weather peak occurs during times of high demand and wet weather peaks occur during strong rain events. The dry weather peak is modeled by applying multipliers to the City's average daily flow values to mimic the natural change in flow due to demand. The curve below was applied to the average daily flow to model anticipated daily flow patterns.



The wet weather peaks are modeled by integrating storm flows in addition to average daily flows. The peak flows from wet weather flow monitoring were applied to the average daily flows to mimic inflow and infiltration within the model. The following Table 5 shows the peaking factors per flow meter district for the September 2018 wet weather event modeled.

Table 5 – Peaking Factors by District

Flow Monitoring District	Peaking Factors
1A	11.6
1B	12.7
2	2.1
3	3.1
4	9.1
5	6.7

3.2.3 Design Flows

The sewer design flows were developed based on metered data from the City of New Prague. The current average daily flow, averaged from flow data over the past six years, at the plant is 0.79 MGD. However, this value includes the flow from Cedar Lake. It is necessary to remove the flow and isolate the flows directly from the City. Overall, the current New Prague flow formula is as follows:

$$Q_{\text{New Prague}} = Q_{\text{New Prague WWTP}} - Q_{\text{Cedar Lake Sanitary District}}$$

Table 6 – Average Daily Flow

Year	Flow (MGD)
2012	0.74
2013	0.79
2014	0.79
2015	0.75
2016	0.84
2017	0.85
Average	0.79
Cedar Lake Average Daily Flow	0.05
New Prague Average Daily Flow	0.74

The isolated average daily flow for New Prague is 0.74 MGD. The flow calculations were calibrated so that the total flows from the City were 0.74 MGD.

To determine future flow rates at each growth stage, calibrated loading rates from existing conditions were used in the model for future development and land use plans. Additional future flows from new development together with existing flows resulted in average daily flow values listed in the table below:

Table 7 – Average Daily Flow Per Growth Stage

Growth Scenario	Average Daily Flow (MGD)
Existing	0.74
Growth Stage 1	1.07
Growth Stage 2	1.17
Growth Stage 3	1.85

NOTE: the existing design capacity of the wastewater treatment plant is 1.83 MGD. It can be assumed that as future growth begins to reach the limits of the growth boundaries identified in stage 3, that the city would also be reaching the design capacity of the wastewater treatment facility.

3.3 Current and Future System Results

The model analyzed the hydraulic capacity and velocity for each growth stage scenario. Hydraulic capacity, determined by the depth/Diameter (d/D) ratios, evaluates the percent of the pipe capacity that is utilized. Ratios under 0.6 indicate that there is significant available capacity remaining within the pipe. Ratios between 0.6 and 0.8 should be considered to be within a "warning threshold," meaning that there is little available capacity for additional flows. Further development or additional flow contributing to these segments should be assessed carefully and may not be allowed without pipe upsizing. Ratios greater than 0.8 may be a sign of potential pipe surcharging and should be closely looked at to determine whether the pipe capacity restriction at that point could cause a back-up or other potential risk of sewage spill. In terms of velocity, it is ideal for the flow velocity to remain within a range of 2–10 ft/s. Velocities below 2 ft/s present the risk of stagnant flows and allow for solids to settle. Velocities above 10 ft/s can erode the lining of the pipe and other supporting structures.

For existing conditions, flow velocities consistently stay below the 10 ft/s threshold. Along the larger trunk lines the majority of velocities remain between the ideal range of 2 ft/s–10 ft/s. However, the majority of the system's smaller trunk lines remain under 2 ft/s. For the system, it is not of concern that that flow remains below 2 ft/s. Velocities for future growth stages are similar and are not of concern. The City's maintenance program for pipe cleaning is appropriate and based on the history of back-ups, reasonably addresses this concern. If the maintenance program is continued it will address future concerns related to velocity. The velocity results can be seen in Figures 4–7.

For capacity, the majority of the pipe network remains below the 0.6 threshold and can adequately handle dry and wet weather flows in existing and future conditions. There are five noted segments of sewer main which have been identified where the capacity exceeds the 0.7 and 0.8 values.

These areas of concern include:

- 7th Street NE from the County Rd 37 Lift Station to Philipp Parkway (see Figure 12)
- The parallel trunk sanitary sewer mains running north from 2nd Street NW alongside the railroad tracks and then east over to 1st Avenue NW (see Figure 13)
- 1st Street SE/SW from Columbus Avenue S to 1st Avenue SW (see Figure 14)
- Columbus Avenue S from 8th Street SE to 3rd Street SE (see Figure 15)
- Easement between Ironwood Avenue and 7th Street NE, downstream of Highview Drive NE (see Inset A)

The parallel trunk sanitary sewer mains running north from 2nd Street NW along the railroad tracks are at different elevations. The westerly main is at a lower elevation than the easterly main and therefore flow initially reaches the westerly main before flow would ever reach the easterly main at the higher elevation. There are several segments of pipe in the westerly main which appear to be at or below minimum grade for its correlating pipe diameter. Pipes laid at a lower (flatter) grade than the minimum recommended grade can result in slower velocity flows, surcharging and potential back-ups (see Figure 13).

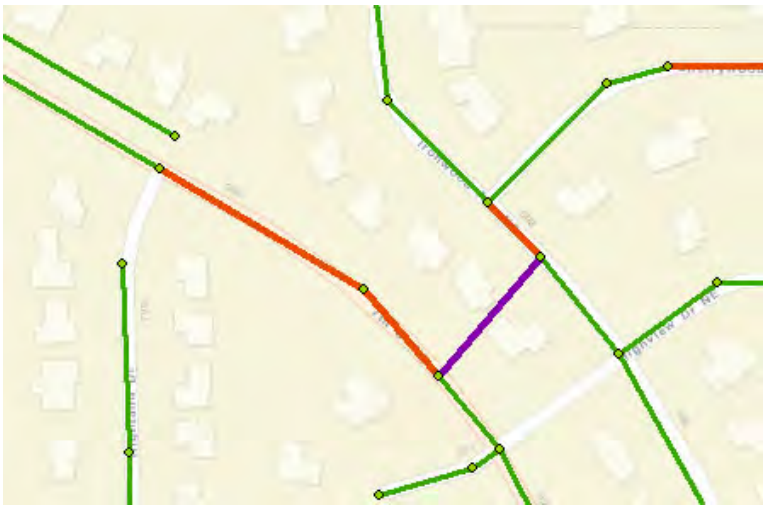
The segments of sanitary sewer mains along 1st Street SE/SW and 7th Street NE are similar situations (Figures 12 and 14) with several segments of pipe which appear to be at or below the minimum grade for their correlating pipe diameters. It is recommended that these areas be

monitored during wet weather events for potential surcharging of pipes. Some of these segments of pipe on 7th Street NE could see some reduction in flow once the Alton Avenue Trunk Sanitary Sewer Main comes on line in the future and some areas to the east are redirected to the Alton Avenue trunk main.

The sanitary sewer main along Columbus Avenue S (Figure 15) appears to be at grades greater (steeper) than minimum grade but the pipes appear to be slightly undersized as compared to the upstream wet weather flows. It is also recommended to monitor this segment of sanitary main during wet weather events. In the future, if development pressure begins to occur from the south along 1st Avenue SE, there is the potential of additional flow to be directed through this sanitary sewer main on Columbus Avenue S. Future consideration should be given to replacing and reconstructing this main to upsize and adjust grades of the main to improve flow and capacities.

The pipe which intersects 7th Street NE downstream of Highview Drive NE (see Inset A) has a smaller diameter than the trunk along 7th Street NE. Pipes of smaller diameter join at the manhole with two other pipes of larger diameter (for instance an 8 inch pipe entering the 15 inch pipe). The pipes shown to be surcharging appear to have been installed at the same invert elevation as the larger trunk sewer main. Preferred sewer designs has the crowns of pipe matching which limits potential issues such as this). A high water level remains constant between the smaller and larger diameter pipes. However, in the smaller pipes the constant water depth causes the high d/D values. Modifications to the grade and/or invert elevations would make little to no change in the water level and would be costly. Therefore, it is not recommended to make any physical changes and simply to monitor these pipes in the future.

Inset A - 7th Street NE downstream of Highview Drive NE



The Library Lift Station has been an area of focus within the model. Discussions have taken place to consider abandoning the Library Lift Station and rerouting those flows to the west down Main Street with the 2020 reconstruction project. Two scenarios within the model tested the system's response with the lift station activated and deactivated. Removing the Library Lift Station and routing the flows west along Main Street places no additional stress on downstream portions of the system. The immediate downstream network remains below the 0.6 threshold and

areas further downstream show little to no change in terms of capacity as seen in Figure 13. With the predicted future scenarios, it is feasible to abandon the Library Lift Station.

3.3.1 Gravity Sewer

Maintenance in the sewer system typically involves cleaning the sewer using a combination of jetters and vactor trucks to remove debris from the sewer pipes.

Root intrusion in the joints of clay pipe can be an issue of ongoing maintenance which requires cutting and removal to remove obstructions in the pipe and allow unobstructed flow of the sewage through the system. Once roots begin to enter the sanitary sewer, it is very difficult to eliminate the recurring growth. The simple cutting of roots often promotes additional growth. Unmanaged root growth can also cause the clay pipe to crack, impacting the integrity of the pipe. Cracked pipes allow additional groundwater and soil into the sewer system.

With little remaining clay pipe, the City has not had many issues in recent years with root intrusion. The exception is the easterly trunk sanitary sewer main north of 2nd Street NW, running along the railroad, which has not been televised due to root obstructions.

Fortunately for the City, most of the old clay sanitary sewers have been replaced during street reconstruction projects between 2001 and 2014. Little clay sanitary sewer pipe is expected to remain following planned capital improvement projects in 2019-2023.

The only significant clay sanitary sewer pipe expected to still be in place after the planned 2023 improvement will be:

- Segments of sanitary sewer main along Columbus Avenue S
- The easterly trunk sanitary sewer main north of 2nd Street NW running along the railroad
- Segments of sanitary sewer main along TH 13/21, south of Main Street

3.4 Recommended Maintenance Program

Proper monitoring and maintenance of the existing system is an important factor in the long-term viability of the system. Maintaining the system extends the life of the system and decreases the likelihood of sewer backups. Sewer backups often lead to property damage claims against the City.

3.4.1 System Cleaning

Cleaning practices vary from city to city depending on available budgets and the condition of the sewer system. Practices range from annual cleaning of all sewers to inconsistent cleaning of known problem areas.

For reasons mentioned above, it is recommended that cities clean clay sewers every three years, or more often when conditions require it, to minimize sewer backups. New Prague currently (2018) has approximately 5.5 miles of clay sewer pipe. Similarly, it is recommended that sanitary sewers of other pipe materials be cleaned every five to seven years. New Prague currently (2018) has approximately 37 miles of sewers in this category.

The City currently cleans 1/4 of the system (approximately 10–11 miles of sanitary sewer mains) each year plus additional trouble areas. The current program addresses the needs of the system based on the recommended yearly schedule.

3.4.2 System Televising

It is recommended that New Prague establish a televising program to televise all sewers. This would establish a “base line” televising database for all sewers in the community. The televising records should be digitally attached to GIS information already developed providing the City with a tool available to maintenance and engineering personnel.

The City has already established a practice of televising sewers in areas where street rehabilitation or reconstruction is scheduled to occur. This allows the City to be efficient with infrastructure management and to avoid situations that require removing portions of a newly constructed street.

Contracts for new sewer construction should include the televising of the newly installed sewer. A copy of the televising should be provided to the City at the end of the project. Televising provides baseline information for the sewer and validates service locations. It also reduces the need for current deflection testing.

3.4.2.1 System Televising Costs

The most efficient means to do this would be to develop a televising program that coincides with the cleaning program described above. It is recommended that the City televise the entire system every 10 years. A 10-year schedule equates to approximately 4 miles per year. Televising costs are estimated at $3,000 per mile. A program to televise 4 miles per year results in a contract cost of $12,000 per year.

4 Operation and Maintenance Plan

The purpose of an operation and maintenance plan is to serve as a guide to operate, monitor, maintain, and rehabilitate the City’s sanitary sewer system. Primary goals of the plan include reducing claims against the City related to sewer backups and continued compliance with local and regional standards for wastewater, including the control of I/I to the system. Specific recommendations in this plan include:

- Rehabilitating system components with concerns related to safety and welfare of City residents and employees
- Rehabilitating system components to improve system effectiveness
- Implementing programs to periodically evaluate system condition
- Expand maintenance programs to help ensure periodic maintenance of the sewer system
- Establishing policies and ordinances to protect the City’s sewer infrastrucuture.

4.1 Existing Public Works Utility Maintenance Division

New Prague Public Works staff, management staff and the elected officials of the community have worked together to develop an efficient public works department that is cross-trained in various other duties assigned to all of Public Works.

Preventative maintenance is conducted by the department on a regular basis and consists of sewer main cleaning; lift station maintenance monitoring and inspection; manhole repairs and rehabilitation; sewer televising; and customer service on a 24-hour, seven days per week basis. The maintenance frequency is based upon inspection and historical data.

4.1.1 Sewer Maintenance Equipment

The City has equipment typical of most communities the size of New Prague. The list of equipment specific to sewer maintenance includes:

- Jetter/Vac Truck
- Generators (portable and stationary)
- Push Camera

4.1.2 Sewer Maintenance Staff

The public works utility staff includes one sewer utilities supervisor and six staff positions. Staffing levels are comparable to other communities in and around the metro area.

4.2 Maintenance Activities

City Maintenance staff jets and cleans approximately 25% (10–11 miles) of the sanitary sewer collection system on an annual basis. Sanitary sewer main line televising and repairs are generally conducted in conjunction with street improvement projects.

Most communities would consider typical routine maintenance of the sewer system to include:

- Televising all sewer lines one time to develop a baseline inventory of the system and periodically thereafter to monitor system changes
- Cleaning of all sewer lines once every 5 years
- Cleaning “trouble spots” as needed

Restaurant grease is an issue in some areas of the system. Maintenance activities have increased in known problem areas. New Prague inspects these known areas on a weekly basis. New Prague cleans the problem areas when there are indications of blockages in addition to routine cleaning. It is recommended that ordinances and policies be reviewed and modified regarding the installation, maintenance, and inspection of grease traps.

4.2.1 Lift Station Access Procedures

The City should maintain written maintenance procedures for accessing the lift stations. The procedures should include the following items:

- Maintain barriers or grating whenever structures are open – either temporary or permanent
- Never enter a subsurface structure without a partner present
- Follow confined space requirements
- Check for applicable gases with appropriate meter
- Operate appropriate ventilation, either portable or permanent
- Maintain required light levels
- Make sure temporary lighting is intrinsically safe
- Make sure temporary ladders meet safety codes and are properly secured
- Use fall protection and safety harnesses
- Carry an electronic communication device such as a radio

4.2.2 Lift Station Maintenance

It is important that the City maintain an active preventive maintenance program for each station. Lift stations represent a vulnerable component of the sanitary sewer collection system. The City pro-actively inspects the lift stations on a daily basis. The program should consist of two parts: actions performed on at least a twice weekly basis and actions performed annually.

The following maintenance tasks should be performed and recorded at least twice weekly:

- Visual site inspection
- Visual inspection of wet well
- Observe pump operation cycle
- Record pump run times
- Monitor system alarms
- Inspect auxiliary equipment in dry well such as sump pump, etc.

Once per year each pump should receive a field and shop inspection, by a pump engineer, which covers the following items:

- Check electrical condition of insulation on power cable
- Check for function of control panel and any loose or faulty electrical connections
- Check voltage supply between all phases on the line side of the electrical control panel with pump off
- Check amperage draw on all phases of the pump motor
- Check voltage between all phases on the load side of the pump motor starter. Check control power
- Check condition and operation of motor thermal protectors.
- Remove submersible pumps from lift station for physical inspection
- Check condition of upper shaft seals and inspect condition oil
- Check condition and operation of moisture sensors
- Check lower shaft seals and inspect condition of oil
- Change oil
- Check whether impeller is loose or worn
- Check all impeller wear rings
- Check for noisy upper and lower bearings
- Check damaged or cut pump cable
- Clean, reset and check operation of the pump alternator and level sensors
- Check for correct shaft rotation
- Reinstall pump and check for leakage at the discharge connection
- Observe one operating cycle
- Prepare inspection report

4.3 Inflow and Infiltration

4.3.1 Background Information

Inflow and Infiltration (I/I) is the amount of clear water entering the collection system. Infiltration is the contribution of flow that is primarily attributable to high groundwater levels, while inflow is attributed to direct discharge of clear water into the sanitary system. It is important that I/I flows be kept to a minimum to maintain pipe capacity and preserve treatment plant capacity.

The efficiency of the sanitary sewer system can be diminished if the outside sources of water are permitted to enter the sewer network. This can happen as a result of sump pumps or foundation drains being illegally connected to the sanitary sewer (inflow) or through the infiltration of ground water into pipes that are damaged or not properly sealed. The volume of wastewater which must be treated can be unnecessarily large during periods of heavy precipitation. The consequences of this are obvious in that the treatment system must accommodate larger volumes of wastewater.

4.3.2 Overall Sanitary Sewer Program Policy

4.3.2.1 Local Sanitary Sewer Ordinances

4.3.2.1.1 Service Lines

Current City ordinances and policies indicate that the property owner is responsible for the sewer service line between the mainline in the street and building or home. This is consistent with many other communities. The City may have experienced some problems related to owner maintenance of sewer services. Most notably are sewer backups which occur because of debris left in mainline sewers after service cleaning.

Options to address this issue include:

- Require permits for sewer service maintenance activities
- Require private maintenance companies to obtain a City license renewed on a regular basis

Permitting each service maintenance activity would be an added administrative activity that could become laborious. We recommend that the City consider developing a licensing program that requires maintenance companies to obtain a City license that is renewed periodically. Conditions of the permit should be notification of sewer maintenance staff of all activities on private and public sewers prior to performing the maintenance activity. Failure to comply would result in revoking of the license or prevent renewal in the future.

The City's policy is to replace sanitary sewer services between the sewer main and the right-of-way when the sanitary main is replaced. This policy helps to reduce some Infiltration occurring at the sewer service pipe.

4.3.3 Current and Future Measures to Mitigate I/I

It is recommended that the City of New Prague develop a private property inspection program to continue efforts to remove I/I from the sanitary sewer system. A large portion of work to reduce I/I has been undertaken, with the replacement of the majority of clay sanitary sewer pipe. Other sources of I/I do exist, in manholes, illegal connections to the sanitary sewer system, service connections, sump pumps, foundation drains and potential leaks/cracks/issues from older homes.

The City's main priorities for the mitigation of I/I should be in the education of private property owners about the sources of I/I and the costs associated with I/I.

4.3.3.1 Private Property Inspections

Private properties have potential to be high contributors of I/I to the gravity sanitary system. A program to inspect foundation drains, cracks in sewer service, roots in sewer service and sump pump connections is recommended to continue work to remove I/I from the system. Illegal discharges to the system from foundation drains and sump pumps are easy ways to remove consistent I/I contributions. Modifications to the City ordinance should be considered to allow for inspection and require correction of code incompliance related to private property service laterals. It is recommended that the program documents and evaluates laterals for I/I susceptibility and repair.

4.3.3.2 Clay Pipe Sewer Service Connections

It is known that clay pipe service connections are weak points in the work to remove I/I. A lined gravity segment may still have I/I issues, stemming from cracked clay pipe service connections and root growth between the service connection and mainline. Root balls also can develop in the service connection and enter the mainline, causing flow issues in lined (and unlined) segments. The cost of rehabilitating service lines will exceed the cost of mainline rehabilitation. The anticipated cost to line sewer services is estimated at $5,000–$10,000 per typical 60–70 foot long service line ($90–150/linear foot), per recent capital improvement projects.

4.3.3.3 Manhole Rehabilitation

Another commonly overlooked area in the work to remove I/I is manhole rehabilitation. Manholes also crack and leak, have root growth, etc. and allow I/I to enter the gravity system. There are many options for manhole rehabilitation, ranging from replacement of adjusting rings and casting, full manhole lining to manhole replacement. Within the lining rehabilitation method, many products with different strengths/situational strengths exist on the market and can be installed at a very reasonable price. Manholes age just like pipe segments, it is recommended to assess the condition of the City's manholes with respect to age and then pursue a manhole rehabilitation project.

5 Capital Improvement Plan – Recommendations

The purpose of a capital improvement plan is to serve as a guide to monitor, maintain, and rehabilitate the City's sanitary sewer system. Primary goals of the plan include the reduction of claims against the City related to sewer backups, increasing or relieving system capacity in critical areas and continued compliance with local and regional standards for wastewater, including the control of I/I to the system. Specific recommendations in this plan include:

- rehabilitation of system components with concerns related to safety, health, and welfare of City residents and employees;
- rehabilitation of system components to improve system effectiveness;
- implementation of programs to periodically evaluate system condition;
- development or expansion of maintenance programs to ensure periodic maintenance of the sewer system;
- establishing policies and ordinances to protect the City's sewer infrastructure; and
- equipment and staffing needs of the City.

5.1 Sewers

Rehabilitation of sewers in disrepair improves flow through the sewers and reduces maintenance expenditures on the system. The proper maintenance and rehabilitation of existing sewers extends the life of the sewer and reduces costly reconstruction of the system.

5.1.1 Collection System Improvements

The following is a list of recommended improvements that should be considered in the near term to the existing and expanding system:

5.1.1.1 2019 Third Avenue NE and 2020 Main Street Sanitary Sewer Reconstructions

Replacement and upsizing of the existing trunk sanitary sewer main, along with revising the profile to allow for the abandonment of the Library Lift Station will help to relieve some of the burden on 1st Street SE/SW that was identified by the model. Abandoning the lift station will be a cost benefit over time by reducing ongoing maintenance costs and eventual replacement of the Library Lift Station. This work is currently planned.

5.1.1.2 Evaluation of the Railroad Trunk Sanitary Sewer Mains (north of 2nd Street NW, along the railroad tracks)

This is a High Priority Item: The condition and integrity of these dual mains is unknown. Clean, inspect and televise the westerly 18-inch clay trunk sanitary sewer main north of 2nd Street NE, along the railroad tracks. This work may likely require cleaning, inspection, televising and verifying the integrity of the easterly 12-inch clay main as well which could be used as a temporary bypass during any work on the westerly trunk main.

Following the evaluation, review best options for the long-term use of this trunk main; installation of cured in-place pipe liner (CIPP) or potential replacement and upsizing of this trunk main. CIPP may be a viable long-term option as lining will protect the pipe integrity and improve hydraulics with a smoother pipe interior.

5.1.1.3 Replacement or CIPP of remaining Clay Sanitary Sewer Mains

Planned improvement projects in 2019–2023 will replace a significant amount of the remaining clay pipe. Consideration should be given to lining (CIPP) or replacing the remaining clay mains as soon as practical. Figure 2 illustrates the different pipe materials within the network.

5.1.1.4 Removal of sediment from various structures

Sediment observed in the vault area and in the trunk mains coming into the main lift station is affecting the capacity of the network. A program should be implemented to clean and remove sediment.

5.1.1.5 Expansion of the Collection System

Proposed expansion of the collection system will generally be developer driven and based on location and timing. Expansion and rerouting of the collection system will help to relieve the existing system in some critical areas which have been identified in this study as nearing capacity if continued growth is added to the existing system. The respective system expansions are described below and in the attached figures 18 and 19.

5.1.1.5.1 NE Lift Station and Alton Avenue Trunk Sanitary Sewer Main

Construction of this east trunk sanitary sewer main will provide sanitary sewer service to the developable commercial areas along TH19 and Alton Avenue. Construction of the Alton Trunk Sanitary Sewer Main will also provide for the abandonment of the Chalupsky and Lady Slipper lift stations. A new lift station will need to be constructed in the in the vicinity of 12th Street NE and Alton Avenue NE (dee Figure 18).

The Alton Avenue Trunk Sanitary Sewer Improvements are roughly estimated at $7 Million (2018$'s) based on estimated costs in a previous study of this area, titled; "Proposed Alton Avenue Site – Engineering Review of Infrastructure Requirements to Service Area", dated November 14, 2007.

These improvements are the most viable in the short-term, will effect a number of developable properties and includes a number of critical design challenges. For those reasons, it is recommended that a more detailed engineering feasibility study be conducted, which should include field elevation surveys and subsurface soil explorations to refine the scope and estimated costs of these improvements and to confirm feasibility.

5.1.1.5.2 SE Lift Station and Southeast Trunk Sanitary Sewer Main

Following the construction of the Alton Avenue Trunk Sanitary Sewer and NE Lift Station, development in the SE portion of the City, east of Alton Avenue and west of Sand Creek will be serviceable via a future SE lift station (see Figure 18). The future SE Lift Station will be pumped to the Alton Trunk Sanitary Sewer Main. A second option was reviewed and considered to provide gravity sewer to this area from the Alton Trunk Main, but it would result in excess sewer depths of 35 feet deep at Highway 19/13 and south in the vicinity of CSAH 3. For that reason, the second option was not recommended.

5.1.1.5.3 NW Lift Station and 11th Avenue NW Trunk Sanitary Sewer Main

The existing collection system in the vicinity of Raven Stream Elementary and Naylor Avenue can service much of these adjacent areas by gravity. As development progresses north of the 6th Street NW, it will require the construction of the NW Lift Station. In the short-term (Stage 1), it may be more practical to route the flows south along the 11th Avenue NW alignment to 6th Street NW in a temporary, "interim" force main until additional development in the NW area (Stage 2 or 3) can justify expansion of the lift station capacity and conveying the flow east along the 12th Street NW to the WWTP in a permanent force main (see Figures 9, 10 and19).

This area was studied in the past in a report titled; "NW Development Area – Review of Infrastructure Requirements to Service Area", dated November 14, 2007.

5.1.1.5.4 SW Lift Station and Southwest Trunk Sanitary Sewer Main

An existing 21 foot deep 30 inch trunk main is stubbed to the south at 11th Avenue SW, however due to topography it likely cannot be extended to the south due to the low ground elevations directly to the south. There is significant developable property south and west of 11th Avenue SW which can be reached with gravity sewer by constructing sewer main to the west from 11th Avenue SW and then to the south to bypass the low areas. Ultimately to service areas further to the south and east of 11th Avenue SW, the SW Lift Station will be required (see Figure 19).

This area was studied in the past in a report titled; "Public Infrastructure Improvements – Southwest Area Commercial Development", dated November 3, 2008. However the scope and estimates in that study looked at a temporary lift station and interim improvements to service a potential Walmart development that did not take place.

5.2 Administrative

5.2.1.1 Private Property Inspection Program

Review and amend ordinance(s) as needed. Establish a program to educate the public about I/I as well as to conduct inspection of homes for conforming sump pumps. Require compliance inspection upon sale of home or with any significant remodeling.

Much can be accomplished through education materials. Physical inspections can be accomplished as part of the home sale process or in conjunction with other home inspections or as a specific project/task.

5.2.1.2 GIS Data

- Update GIS Data to include inverts established in developing the sanitary sewer model.
- Update inverts in GIS for areas around the Main and Bypass Lift Stations.
- Link digital televising video data to the respective pipe segments in the GIS system.

5.3 Lift Stations

The adequacy of each lift station was evaluated against the following nine parameters:

- Station Hydraulic Capacity
- Safety
- Potential for Sewer Back-up
- Pump Review and Capacity
- Wet Well Physical Condition
- Valve Vault or Dry Well, Physical Condition
- Electrical Components
- Instrumentation/Control Issues
- Suitability of Location

The criteria by which each of these parameters was evaluated is discussed in Section 2.2.

An acceptability rating scale of 1 to 5 was established for the evaluation criteria listed above for each of the three stations. A rating of 1 is excellent; a rating of 2 is good meaning the station is better than the average lift station in the metropolitan area; a rating of 3 means it is similar to an average station in the metropolitan area; a rating of 4 indicates this parameter is below average, and a rating of 5 is unacceptable and the condition should be corrected in the near future. It must be understood that rating scores are subjective and different individuals would likely give different scores for any given parameter. Also, no universal standard exists. However, since the goal of the rating system is to establish a sense of relative need rather than concise determinations, the evaluations are deemed suitable for this study.

5.3.1 Lift Station Improvements

Table 3 contains acceptability ratings for each sewage lift station in the City. All the stations have an overall rating of better than the industry average. Individual parameters in each of the stations contain a range of excellent to below average ratings. Such deficiencies can most likely be

corrected individually at each station. The decision of which to pursue depends upon the severity of the individual deficiencies.

The adequacy of each lift station was evaluated against nine parameters, described in Section 2 of this report.

5.3.1.1 12th and Columbus

The following list identifies recommended improvements for the 12th and Columbus Lift Station in the next 3–5 years:

- Replace above ground (steel) wet well portion
- Install fall protection, safety grating (wet well)
- Install fall protection (Dry Well), net type

Additionally, the following list identifies recommended improvements for the 12th and Columbus Lift Station in the next 6–10 years:

- New Generator (Natural Gas)

Any parameter which received a rating of above average are not listed as requiring improvement during the next 10 years in the capital improvement plan.

5.3.1.2 37 (County Rd 37)

The following list identifies recommended improvements for the County Road 37 Lift Station in the next 3–5 years:

- Replace guiderail brackets
- Install fall protection, safety grating (Valve Vault)

Any parameter which received a rating of above average are not listed as requiring improvement during the next 10 years in the capital improvement plan.

5.3.1.3 Bypass

The following list identifies recommended improvements for the Bypass Lift Station in the next 3–5 years:

- Install new ventilation
- Install fall protection, safety grating (Wet Well)
- Seal leaking Wet Well Joints
- Review Pump Sizing

Any parameter which received a rating of above average are not listed as requiring improvement during the next 10 years in the capital improvement plan.

5.3.1.4 Central

The following list identifies recommended improvements for the Central Lift Station in the next 3–5 years:

- Install fall protection, safety grating (Wet Well)
- Seal leaking Wet Well Joints
- Install new generator hookups

- Install fall protection (Valve Vault), net type
- Repair/Replace I-beam under slab

Any parameter which received a rating of above average are not listed as requiring improvement during the next 10 years in the capital improvement plan.

5.3.1.5 Chalupsky

Note: This lift station is targeted for eventual abandonment upon the construction of the Alton Avenue Trunk Sanitary Sewer Main.

In the meantime, the following list identifies recommended improvements for the Chalupsky Lift Station in the next 3-5 years if this lift station were to be left in place for a longer period of time:

- Install fall protection, safety grating (Wet Well)
- Remove/replace rusted riser plate under Wet Well hatch

Additionally, the following list identifies recommended improvements for the Chalupsky Lift Station in the next 6–10 years:

- New Generator (Natural Gas)

Any parameter which received a rating of above average are not listed as requiring improvement during the next 10 years in the capital improvement plan.

5.3.1.6 Homefield

The following list identifies recommended improvements for the Homefield Lift Station in the next 3–5 years:

- Seal leaking Wet Well Joints
- Seal leaking Valve Vault Joints
- Install fall protection (Valve Vault), net type

Additionally, the following list identifies recommended improvements for the Homefield Lift Station in the next 6–10 years:

- New Generator (Natural Gas)

Any parameter which received a rating of above average are not listed as requiring improvement during the next 10 years in the capital improvement plan.

5.3.1.7 Lady Slipper

Note: This lift station is targeted for eventual abandonment upon the construction of the Alton Avenue Trunk Sanitary Sewer Main, NE lift Station and development of the Bisek property north of 7th Street NE.

In the meantime, the following list identifies recommended improvements for the Lady Slipper Lift Station in the next 3–5 years if this lift station were to be left in place for a longer period of time:

- Install fall protection, safety grating (Wet Well)
- Seal leaking Wet Well top slab
- Seal electric conduit penetration at Wet Well
- Remove/replace rusted riser plate under Wet Well hatch

Additionally, the following list identifies recommended improvements for the Lady Slipper Lift Station in the next 6–10 years:

- New Generator (Natural Gas)

Any parameter which received a rating of above average are not listed as requiring improvement during the next 10 years in the capital improvement plan.

5.3.1.8 Main

The following list identifies recommended improvements for the Main Lift Station in the next 3–5 years:

- Replace/Repair Valve Vault Drain
- Diversion Structure Improvements

Any parameter which received a rating of above average are not listed as requiring improvement during the next 10 years in the capital improvement plan.

5.3.1.9 Library

No recommendations are provided here as the Library lift station is proposed to be abandoned in 2020 following the proposed Main Street sanitary sewer improvements.

5.4 Ten Year Plan Summary

The tables below identify estimated maintenance costs which should be programmed by the City over the next 10 years. Capital Improvements which are assumed to be mostly developer driven and a developer costs are not included in this cost summary. The exception is the Alton Avenue Trunk Sanitary Sewer improvements which are expected to be a more significant City cost.

Table 8 – Capital Improvement Plan – Sewer Collection System

Item No.	Description	Recommended Year	Est. Cost
5.1.1.1	2019 & 2020 Sanitary Sewer System	2019 - 2020	$ 900,000
5.1.1.2a	Evaluation of RR Trunk Sewer Mains	2019	$ 10,000
5.1.1.2b	RR Trunk Sewer – CIPP or Replace	TBD	$200K–$500K
5.1.1.3a	Replace clay mains 2021-2023	2021-2023	$2 Million
5.1.1.3b	Replace or CIPP remaining clay mains	TBD	$1 Million
5.1.1.4	Remove Sediment from Vault and Trunk Sewer	2019	$10,000
5.1.1.5.1	NE Lift Station and Alton Avenue Trunk Sanitary Sewer Main	TBD	$7 Million Developer/City
5.1.1.5.2	SE Lift Station and Southeast Trunk Sanitary Sewer Main	TBD	$3 Million Developer/City
5.1.1.5.3	NW Lift Station and 11th Avenue NW Trunk Sanitary Sewer Main	TBD	$9 Million Developer/City
5.1.1.5.4	SW Lift Station and Southwest Trunk Sanitary Sewer Main	TBD	$5 Million Developer/City
5.2.1.1	Private Property Sump Pump Inspection	TBD	TBD
5.2.1.2	GIS Data Update	2019	TBD

Table 9 – Capital Improvement Plan – Sewer Collection System

	Quantity	Unit Cost	Cost per Year
Gravity Sewer			
Cleaning and Jetting	9 miles	$ 3,000	$ 27,000
Televising	4 miles	$ 3,000	$ 12,000
Total Yearly Maintenance Cost			**$ 39,000**

Table 10 – Lift Station Capital Improvement Plan

Lift Station	Cost
12th & Columbus	$107,600
37 (County Rd 37)	$5,000
Bypass	$9,500
Central	$14,000
Chalupsky(1)	$33,750
Homefield	$34,390
Lady Slipper(1)	$35,890
Main	$36,500
TOTAL	**$276,630**

(1) Chalupsky and Lady Slipper Lift Stations have been identified to be abandoned with the completion of the Alton Avenue Trunk Santiary Sewer Main. See attached Figures and Exhibits.

6 Summary/Recommendations

It is recommended that this Comprehensive Sanitary Sewer Plan be used as the basis for planned growth and development within and outside of the city limits.

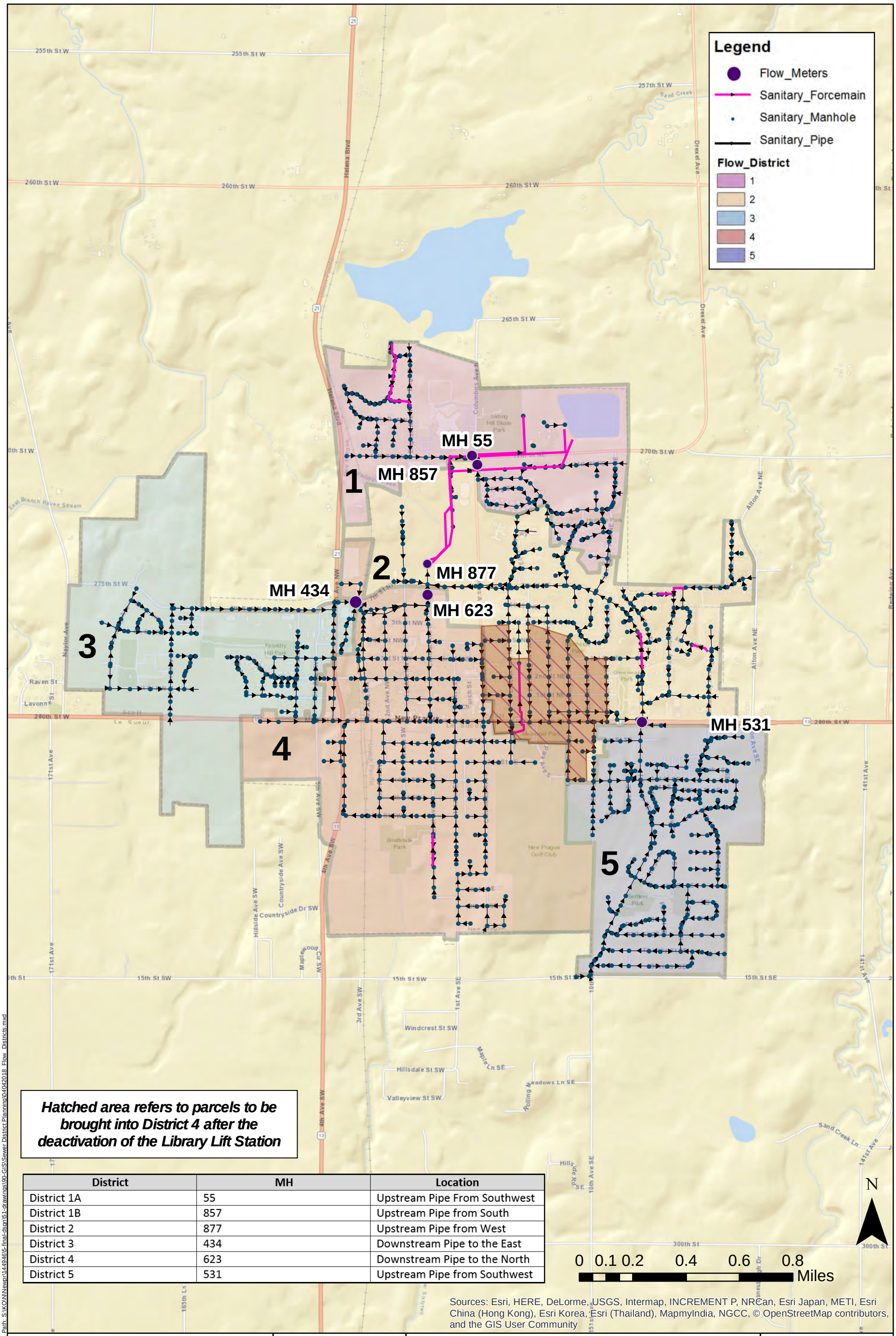
It is recommended that the City program and implement the Capital Improvements outlined in Section 5 of this report. Those identified as to be completed in 2019 are recommended as high priority items.

It is recommended that Public Works staff continue to monitor the specific areas in the existing collection system that have been identified by the model as close to capacity. These areas should be reviewed following large rain events (see Figures 8–11).

It is recommended that the sanitary sewer model developed for this comprehensive plan be kept up-to-date with future improvements and that it be utilized as development improvements are proposed to verify and confirm optimum pipe sizes and grades for proposed trunk sanitary sewer.

When a development is proposed in one of the identified growth areas which requires the construction of a trunk main and/or lift station, a detailed feasibility study should be conducted for all critical elements to confirm locations, alignments, elevations, grades and pipe sizes, as well as details required for the lift station.

Figures



Hatched area refers to parcels to be brought into District 4 after the deactivation of the Library Lift Station

District	MH	Location
District 1A	55	Upstream Pipe From Southwest
District 1B	857	Upstream Pipe from South
District 2	877	Upstream Pipe from West
District 3	434	Downstream Pipe to the East
District 4	623	Downstream Pipe to the North
District 5	531	Upstream Pipe from Southwest

Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

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Project: NEWPR 144946
Print Date: 4/26/2018

Map by: kholmberg
Projection:
Source:

Flow Metering Locations
2040 Sanitary Sewer Comprehensive Plan
New Prague, MN

Figure 1

Path: S:\KON\Newpr\144946\5-final-dsgn\51-drawings\90-GIS\Sewer District Planning\04042018_Flow_Districts.mxd

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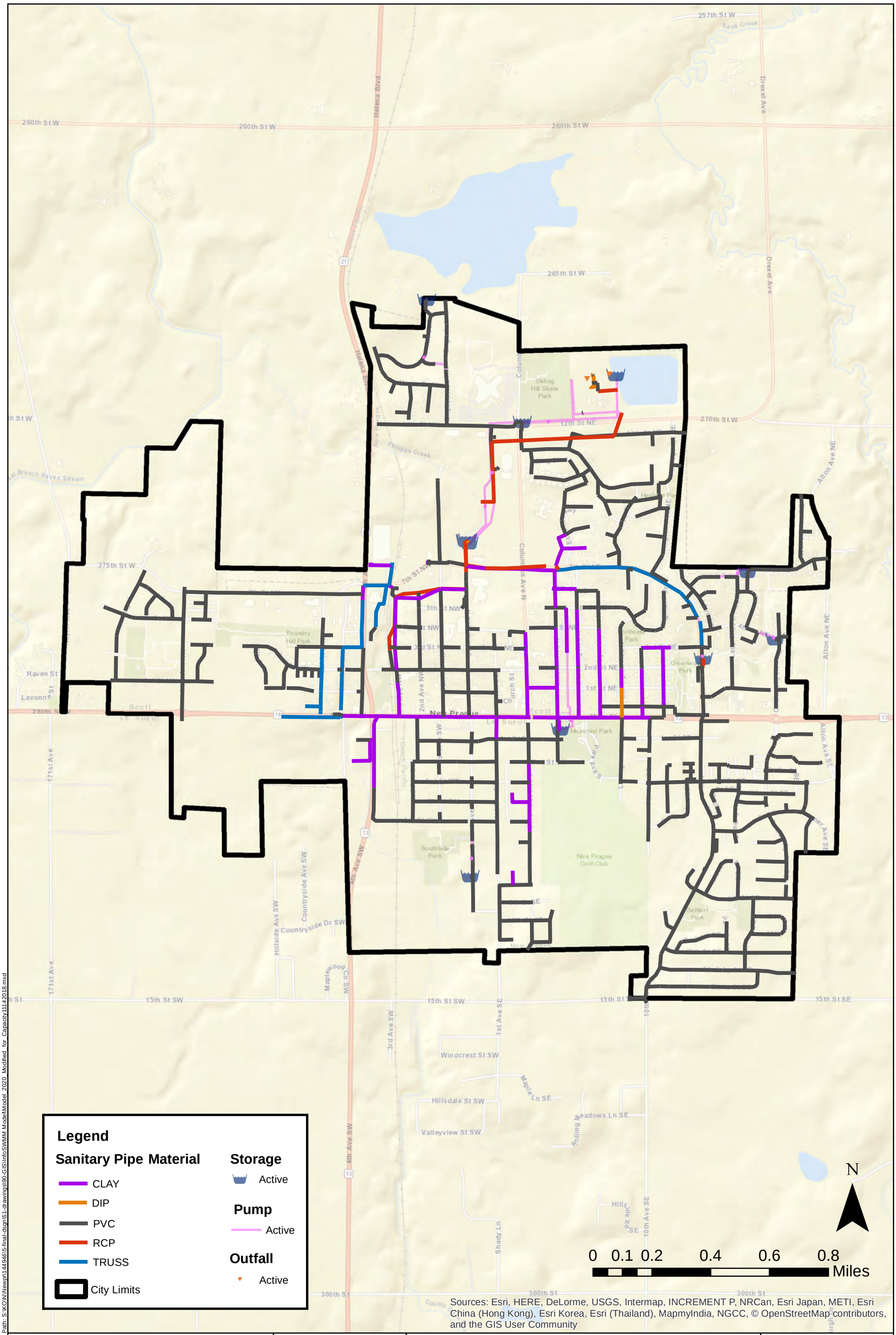

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Print Date: 12/11/2018

Map by: KHolmberg
Source: City of New Prague

Sanitary Pipe Materials

Comprehensive Plan
City of New Prague, Minnesota

Figure 2

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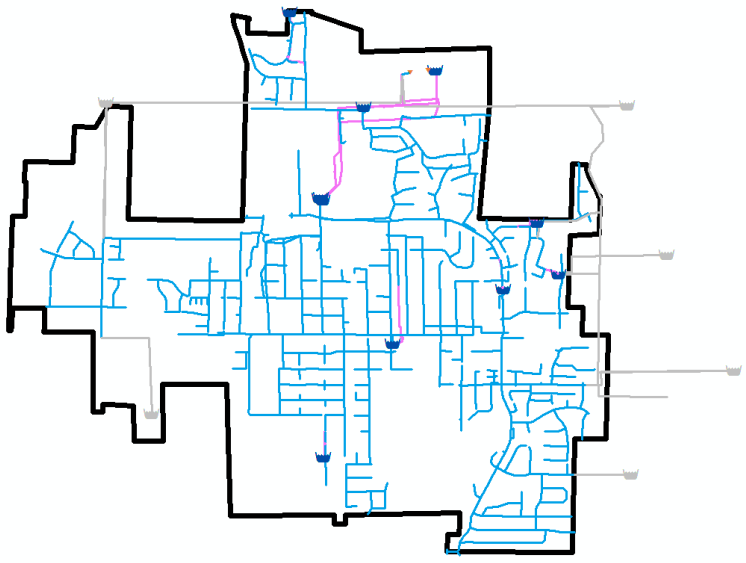
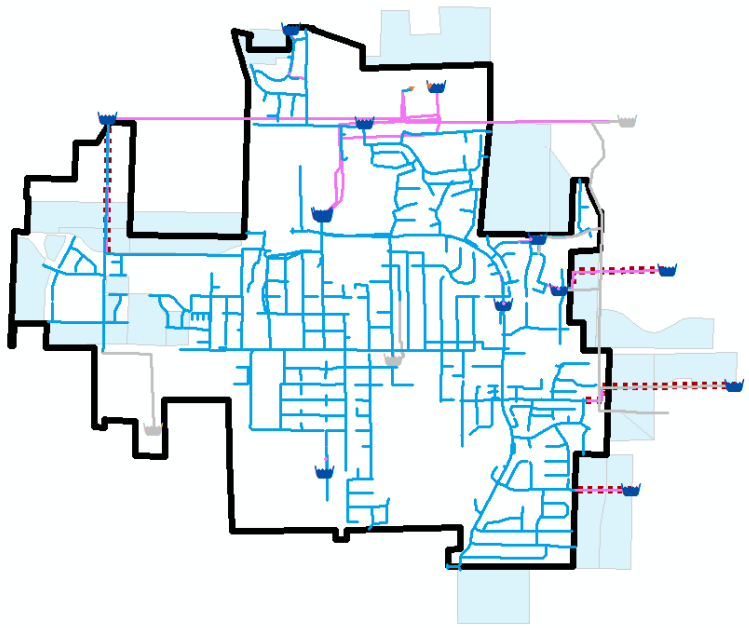
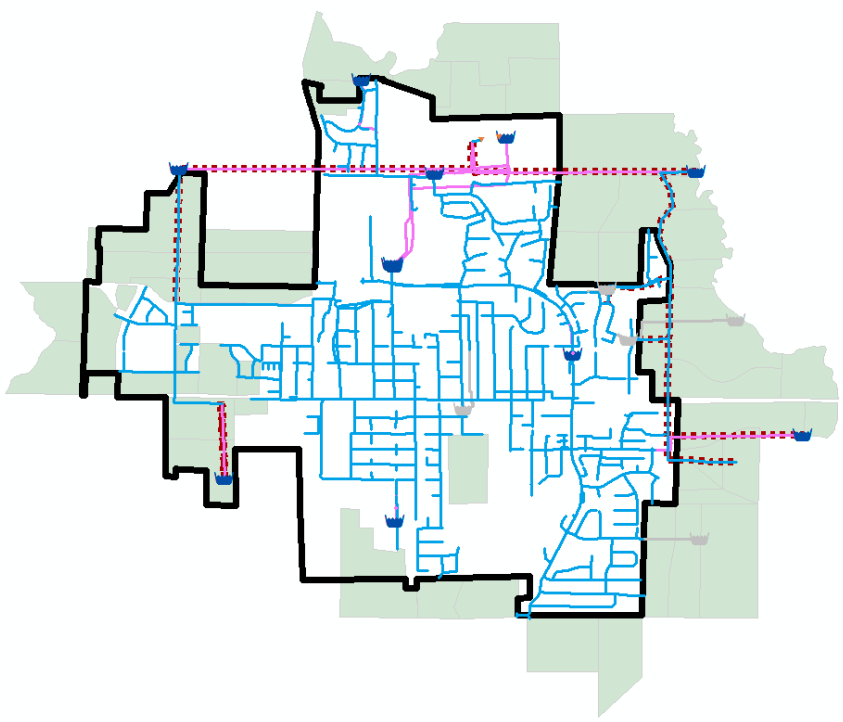


Existing Network



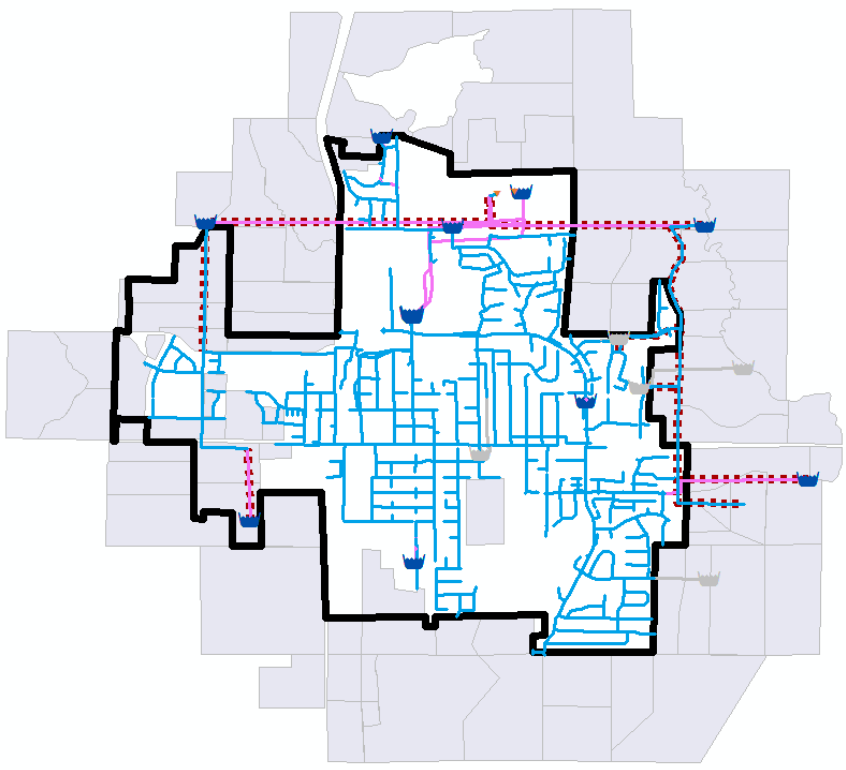
Growth Stage 1

- Includes re-zoning parcels
- Areas of pressing development
- Removal of Library Lift Station
- 3 temporary lift stations
- Northwest Lift Station



Growth Stage 2

- Includes re-zoning parcels
- Areas identified for development
- Removal of Library Lift Station
- Alton Trunk line with Northeast Lift Station and 1 temporary lift station
- Southwest Lift Station
- Northwest Lift Station
- Removal of Lady Slipper and Chalupsky Lift Stations



Growth Stage 3

- Includes re-zoning parcels
- Ultimate future land use plan
- Removal of Library Lift Station
- Alton Trunk line with Northeast Lift Station and Southeast Lift Station
- Southwest Lift Station
- Northwest Lift Station
- Removal of Lady Slipper and Chalupsky Lift Stations

Path: S:\KOINN\ewpr\144946\5-final-dsgn\51-drawings\90-GIS\InfoSWMM Model\Model_Future11122018.mxd

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Print Date: 11/19/2018

Map by: KHolmberg
Source: City of New Prague

Future Network Configurations

Comprehensive Plan
City of New Prague, Minnesota

Figure 3

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0 0.125 0.25 0.5 0.75 1 Miles

N

Legend

Lift Station
- Active
- Inactive

Pump
- Active
- Inactive

Conduit

Velocity
- Less than 2 ft/s
- 2~10 ft/s
- Greater than 10 ft/s

Outfall
- Active
- Inactive

City Limit

Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

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Project: NewPR 144946
Print Date: 12/14/2018

Map by: kholmberg
Source: City of New Prague

Flow Velocity for Dry Weather Flow in Existing Conditions
Comprehensive Plan
City of New Prague, Minnesota

Figure 4

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0 0.125 0.25 0.5 0.75 1 Miles

N

Legend

Lift Station
- Active
- Inactive

Pump
- Active
- Inactive

Conduit Velocity
- Less than 2 ft/s
- 2~10 ft/s
- Greater than 10 ft/s

Outfall
- Active
- Inactive

- Growth Stage 1
- Growth Stage 1 Infrastructure
- City Limit

Growth Stage 1

- Includes re-zoning parcels
- Areas of pressing development
- Removal of Library Lift Station
- 3 temporary lift stations
- Northwest Lift Station

Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

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Project: NewPR 144946
Print Date: 12/14/2018

Map by: kholmberg
Source: City of New Prague

Flow Velocity for Dry Weather Flow in Growth Stage 1
Comprehensive Plan
City of New Prague, Minnesota

Figure 5

This map is neither a legally recorded map nor a survey map and is not intended to be used as one. This map is a compilation of records, information, and data gathered from various sources listed on this map and is to be used for reference purposes only. SEH does not warrant that the Geographic Information System (GIS) Data used to prepare this map are error free, and SEH does not represent that the GIS Data can be used for navigational, tracking, or any other purpose requiring exacting measurement of distance or direction or precision in the depiction of geographic features. The user of this map acknowledges that SEH shall not be liable for any damages which arise out of the user's access or use of data provided.

0 0.15 0.3 0.6 0.9 1.2 Miles

N

Legend

Lift Station
- Active
- Inactive

Pump
- Active
- Inactive

Conduit Velocity
- Less than 2 ft/s
- 2~10 ft/s
- Greater than 10 ft/s

Outfall
- Active
- Inactive

- Growth Stage 2
- Growth Stage 2 Infrastructure
- City Limit

Growth Stage 2

- Includes re-zoning parcels
- Areas identified for development
- Removal of Library Lift Station
- Alton Trunk line with Northeast Lift Station and 1 temporary lift station
- Southwest Lift Station
- Northwest Lift Station
- Removal of Lady Slipper and Chalupsky Lift Stations

Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

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Map by: kholmberg
Source: City of New Prague

Flow Velocity for Dry Weather Flow in Growth Stage 2
Comprehensive Plan
City of New Prague, Minnesota

Figure 6

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0 0.15 0.3 0.6 0.9 1.2
Miles

N

Legend

Lift Station
- Active
- Inactive

Pump
- Active
- Inactive

Conduit Velocity
- Less than 2 ft/s
- 2~10 ft/s
- Greater than 10 ft/s

Outfall
- Active
- Inactive

Growth Stage 3

Growth Stage 3 Infrastructure

City Limit

Growth Stage 3

- Includes re-zoning parcels
- Ultimate future land use plan
- Removal of Library Lift Station
- Alton Trunk line with Northeast Lift Station and Southeast Lift Station
- Southwest Lift Station
- Northwest Lift Station
- Removal of Lady Slipper and Chalupsky Lift Stations

Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

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Map by: kholmberg
Source: City of New Prague

Flow Velocity for Dry Weather Flow in Growth Stage 3
Comprehensive Plan
City of New Prague, Minnesota

Figure 7

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0 0.125 0.25 0.5 0.75 1
Miles

N

Legend

Lift Station
- Active
- Inactive

Pump
- Active
- Inactive

Conduit Capacity
- Less than 0.6
- 0.6~0.8
- Greater than 0.8

Outfall
- Active
- Inactive

City Limit

Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

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Project: NewPR 144946
Print Date: 12/14/2018

Map by: kholmberg
Source: City of New Prague

Pipe Capacity for Wet Weather Flow in Existing Conditions
Comprehensive Plan
City of New Prague, Minnesota

Figure 8

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0 0.125 0.25 0.5 0.75 1 Miles

N

Legend

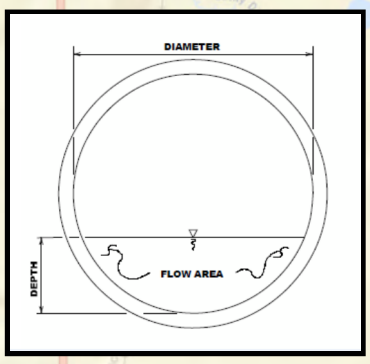
Lift Station
- Active
- Inactive

Pump
- Active
- Inactive

Conduit Capacity
- Less than 0.6
- 0.6~0.8
- Greater than 0.8

Outfall
- Active
- Inactive

- Growth Stage 1
- Growth Stage 1 Infrastructure
- City Limit



Growth Stage 1

- Includes re-zoning parcels
- Areas of pressing development
- Removal of Library Lift Station
- 3 temporary lift stations
- Northwest Lift Station

Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

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Map by: KHolmberg
Source: City of New Prague

Pipe Capacity for Wet Weather Flows in Growth Stage 1

Comprehensive Plan
City of New Prague, Minnesota

Figure 9

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0 0.15 0.3 0.6 0.9 1.2
Miles

N

Legend

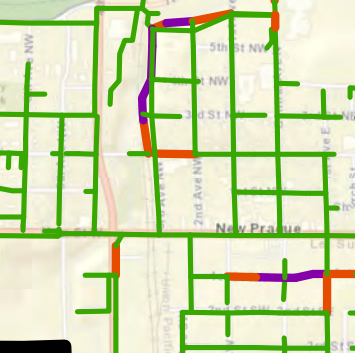
Lift Station
- Active
- Inactive

Pump
- Active
- Inactive

Conduit Capacity
- Less than 0.6
- 0.6~0.8
- Greater than 0.8

Outfall
- Active
- Inactive

- Growth Stage 2
- Growth Stage 2 Infrastructure
- City Limit



Growth Stage 2

- Includes re-zoning parcels
- Areas identified for development
- Removal of Library Lift Station
- Alton Trunk line with Northeast Lift Station and 1 temporary lift station
- Southwest Lift Station
- Northwest Lift Station
- Removal of Lady Slipper and Chalupsky Lift Stations

Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

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Source: City of New Prague

Pipe Capacity for Wet Weather Flow in Growth Stage 2

Comprehensive Plan
City of New Prague, Minnesota

Figure 10

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0 0.15 0.3 0.6 0.9 1.2
Miles

N

Legend

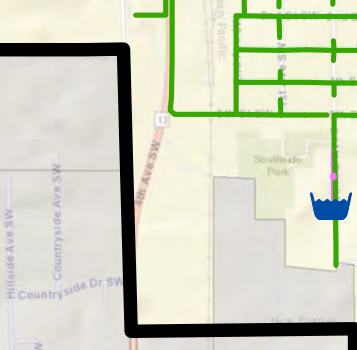
Lift Station
- Active
- Inactive

Pump
- Active
- Inactive

Conduit Capacity
- Less than 0.6
- 0.6~0.8
- Greater than 0.8

Outfall
- Active
- Inactive

- Growth Stage 3
- Growth Stage 3 Infrastructure
- City Limit



Growth Stage 3

- Includes re-zoning parcels
- Ultimate future land use plan
- Removal of Library Lift Station
- Alton Trunk line with Northeast Lift Station and Southeast Lift Station
- Southwest Lift Station
- Northwest Lift Station
- Removal of Lady Slipper and Chalupsky Lift Stations

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Project: NewPR 144946
Print Date: 12/15/2018

Map by: kholmberg
Source: City of New Prague

Pipe Capacity for Wet Weather Flow in Growth Stage 3
Comprehensive Plan
City of New Prague, Minnesota

Figure 11

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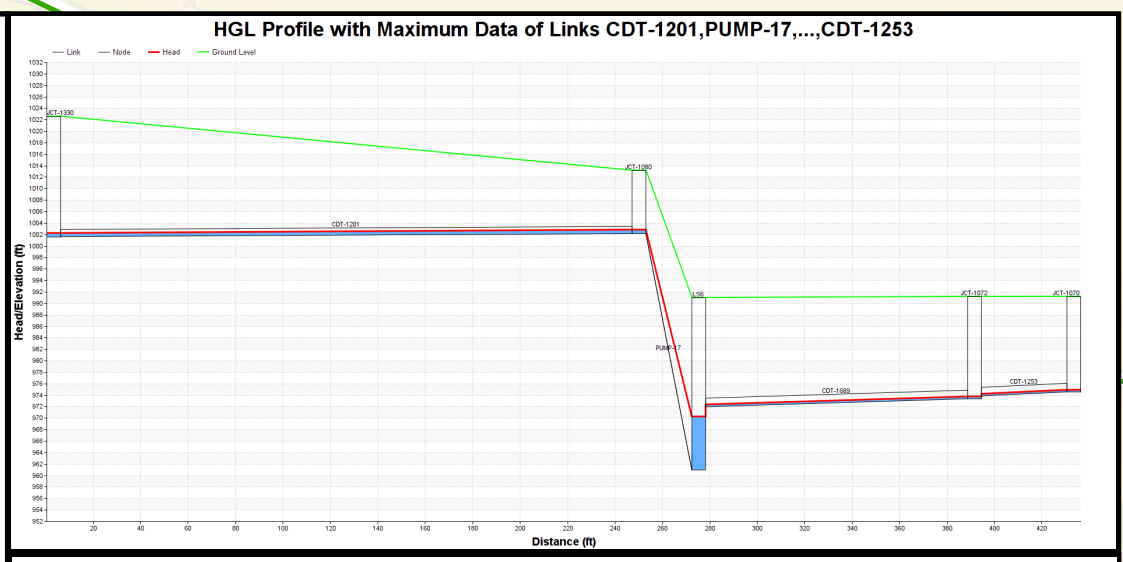
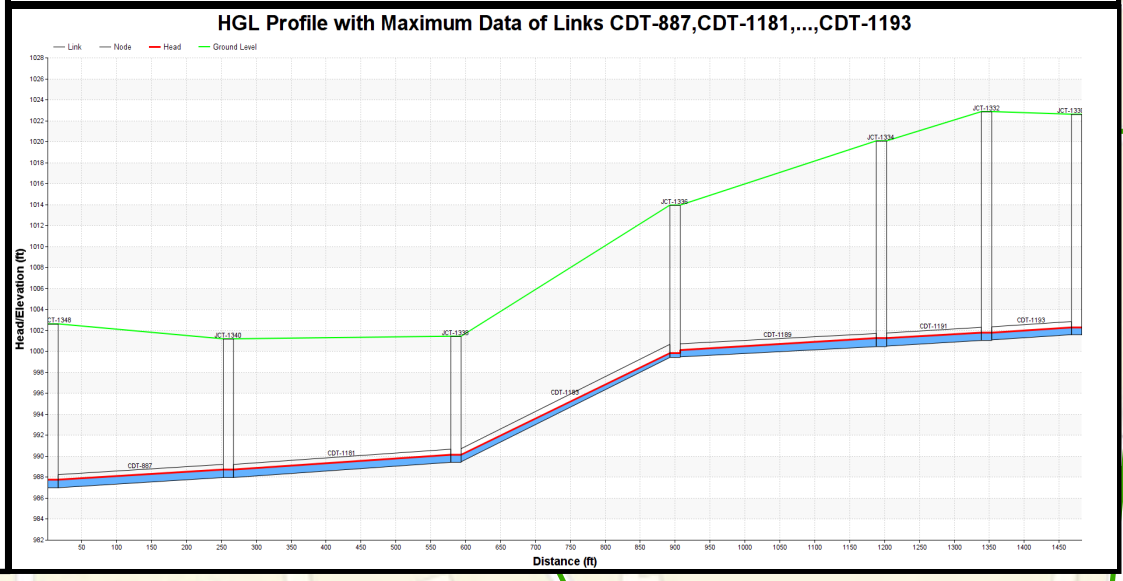
0 0.0225 0.045 0.09 0.135 0.18 Miles

N

Growth Stage 3





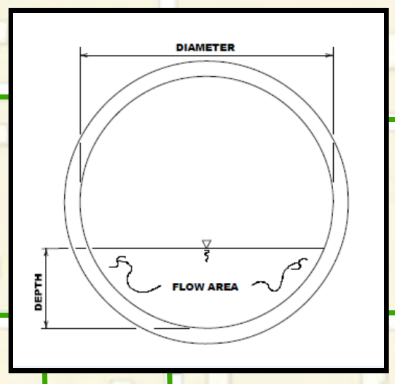
A

B

B

A

JCT-1348
JCT-1340
JCT-1338
JCT-1336
JCT-1334
JCT-1332
JCT-1330
JCT-1080
JCT-1072
JCT-1070



Legend

Lift Station
- Active
- Inactive

Pump
- Active
- Inactive

Conduit

Capacity
- Less than 0.6
- 0.6~0.8
- Greater than 0.8

Outfall
- Active
- Inactive

- Growth Stage 3
- Growth Stage 3 Infrastructure
- City Limit

Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

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www.sehinc.com

Project: NewPR 144946
Print Date: 12/15/2018

Map by: kholmberg
Source: City of New Prague

Pipe Capacity for 7th St NE and County Rd 37 Lift Station
Comprehensive Plan
City of New Prague, Minnesota

Figure 12

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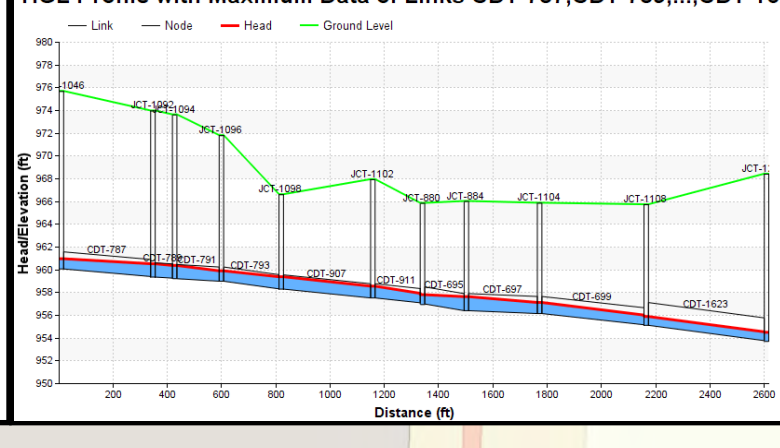
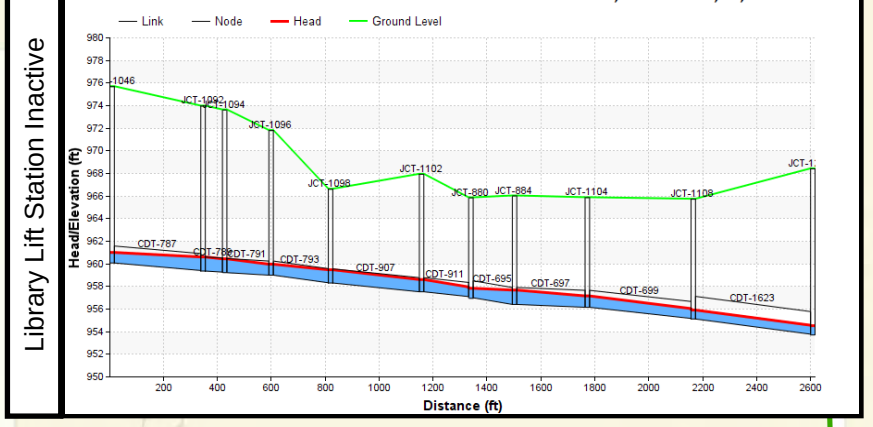
0 0.0150.03 0.06 0.09 0.12
Miles

N

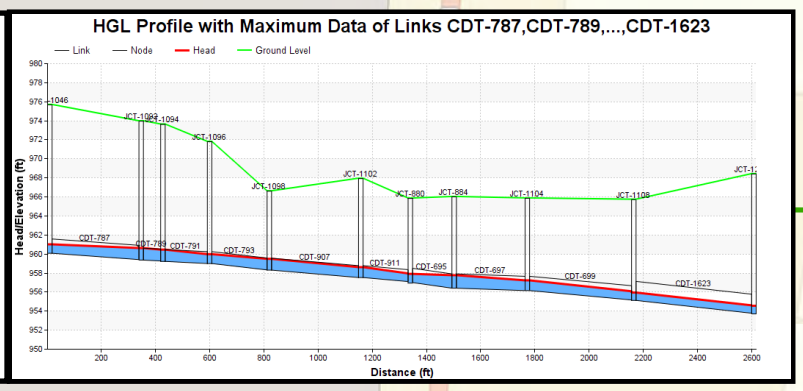
Library LS Active



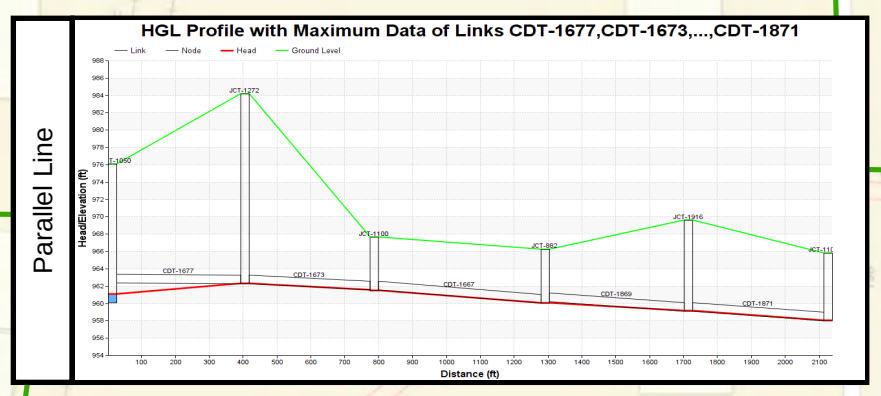
Library Lift Station Inactive

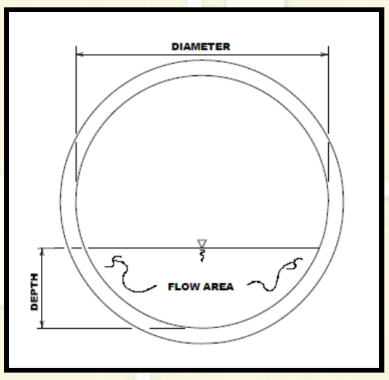


Growth Stage 3



Parallel Line





JCT-1108
JCT-1104
JCT-884
JCT-880
JCT-1102
JCT-1098
JCT-1096
JCT-1094
JCT-1092
JCT-1046

Legend

Lift Station
- Active
- Inactive

Pump
- Active
- Inactive

Conduit

Capacity
- Less than 0.6
- 0.6~0.8
- Greater than 0.8

Outfall
- Active
- Inactive

Growth Stage 3

Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Path: C:\Users\kholmberg\Desktop\Here Goes Nothing\Model Future 12052018 deep sewer.mxd

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www.sehinc.com

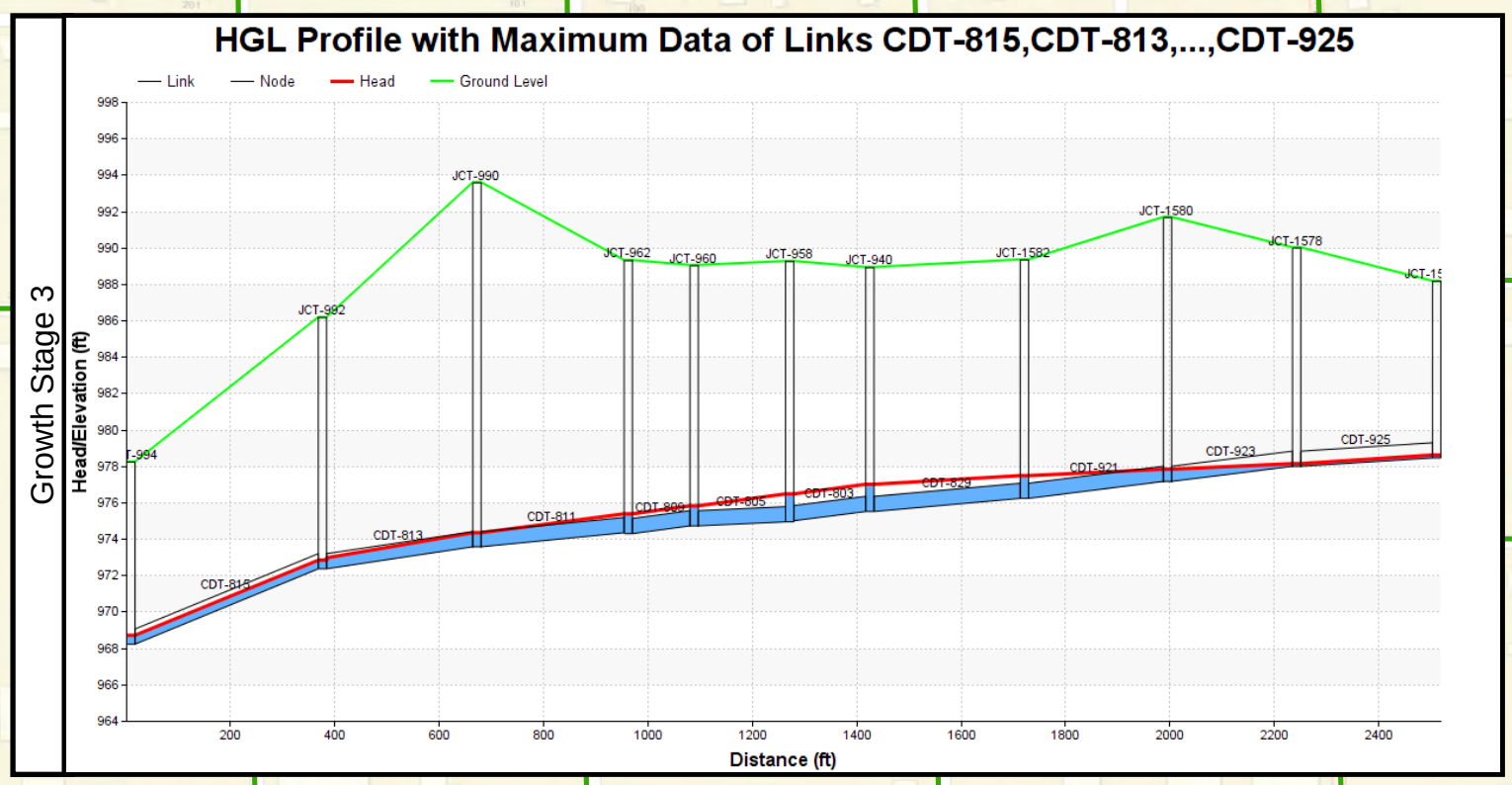
Project: NewPR 144946
Print Date: 12/15/2018

Map by: kholmberg
Source: City of New Prague

Pipe Capacity for Parallel Lines Along Railroad
Comprehensive Plan
City of New Prague, Minnesota

Figure 13

This map is neither a legally recorded map nor a survey map and is not intended to be used as one. This map is a compilation of records, information, and data gathered from various sources listed on this map and is to be used for reference purposes only. SEH does not warrant that the Geographic Information System (GIS) Data used to prepare this map are error free, and SEH does not represent that the GIS Data can be used for navigational, tracking, or any other purpose requiring exacting measurement of distance or direction or precision in the depiction of geographic features. The user of this map acknowledges that SEH shall not be liable for any damages which arise out of the user's access or use of data provided.



Legend

Lift Station
- Active
- Inactive

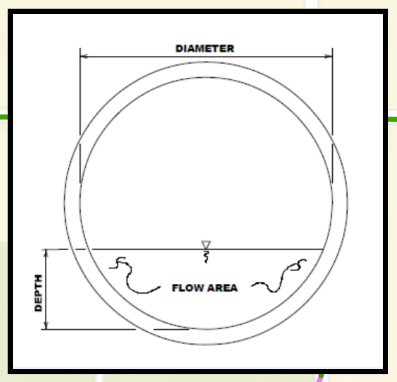
Pump
- Active
- Inactive

Conduit

Capacity
- Less than 0.6
- 0.6~0.8
- Greater than 0.8

Outfall
- Active
- Inactive

Growth Stage 3



Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

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Project: NewPR 144946
Print Date: 12/15/2018

Map by: kholmberg
Source: City of New Prague

Pipe Capacity Along 1st St SE
Comprehensive Plan
City of New Prague, Minnesota

Figure 14

Path: C:\Users\kholmberg\Desktop\Here Goes Nothing\Model_Future_12052018_deep_sewer.mxd

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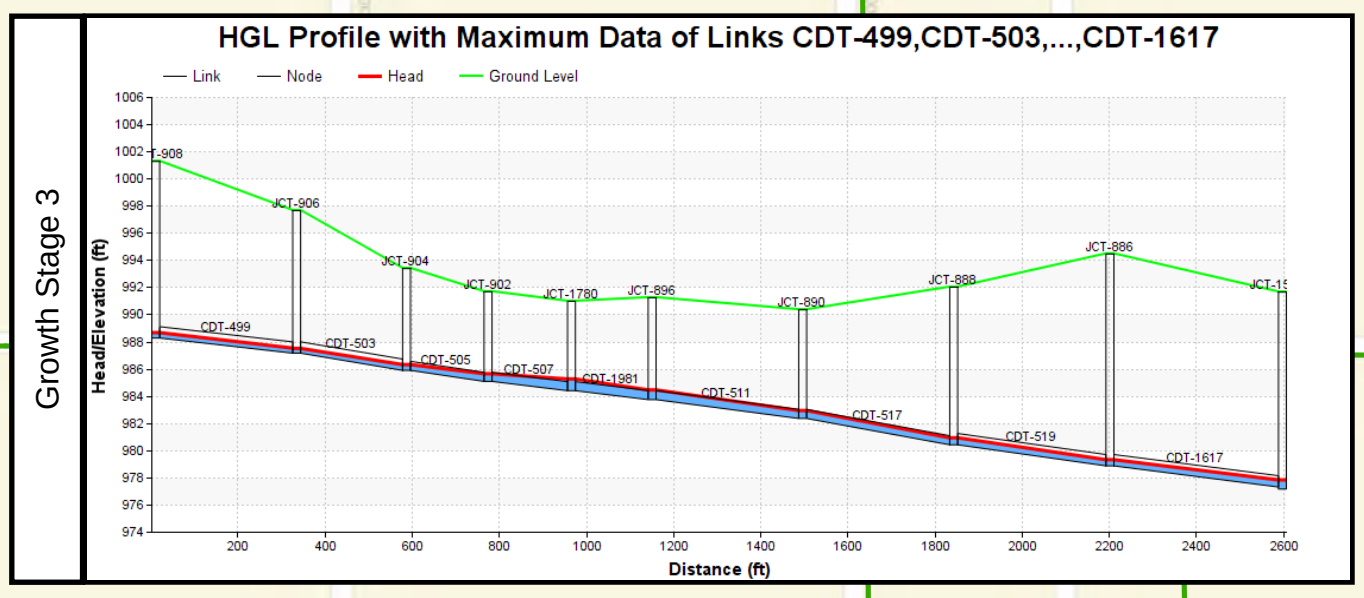
0 0.0125 0.025 0.05 0.075 0.1 Miles

N



JCT-888

JCT-890

JCT-896

JCT-1780

JCT-902

JCT-904

JCT-906

JCT-908

Legend

Lift Station
- Active
- Inactive

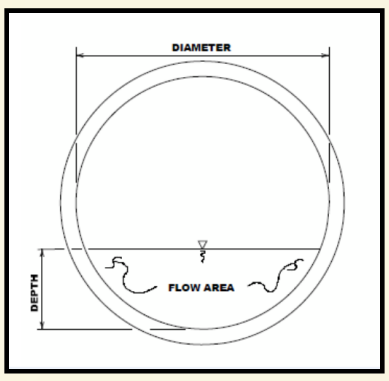
Pump
- Active
- Inactive

Conduit

Capacity
- Less than 0.6
- 0.6~0.8
- Greater than 0.8

Outfall
- Active
- Inactive

Growth Stage 3



Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

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Project: NewPR 144946
Print Date: 12/15/2018

Map by: kholmberg
Source: City of New Prague

Pipe Capacity along Columbus Ave S

Comprehensive Plan
City of New Prague, Minnesota

Figure 15

This map is neither a legally recorded map nor a survey map and is not intended to be used as one. This map is a compilation of records, information, and data gathered from various sources listed on this map and is to be used for reference purposes only. SEH does not warrant that the Geographic Information System (GIS) Data used to prepare this map are error free, and SEH does not represent that the GIS Data can be used for navigational, tracking, or any other purpose requiring exacting measurement of distance or direction or precision in the depiction of geographic features. The user of this map acknowledges that SEH shall not be liable for any damages which arise out of the user's access or use of data provided.

0 0.375 0.75 1.5 2.25 3 Miles

N

Legend

Lift Station
- Active

Conduit
- Active

Pump
- Active

Outfall
- Active
- CityLimits

Proposed Future Network
- Forcemain
- 8
- 10
- 12
- 15
- 18
- 21
- 24
- 27
- 30

Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

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Project: NewPR 144946
Print Date: 1/3/2019

Map by: kholmberg
Source: City of New Prague

Conceptual Ultimate Service Areas
Comprehensive Plan
City of New Prague, Minnesota

Figure 16

This map is neither a legally recorded map nor a survey map and is not intended to be used as one. This map is a compilation of records, information, and data gathered from various sources listed on this map and is to be used for reference purposes only. SEH does not warrant that the Geographic Information System (GIS) Data used to prepare this map are error free, and SEH does not represent that the GIS Data can be used for navigational, tracking, or any other purpose requiring exacting measurement of distance or direction or precision in the depiction of geographic features. The user of this map acknowledges that SEH shall not be liable for any damages which arise out of the user's access or use of data provided.

0 0.125 0.25 0.5 0.75 1
Miles

N

Legend

Lift Station
- Active
- Inactive

Pump
- Active
- Inactive

Conduit
- Active
- Inactive

Outfall
- Active
- Inactive

Serviceability
- Access to Existing System Via Extension of Gravity Sewer
- Access to Existing System Via Interim or Permanent Lift Station
- City Limits

Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

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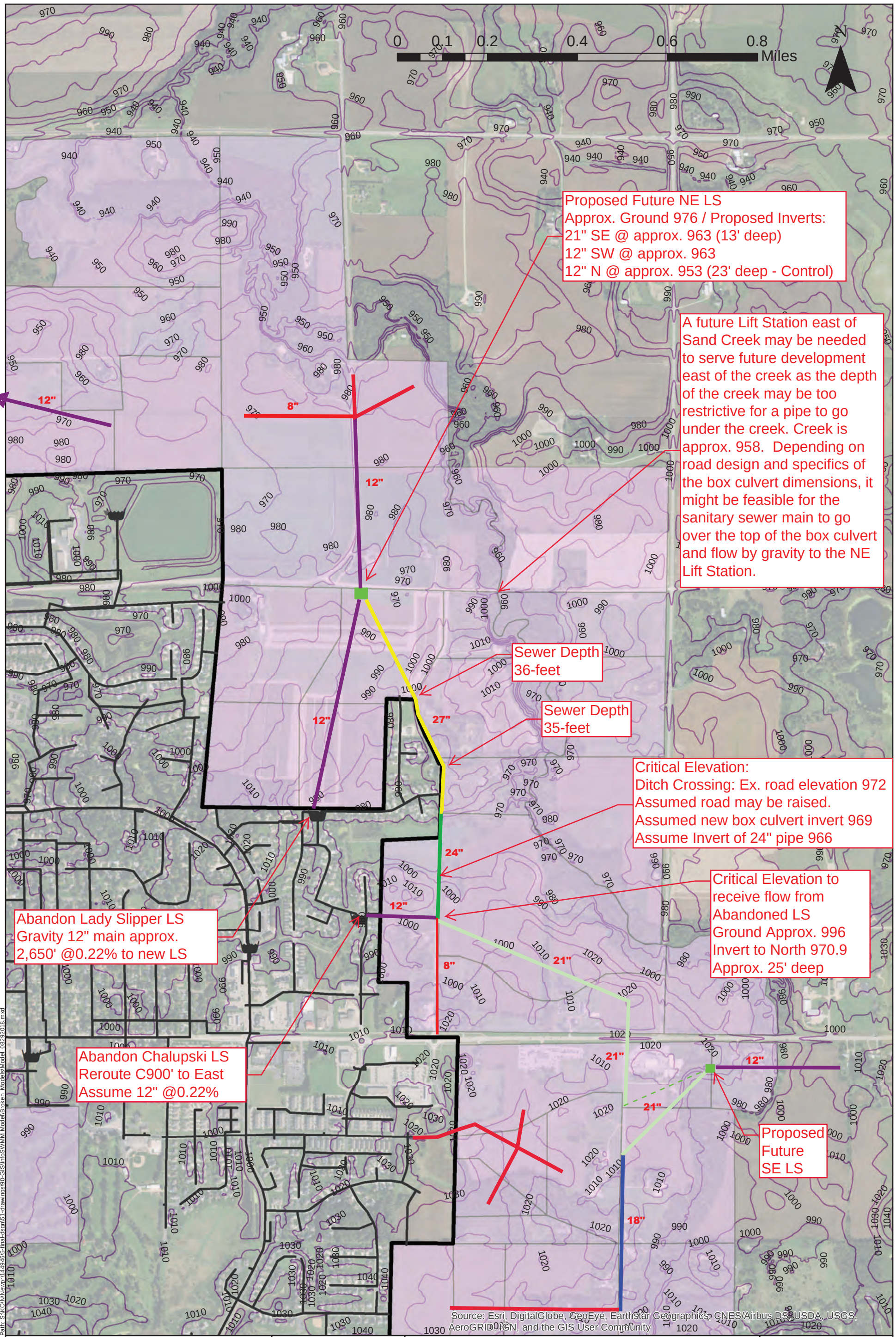
Project: NewPR 144946
Print Date: 12/20/2018

Map by: KHolmberg
Source: City of New Prague

Preliminary Areas Immediately Servicable By Existing System
Comprehensive Plan
City of New Prague, Minnesota

Figure 17

This map is neither a legally recorded map nor a survey map and is not intended to be used as one. This map is a compilation of records, information, and data gathered from various sources listed on this map and is to be used for reference purposes only. SEH does not warrant that the Geographic Information System (GIS) Data used to prepare this map are error free, and SEH does not represent that the GIS Data can be used for navigational, tracking, or any other purpose requiring exacting measurement of distance or direction or precision in the depiction of geographic features. The user of this map acknowledges that SEH shall not be liable for any damages which arise out of the user's access or use of data provided.



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Project: NewPR 144946
Print Date: 12/27/2018

Map by: kholmberg
Source: City of New Prague

Potential Future Network Layouts - Northeast Region

Comprehensive Plan
City of New Prague, Minnesota

Figure 18

This map is neither a legally recorded map nor a survey map and is not intended to be used as one. This map is a compilation of records, information, and data gathered from various sources listed on this map and is to be used for reference purposes only. SEH does not warrant that the Geographic Information System (GIS) Data used to prepare this map are error free, and SEH does not represent that the GIS Data can be used for navigational, tracking, or any other purpose requiring exacting measurement of distance or direction or precision in the depiction of geographic features. The user of this map acknowledges that SEH shall not be liable for any damages which arise out of the user's access or use of data provided.

0 0.125 0.25 0.5 0.75 1 Miles

N

18"

12"

Proposed Future NW LS

18"

8"

36"

8"

8"

24"

30"

8"

24"

24"

8"

18"

Proposed Future SW LS

30" Main cannot be installed directly to the south without daylighting at the 980 low point, which is likely to be a stormwater element in the future. Significant developable area can be served by gravity to the SW along 171st Avenue.

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Path: S:\KOI\N\Newpr\144946\5-final-dsgn\51-drawings\90-GIS\InfoSWMM Model\Broken Models\Model 08292018.mxd

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Project: NewPR 144946
Print Date: 12/27/2018

Map by: kholmberg
Source: City of New Prague

Potential Future Network Layouts - Northwest Region
Comprehensive Plan
City of New Prague, Minnesota

Figure 19

This map is neither a legally recorded map nor a survey map and is not intended to be used as one. This map is a compilation of records, information, and data gathered from various sources listed on this map and is to be used for reference purposes only. SEH does not warrant that the Geographic Information System (GIS) Data used to prepare this map are error free, and SEH does not represent that the GIS Data can be used for navigational, tracking, or any other purpose requiring exacting measurement of distance or direction or precision in the depiction of geographic features. The user of this map acknowledges that SEH shall not be liable for any damages which arise out of the user's access or use of data provided.

Appendix A

2018 Lift Station Inspection Reports

LIFT STATION INSPECTION REPORT

SEH
Building a Better World for All of Us®

Project: Sanitary Sewer Comprehensive Plan Update
Lift Station No: Main
Project No: NEWPR 144946

Date 10/03/2018 Time: 10:46 a.m. Weather: Cloudy 71°

Inspection Team: BRH & DJS

Description:

North of 7th St NE from the end of Central Ave N.

Wet well is located in a dedicated gravel service drive.

Valve vault is located next to the wet well also in a gravel area.

Site Access and Safety:

Access from the service drive. Parking is on the service drive right next to the wet well.

Wet well access hatch is in good condition and has safety grates.

Valve vault access hatch is in good condition and has safety grates.

Pump Details:

Pump 1: Submersible VFD 60 HZ

Pump 2: Submersible VFD 60HZ

Drawdown Results:

Pump 1: 898.96 gpm

Pump 2: 875.46 gpm

Both Pumps: 957.72 gpm

Measured Influent: 493.55 gpm

Condition of Wet well:

Good condition, coated, vented. Coating is spalling.

Inside DIA 10', total depth 18.30, depth to water 9.74', 1 incoming pipe.

Condition of Valve Vault:

Good condition, not coated, vented. Full of water, has a drain.

Gate valve opened to drain structure to wet well. City personnel states barrel sections not sealed.

Electrical and Controls Comments:

Allen Bradley controller is located next to the wet well. Has a generator that is ran monthly.

SCADA and electric have been good.

Other Comments:

Water level at controller 6.4'.

Communication currently radio and is being converted to fiber optic within the next year.

Controller being replaced with a Quality Flow 1500 CT within the next year.

LIFT STATION INSPECTION REPORT

Building a Better World for All of Us®

Project: Sanitary Sewer Comprehensive Plan Update

Lift Station No: Bypass
Project No: NEWPR 144946

Date 10/03/2018 Time: 11:18 a.m. Weather: Cloudy 72°

Inspection Team: BRH & DJS

Description:

North of 7th St NE from the end of Central Ave N.

Wet well is located at the end of a dedicated gravel service drive.

Valve boxes are located in the grass next to the wet well.

Site Access and Safety:

Access from the service drive. Parking is on the service drive right next to the wet well.

Wet well access hatch is in good condition. No fall protection.

Pump Details:

Pump 1: Submersible dual vane

Pump 2: Submersible dual vane

Drawdown Results:

Pump 1: 2111.44 gpm

Pump 2: 2800.89 gpm

Both Pumps: 3447.24 gpm

Measured Influent: 0 gpm

Condition of Wet well:

Good condition, coated, vented thru large elliptical pipe to weir structure. Has a radar transducer.

Inside dimensions 12'x12', total depth 20.80, depth to water 14.12', 1 incoming pipe.

Slight rust on bottom of pump rails. Chains to operate check valves in wet well are rusted.

Discharge pipes and check valves are rusted. Slight I&I at structure joints and at top of elliptical pipe.

Electrical and Controls Comments:

Quality Flow 1500 CT controller is located next to the wet well. Has a generator that is ran monthly.

SCADA and electric have been pretty good.

Other Comments:

Water level at controller 5.4'.

Communication is currently radio and is being converted to fiber optic within the next year.

LIFT STATION INSPECTION REPORT

Building a Better World for All of Us®

Project: Sanitary Sewer Comprehensive Plan Update

Lift Station No: 12th & Columbus
Project No: NEWPR 144946

Date 10/03/2018 Time: 2:23 p.m. Weather: Cloudy 75°

Inspection Team: BRH & DJS

Description:

NE corner of Columbus Ave N and 12th St NE

Wet well is located inside a dedicated fenced gravel area.

Dry pit is located next to the wet well also inside the dedicated fenced gravel area.

Site Access and Safety:

Access from the gravel area. Parking is right next to the wet well.

Wet well access hatch is in fair condition. The hatch hinge and inside of riser are rusted.

Dry pit access hatch is in good condition. Access is made with a ladder and harness system.

Pump Details:

Pump 1: Non-submersible located in dry pit.

Smith & Loveless equivalent to a vortex

Pump 2: Non-submersible located in dry pit.

Smith & Loveless equivalent to a vortex

Drawdown Results:

Pump 1: 703.19 gpm

Pump 2: 733.27 gpm

Measured Influent: 56.41 gpm

Condition of Wet well:

Good condition, not coated, not vented. Has a radar transducer.

Inside DIA 8', total depth 26.05', depth to water 23.33', 2 incoming pipes.

Condition of Dry Pit:

Good condition, coated, vented, dry and has a drain.

Electrical and Controls Comments:

Allen Bradley controller is located in a cabinet on antenna pole approximately 20' from the dry pit.

No generator or portable generator hookup.

SCADA and electric have been good.

Other Comments:

Within the next year, communication will be fiber optic and the controller will be a Quality Flow 1500 CT.

LIFT STATION INSPECTION REPORT

Building a Better World for All of Us®

Project: Sanitary Sewer Comprehensive Plan Update

Lift Station No: 37 (County Rd 37)
Project No: NEWPR 144946

Date 10/03/2018 Time: 12:30 p.m. Weather: Cloudy 72°

Inspection Team: BRH & DJS

Description:

East side of County Rd 37, south of 4th St NE

Wet well is located at the end of a dedicated bit service drive.

Valve vault is located approximately 20' from the wet well in a grass area.

Site Access and Safety:

Access from the service drive. Parking is on the service drive right next to the wet well.

Wet well access hatch is in good condition and has safety grates.

Pump Details:

Pump 1: Submersible Ebara vortex, 20 HP

Pump 2: Submersible KSB vortex, 30 HP

Pump 3: Submersible Ebara vortex, 20 HP

Drawdown Results:

Pump 1: 517.05 gpm

Pump 2: 752.07 gpm

Pump 3: 587.56 gpm

All 3 Pumps: 1186.86 gpm

Measured Influent: 58.76 gpm

Condition of Wet well:

Good condition, not coated, vented. Has a radar transducer.

Inside DIA 10', total depth 30.40', depth to water 23.94', 1 incoming pipe.

Pump rail top brackets are rusted.

Condition of Valve Vault:

Good condition, bottom section coated, dry and has a drain.

Electrical and Controls Comments:

Quality Flow 1500 CT controller is located next to the wet well. Has a generator that is ran monthly.

SCADA and electric have been good.

Other Comments:

Water level at controller 5.1'.

Communication is fiber optic.

LIFT STATION INSPECTION REPORT

Building a Better World for All of Us®

Project: Sanitary Sewer Comprehensive Plan Update

Lift Station No: Central
Project No: NEWPR 144946

Date 10/03/2018 Time: 10:23 a.m. Weather: Cloudy 70°

Inspection Team: BRH & DJS

Description:

908 Central Ave S

Wet well is located on west side of Central Ave S in a grass area next to a residents yard.

Valve vault is located approximately 20' from the wet well in a grass area.

Site Access and Safety:

Access from street or resident driveway. Parking on street or driveway next to wet well.

Wet well access hatch is in good condition. No fall protection.

Pump Details:

Pump 1: Submersible vortex (4 years old)

Pump 2: Submersible vortex (4 years old)

Drawdown Results:

Pump 1: 101.53 gpm

Pump 2: 93.07 gpm

Measured Influent: 0.00 gpm

Condition of Wet well:

Good condition, not coated, vented. Has a radar transducer.

Inside DIA 6', total depth 12.60', depth to water 10.41', 1 incoming pipe.

Slight rust on discharge pipes and elbows. I-beam under top slab is rusted.

Condition of Valve Vault:

Good condition, not coated, dry and has a drain. Slight rust on pipes.

Electrical and Controls Comments:

Quality Flow 1500 CT controller is located next to the wet well.

SCADA and electric have been good. No generator, portable generator hook-up or antenna.

Other Comments:

Water level at controller 1.8'.

Communication is fiber optic.

LIFT STATION INSPECTION REPORT

Building a Better World for All of Us®

Project: Sanitary Sewer Comprehensive Plan Update

Lift Station No: Chalupsky
Project No: NEWPR 144946

Date 10/03/2018 Time: 1:27 p.m. Weather: Cloudy with light rain 73°

Inspection Team: BRH & DJS

Description:

SW corner of 4th St NE and Chalupsky Ave N

Wet well is located at the end of a dedicated concrete service drive.

Valve boxes are located in the concrete service drive next to the wet well.

Site Access and Safety:

Access from the service drive. Parking is on the service drive right next to the wet well.

Wet well access hatch is in good condition. Hatch frame is rusted. No fall protection.

Pump Details:

Pump 1: Submersible vortex, KSB VFD (5 years old)

Pump 2: Submersible vortex, KSB VFD (5 years old)

Drawdown Results:

Pump 1: 340.55 gpm

Pump 2: 323.63 gpm

Measured Influent: 2.12 gpm

Condition of Wet well:

Good condition, not coated, vented. Has a radar transducer.

Inside DIA 6', total depth 17.80', depth to water 14.45', 1 incoming pipe.

Discharge pipes and top of pump rails are rusted.

Electrical and Controls Comments:

Quality Flow 1500 CT controller is located next to the wet well. No generator or antenna.

SCADA and electric have been good.

Other Comments:

Water level at controller 1.9'.

Communication is fiber optic.

LIFT STATION INSPECTION REPORT

Building a Better World for All of Us®

Project: Sanitary Sewer Comprehensive Plan Update

Lift Station No: Homefield
Project No: NEWPR 144946

Date 10/03/2018 Time: 9:40 a.m. Weather: Cloudy 67°

Inspection Team: BRH & DJS

Description:

North side of Art St NW

Wet well is located at the end of a dedicated bit service drive in a grass area.

Valve vault is located approximately 20' from the wet well in a grass area adjacent to the service drive.

Site Access and Safety:

Access from service drive. Parking on the service drive next to wet well.

Wet well access hatch is in good condition and has safety grates.

Pump Details:

Pump 1: Submersible Pump Ex dual vane impeller

Pump 2: Submersible KSB vortex

Drawdown Results:

Pump 1: 217.40 gpm

Pump 2: 240.90 gpm

Both Pumps: 370.16 gpm

Measured Influent: 5.88 gpm

Condition of Wet well:

Good condition, not coated, vented. Has a radar transducer.

Inside DIA 10', total depth 35.11', depth to water 32.13', 2 incoming pipes.

Slight rust on discharge bends.

Condition of Valve Vault:

Good condition, not coated, dry and has a drain. Some I&I and calcium buildup on wall.

Electrical and Controls Comments:

Quality Flow 1500 CT controller is located next to the wet well. No generator or antenna.

SCADA and electric have been good. SCADA is brand new.

Other Comments:

Water level at controller 4.6'.

Communication is fiber optic.

LIFT STATION INSPECTION REPORT

Building a Better World for All of Us®

Project: Sanitary Sewer Comprehensive Plan Update

Lift Station No: Lady Slipper
Project No: NEWPR 144946

Date 10/03/2018 Time: 1:00 p.m. Weather: Cloudy 72°

Inspection Team: BRH & DJS

Description:

South side of 7th St NE, east of Lady Slipper Ave NE.

Wet well is located at the end of a dedicated concrete service drive.

Valve boxes are located in the concrete service drive next to the wet well.

Site Access and Safety:

Access from the service drive. Parking is on the service drive right next to the wet well.

Wet well access hatch is in good condition. Hatch frame is rusted. No fall protection.

Pump Details:

Pump 1: Submersible vortex

1 pump is a 7.5 HP and one is a 10 HP but City personnel was not sure which was which.

Pump 2: Submersible vortex

Drawdown Results:

Pump 1: 211.52 gpm

Pump 2: 177.68 gpm

Both Pumps: 262.29 gpm

Measured Influent: 16.92 gpm

Condition of Wet well:

Good condition, not coated, vented. Has a radar transducer.

Inside DIA 6', total depth 23.53', depth to water 19.75', 2 incoming pipes.

Horizontal discharge pipes and elbows are rusted. Slight I&I at top slab and structure joint.

Electrical and Controls Comments:

Quality Flow 1500 CT controller is located next to the wet well. No generator or antenna.

SCADA and electric have been good.

Other Comments:

Water level at controller 3.4'.

Communication is fiber optic.

LIFT STATION INSPECTION REPORT

Building a Better World for All of Us®

Project: Sanitary Sewer Comprehensive Plan Update

Lift Station No: Library
Project No: NEWPR 144946

Date 10/03/2018 Time: 1:56 p.m. Weather: Cloudy 74°

Inspection Team: BRH & DJS

Description:

SE corner of Lincoln Ave S and Main St E, just south of the New Prague Library in Memorial Park.

Wet well is located approximately 20' east of Lincoln Ave S in a grass area.

Dry pit is located next to the wet well also in a grass area.

Site Access and Safety:

Access from the Lincoln Ave S. Parking is on the street approximately 20' from the wet well.

Wet well access hatch is in fair condition. The hatch hinge, inner latch and inside of riser are rusted.

Dry pit access hatch is in good condition. Access is made with a ladder and harness system.

Pump Details:

Pump 1: Non-submersible located in dry pit.

Smith & Loveless dual vane impeller

Pump 2: Non-submersible located in dry pit.

Smith & Loveless dual vane impeller

Drawdown Results:

Pump 1: 217.40 gpm

Pump 2: 193.89 gpm

Both Pumps: 258.52 gpm

Measured Influent: 82.26 gpm

Condition of Wet well:

Good condition, not coated, vented. Has a radar transducer.

Inside DIA 5', total depth 17.40', depth to water 15.18', 1 incoming pipe and 1 overflow pipe.

Condition of Dry Pit:

Fair condition, coated, vented, dry and has a drain.

Electrical and Controls Comments:

Quality Flow 1500 CT controller is located inside dry pit.

No generator, portable generator hookup or antenna.

SCADA and electric have been good.

Other Comments:

Water level at controller 5.5'.

Communication will be fiber optic next week.

Appendix B

Lift Station Capacities

Lift Station Capacity

Station No.	Pump Rate 1 (gpm)	Pump Rate 2 (gpm)	Pump Rate 3 (gpm)	Average Pump Rates (gpm)	Average Flow Rate (gpd)	WW Depth (ft)	WW Diameter (ft)	Wet Well Volume (gal)	Wet Well Detention Time (min)
12th & Columbus	703	733		718	59,968	26.1	8	2,497	60
County Rd 37	517	752	588	619	148,049	30.4	10	7,927	77
Bypass	2111	2801		2,456	N/A	20.8	12X12	9,694	N/A
Central	102	93		97	19,366	12.6	6	1,237	92
Chalupsky	341	324		332	8,569	17.8	6	1,269	213
Homefield	217	241		229	886	35.1	10	4,952	8,052
Lady Slipper	212	178		195	24,902	23.5	6	1,170	68
Library	217	194		206	48,314	17.4	5	814	24
Main	899	875		887	681,514	18.3	10	5,375	11

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SEH