Comprehensive Water and Wastewater Systems Master Plan Update

Village of Huntley,
McHenry and Kane
Counties, Illinois

September 2022

COMPREHENSIVE WATER & WASTEWATER SYSTEMS MASTER PLAN – 2022

Village of Huntley, IL

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The development of the Comprehensive Water and Wastewater Systems Master Plan was a joint effort by Village Staff and EEI. The Village of Huntley Director of Public Works & Engineering, Timothy Farrell, P.E., assisted with various portions of Sections 1, 2, 4, 5, and 6. EEI staff prepared the remainder of the report.

ABBREVIATIONS	MEANING
ADD	AVERAGE DAY DEMAND
AFF	AVAILABLE FIRE FLOW
AMCL	ALTERNATIVE MAXIMUM CONTAMINANT LEVEL
AWWA	AMERICAN WATER WORKS ASSOCIATION
BCL	BOTTOM CAPACITY LINE
BMP	BEST MANAGEMENT PRACTICE
BP/PRV	BOOSTER PUMPING / PRESSURE REDUCING VALVE
BPS	BOOSTER PUMP STATION
CCL	CONTAMINANT CANDIDATE LIST
CF	CUBIC FEET
CMAP	CHICAGO METROPOLITAN AGENCY FOR PLANNING
CMAP PLAN	2050: NORTHEASTERN ILLINOIS REGIONAL WATER SUPPLY/DEMAND PLAN
CT	CURRENT TRENDS
DBP	DISINFECTANT/DISINFECTION BYPRODUCT
EWST	ELEVATED WATER STORAGE TANK
FBRR	FILTER BACKWASH RECYCLING RULE
FT	FOOT
GAL	GALLON(S)
GPCPD	GALLONS PER CAPITA PER DAY
GPM	GALLONS PER MINUTE
GST	GROUND STORAGE TANK
GWR	GROUND WATER RULE (2006)
GWS	GROUNDWATER SYSTEM
HE	HIGH EFFICIENCY
HET	HIGH EFFICIENCY TOILET
IDSE	INITIAL DISTRIBUTION SYSTEM EVALUATION
IEPA	ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
I/I	INFILTRATION AND INFLOW
IN	INCH(ES)
ISGS	ILLINOIS STATE GEOLOGICAL SURVEY

ISWTER	INTERIM ENHANCED SURFACE WATER TREATMENT RULE
ISWS	ILLINOIS STATE WATER SURVEY
LCR	LEAD AND COPPER RULE (1991)
LRAA	LOCATIONAL RUNNING ANNUAL AVERAGE
LRI	LESS RESOURCE INTENSIVE
LT2SWTR	LONG TERM 2 SURFACE WATER TREATMENT RULE
MCL	MAXIMUM CONTAMINANT LEVEL
MOU	THE CALIFORNIA MEMORANDUM OF UNDERSTANDING
MMM	MULTIMEDIA MITIGATION
MRDLGs	MAXIMUM RESIDUAL DISINFECTANT LEVEL GOALS
MRDLs	MAXIMUM RESIDUAL DISINFECTANT LEVELS
MDD	MAXIMUM DAY DEMAND
MGAL	MILLION GALLONS
MGD	MILLION GALLONS PER DAY
MG/L	MILLIGRAMS PER LITER
MRI	MORE RESOURCE INTENSIVE
MSL	MEAN SEA LEVEL
MTBE	METHYL-T-BUTYL ETHER
PCI/L	PICOCURIES PER LITER
PE	POPULATION EQUIVALENT
PHD	PEAK HOUR DEMAND
PPB	PARTS PER BILLION
PPM	PARTS PER MILLION
PSI	POUNDS PER SQUARE INCH
PWS	PUBLIC WATER SUPPLY
RO	REVERSE OSMOSIS
RWSP	REGIONAL WATER SUPPLY PLAN
SCADA	SUPERVISORY CONTROL AND DATA ACQUISITION
SDWA	SAFE DRINKING WATER ACT
SF	SQUARE FEET
SMCL	SECONDARY MAXIMUM CONTAMINANT LEVEL
SSA	SOUTHERN SERVICE AREA
STAGE 1 DBPR	STAGE 1 DISINFECTANT/DISINFECTION BYPRODUCTS RULE

STAGE 2 DBPR	STAGE 2 DISINFECTANT/DISINFECTION BYPRODUCTS RULE
TCL	TOP CAPACITY LINE
TCR	TOTAL COLIFORM RULE
TTHM	TOTAL TRIHALOMETHANE
UCM	UNREGULATED CONTAMINANT MONITORING
UCMR	UNREGULATED CONTAMINANT MONITORING RULES
UG/L	MICROGRAMS PER LITER
USEPA	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
USGS	UNITED STATES GEOLOGICAL SURVEY
VFD	VARIABLE FREQUENCY DRIVE
VILLAGE	VILLAGE OF HUNTLEY
WARD	WATER AUDIT REFERENCE DATASET
WLCC	WATER LOSS CONTROL COMMITTEE (AWWA)
WM	WATER MAIN
WTP	WATER TREATMENT PLANT
WWTP	WASTEWATER TREATMENT PLANT

EXECUTIVE SUMMARY

The Village of Huntley is a progressive community that is strategically located approximately 30 miles northwest of Chicago and 50 miles east of Rockford. It straddles two counties: McHenry County north of Kreutzer Road, and Kane County to the south. The Village experienced a tremendous amount of growth starting in the late 1990s through the early 2000s and the Village's Water Works and Wastewater Systems was subsequently improved to accommodate the expansion during this timeframe. While the Village's growth rate has significantly decreased during the latest recession, the economy has recently picked up and an increased level of growth is anticipated in the near future.

Regional population projections by the Chicago Metropolitan Agency For Planning (CMAP) suggest that Northeastern Illinois (an 11 county area consisting of Cook, Lake, DuPage, Will, Kane, Kendall, McHenry, Dekalb, Boone, Kankakee, and Grundy Counties) may add as many as four million new residents to the region by 2050. With this increase in growth, the region's water resources will also undergo higher demand. Regional water planning by the CMAP-led Regional Water Supply Planning Group (RWSPG) has quantified the water supply and demand relationship throughout the region, and has concluded that water conservation is necessary to sustainably provide for the region's future.

Given the anticipated growth, the Village Staff and Village Board reevaluated the long-term expansion of the Village's Water Works and Wastewater Systems, and completed a Comprehensive Water and Wastewater Systems Master Plan; this report serves as an update and plans until the year 2050, in accordance with the CMAP projections. The main goal of this plan is to provide a strategy to maintain effective and cost-efficient Water Works and Wastewater Systems for current and projected water uses. This Master Plan not only evaluates system expansion utilizing recent historical water use trends, referred to as Current Trends (CT) water use demands, but also evaluates the RWSPG's water conservation recommendations to define practical reductions in projected water demands. This report explores the potential of additional water conservation efforts and calculates the capital cost savings these additional efforts can achieve. The future water demands that include water conservation strategies are defined as the Less Resource Intensive (LRI) water use projections. The Master Plan also evaluates system expansion utilizing the LRI projections, and finally identifies the capital cost savings the Village would realize with a further commitment to water conservation.

This report also assesses the condition and capacity of the Village's Wastewater System. It evaluates impending regulatory challenges and identifies WWTP improvements needed to continue to operate and maintain both WWTPs under current and near future regulations. It also plans out the expansion of the Village's sanitary sewer network throughout the Village's planning area but especially in the Southern Service area, and develops an implementation plan for the proposed improvements at the WWTPs.

The Comprehensive Water Master Plan is divided into ten sections, summarized on the following pages.

Introduction

The current Village corporate limits encompass 14.13 square miles of land, while the planning area outside of the corporate boundary adds another 20.09 square miles, for a total of 34.22 square miles of land within the study area. The Village offers many opportunities for growth with a significant amount of undeveloped land in the northern and southern portions of the study area, along with infill growth within the existing Village limits. These areas will one day provide homes to new Village residents, as well as contribute to the local economy with new commercial, industrial and institutional land uses. The Village's population was estimated to be 29,444 by Huntley First as of 2021; CMAP estimates the Village of Huntley population at 58,997 people by 2050, which is consistent with the historical long term growth patterns in the Village and the amount of open space available for development.

Existing Water Works System

The Village of Huntley first installed a public water supply in 1903, and utilized shallow sand and gravel water wells as the source of supply for many years. In 1994, the Village drilled its first deep well and by 1999, was wholly dependent on the deep sandstone aquifer as its source of supply. The Village currently operates five deep wells (Wells No. 7 – 11) that are tributary to their five individual water treatment plants.

While the water withdrawn from the deep sandstone wells is fairly free of contaminants, all of the wells exceed the Maximum Contaminant Limits (MCLs) of 2.0 mg/L for barium and 5.0 pCi/L for combined radium. The Village utilizes cation exchange treatment at all of its water treatment plants to reduce the effluent barium and combined radium levels below their respective MCLs, which also happens to soften the water and removes hardness. In addition to the cation exchange treatment process, the Well No. 9 Water Treatment Plant (WTP) includes an aeration and detention treatment step to reduce the hydrogen sulfide levels within the raw water.

The Village's Water Works System contains five elevated water storage tanks (EWSTs) and two detention tanks at two of the WTPs. The total combined water storage within the Village is 3.32 MG. The Village's water main network consists of approximately 170 miles of 4" to 16" pipe and operates as one pressure zone. The Village utilizes a Supervisory Control and Data Acquisition (SCADA) system to monitor the supply, treatment, storage, and distribution components of the Water Works System. With the Village staff's continual focus on system maintenance, the Water Works System components are currently in good condition.

Existing Wastewater System

The Village's Wastewater System includes two Wastewater Treatment Plants (WWTPs), thirteen lift stations, and sanitary sewer pipes ranging in size from 8" to 36". While portions of the sanitary sewer network are more than 60 years old, Village staff has reported the sanitary sewer network is in good condition. The Village follows through on an annual sanitary sewer system maintenance program, which includes jetting, root cutting, and televising portions of the system each year. The Village also has lined a substantial portion of its vitrified clay pipe (VCP) sewers, among the oldest in the network, to prevent inflow and infiltration. All of the lift stations are in good condition; half of the lift stations have onsite backup electrical generators, while the other half have portable generator connection capabilities.

The Village's East WWTP was constructed in 1950, and significant improvements to the plant were completed in 1960, 1977, 1988, 2000, 2002, and 2017. The 2002 improvements expanded the WWTP to its current Design Average Flow (DAF) capacity of 1.8 MGD, with a Design Maximum Flow (DMF) of 4.5 MGD. The East WWTP treatment train consists of fine screens, oxidation ditches, secondary clarification, and ultraviolet disinfection; two sand filters are present but are not utilized. Alum is fed within the treatment train to aid in the removal of barium to meet the pertinent water quality standard. The biosolids treatment train consists of aerobic digestion and mechanical dewatering with the use of a belt filter press. The plant also has a gravity sludge thickener tank, which is currently not in service.

The East WWTP discharges to the Huntley Branch of the Kishwaukee River. Its effluent limitations, as outlined in its NPDES permit, are consistent with other Kishwaukee River Watershed WWTPs. The East WWTP is well run and is generally in very good condition. Some components of the plant require rehabilitation, but given its current and future service area, no additional expansion of the East WWTP is anticipated.

The Village's West WWTP was constructed in 1998. With the first expansion in 2001, another in 2006, and improvements in 2017, the total DAF and DMF capacities of the current plant are 2.6 & 6.5 MGD, respectively. The West WWTP treatment train consists of screening, oxidation ditches, secondary clarification, filtration, and ultraviolet disinfection. Alum is fed within the treatment train to aid in the removal of barium and phosphorus to meet the pertinent water quality standards. The biosolids treatment train consists of thickening with gravity belt thickeners, aerobic digestion, and mechanical dewatering with the use of a belt filter press.

The West WWTP discharges to the South Branch of the Kishwaukee River, and its effluent limitations are similar to those of the East WWTP. The West WWTP is well run and also is in very good condition. Due to the fact that the oldest components are only 22 years old, there is a limited amount of rehabilitation needed at this plant. However, there are a few improvements that will aid the efficient long-term operation of the plant. Based on the current and future tributary areas to the West WWTP, it is likely this plant will need to be expanded at some point during the planning period.

Both the East and West WWTPs utilize SCADA systems to monitor the operations of the plants.

Historical Water Use and Wastewater Flows

The Village's water use from 2017 – 2021 was reviewed to identify recent water use trends for the Water Works System. The water supply and storage systems were assessed for adequacy using evaluation parameters that rate the strength of the supply and storage components. The evaluation concluded that the water supply test parameters were positive in lower water use years and negative in higher water use years; however, the capacity of the current water supply and treatment resources within the system generally meet the current demands on the system, although the *Peak Hour Storage* test parameter indicates that the storage capacity of the system is at its limit. Increases in demand on the system will undoubtedly require additional water supply, treatment, and storage additions.

Water use data for 2020 were analyzed in a manner similar to the AWWA water audit program, and the results of the analysis indicate that the Village's total water loss averaged about 11% for the year. The amount of water lost equates to over $300,000 annually in monetized costs. Minimizing this lost revenue should be an incentive for continued water loss reduction.

Total Wastewater System flows and flows at each of the two WWTPs were analyzed for 2017 – 2021. The total sanitary sewer flows are well below the current total wastewater treatment capacity, and the historical flows to each of the individual plants were well below the current capacity of each plant as well. The current total average daily wastewater flow within the sanitary sewer network is approximately 2.34 MGD, which is approximately 53% of the total DAF capacity of the two WWTPs. The infiltration and inflow within the sanitary sewer network are acceptable and wet weather flows at the WWTPs are manageable.

Both the East WWTP and West WWTP met all of their respective plant effluent limits during the five years analyzed.

Projected Water Use and Wastewater Flows

The average 2017 – 2021 water use for the Village was calculated to be 83 gpcd with an average maximum day to average day ratio of 1.93. A Current Trends (CT) water use projection was developed by applying these parameters to incremental population equivalent (P.E.) increases up to the 2050 population projection of 58,997 (+29,553 P.E.). The needs assessment calculations determined that the CT water supply and treatment deficit in 2050 would be approximately 5,200 gpm and the storage deficit would be 2.9 MG, not counting the addition of a planned 1,000 GPM well and water treatment plant to be online around 2024.

However, the Village does have the potential of reducing those deficits. In an effort to define a reasonable Less Resource Intensive (LRI) demand scenario for the Village, a systematic process was used to efficiently review available information, select relevant water conservation strategies, and calculate estimated savings. Following a review of the 13 water conservation measures recommended by the RWSPG and then a quantification of the amount of demand that reduction applicable programs could reasonably provide for the Village of Huntley, it was determined the projected water use per capita per day could be gradually reduced by 9% to 75.5 gpcd by 2050 under the LRI demand projection. Utilizing the 75.5 gpcd, Maximum Day Demand to Average Day Demand ratio (MDD:ADD) and Maximum Hour Demand to Maximum Day Demand ratio (MHD:MDD) of 1.83 and 2.0, respectively, the 2050 LRI projected water demands were developed.

The evaluation concluded that while the *Reliable Source Capacity and Peak Hour Storage* needs assessment parameters continue to fail with additional P.E. increases, the water supply deficit is cut about a third to 3,300 gpm under the LRI scenario. The water storage capacity deficit is reduced to 2.0 MG, which is two-thirds of the CT value.

As part of the LRI water use projection evaluation, the Village's water use for outdoor use (i.e. irrigation) was defined. It was determined that on average, 17% of the Village's annual water use is for outdoor water use, down from 22% for the 2014 Master Plan. While this percentage is below the national average (considering that irrigation only occurs from six to seven months out of the year in Illinois, whereas in other portions of the nation it could occur all year long), it is well above most Northeastern Illinois communities. For reference, the City of Elgin's outdoor water use has been calculated to be 10% of its total water supply, and the Village of Algonquin's outdoor water use was 6% of its total water pumped. It has been estimated that approximately 50% of the water used for irrigation is wasted due to inefficient practices such as over-irrigation or distribution of irrigation water onto impervious surfaces. Considering that some reduction in outdoor waste has already occurred, if 25% of the 50% of the irrigation water that is wasted is no longer wasted, the Village of Huntley would save approximately 46,400,000 gallons of water per year in 2050, which is the typical water use of about 1,500 people in a year.

Regulatory Review

A comprehensive review of the existing and future regulations was conducted to determine the current and future regulatory status of the Water Works System. The Village of Huntley's Water Works System is meeting all existing and near-future regulations, and the current system operation would meet the future regulations currently being contemplated.

A comprehensive review of the existing and future regulations also was conducted on the Wastewater System. Both WWTPs have received a Total Phosphorus effluent limitation in their current permits, and additional special conditions require further nutrient removal evaluation as well as the requirement for a Capacity, Management, Operation, and Maintenance (CMOM) plan.

Water Works System Evaluation and Recommendations

In order to correct the *Reliable Source Capacity* and *Peak Hour Storage Capacity* deficit for the projected CT and LRI water use scenarios, sustainable sources of water supply and treatment and additional storage will need to be integrated into the Water Works System. The recommended improvements will meet the projected water supply and treatment needs and provide sufficient water storage volume to continue to provide safe and adequate water to the Village of Huntley given both CT and LRI demand scenarios. The recommendations are broken down into supply and treatment, storage, and distribution. Under the CT demand scenario, the following improvements are recommended:

- *CT Supply & Treatment:*

Well No. 13 and Well No. 13 WTP (design in progress)	$8,523,000
Well No. 14 and Well No. 14 WTP	$9,192,000
Well No. 15 and Well No. 15 WTP (Building Sized For Future Well Connection)	$9,206,000
Well No. 16 and Well No. 16 WTP	$8,523,000
Well No. 17 and Well No. 17 WTP	$9,192,000
Well No. 18 and Wells No. 15 and 18 WTP Expansion	$7,883,000

- *CT Storage:*

EWST No. 6 (1.50 MG)	$8,973,000
EWST No. 7 (1.00 MG)	$7,355,000
EWST No. 8 (1.00 MG)	$7,355,000

- *CT Distribution:*

Phase 1: 18,000 LF 16" Water Main Loop from stub under IL-47	$6,327,000
Phase 3: 3,100 LF 16" Water Main Extension from Sandwald Rd.	$1,536,000
Replace small diameter water mains with a minimum of 8" water main (i.e. replace 4" water main with 8" water main) at the end of the small diameter water main's useful life	

With the reduction in water demands for the LRI scenario, the planning period system needs to decrease. The changes to the recommended improvements with a future water demand that is consistent with the LRI projections are as follows:

- *LRI Supply & Treatment:*

Well No. 13 and Well No. 13 WTP (design in progress)	$8,523,000
Well No. 14 and Well No. 14 WTP	$9,192,000
Well No. 15 and Well No. 15 WTP (Building Sized For Future Well Connection)	$9,206,000
Well No. 16 and Well No. 16 WTP	$8,523,000

- *LRI Storage:*

EWST No. 6 (1.50 MG)	$8,973,000
EWST No. 7 (1.00 MG)	$7,355,000

- *LRI Distribution:*
  - Phase 1: 18,000 LF 16" Water Main Loop from stub under IL-47 $6,327,000
  - Phase 3: 3,100 LF 16" Water Main Extension from Sandwald Rd. $1,536,000
  - Replace small diameter water mains with a minimum of 8" water main (i.e. replace 4" water main with 8" water main) at the end of the small diameter water main's useful life

Exhibits summarizing the Water Works System Master Plan for both the CT and LRI scenarios were developed. The projected capital investment for the supply and treatment and storage improvements to meet the CT water demand scenario were calculated to be $60,382,000 and $43,307,000, respectively. The total projected capital investment to meet the CT demands would be $84,065,000. With the reduction in the required improvements to meet the LRI demand scenario, the total cost of the improvements for the planning period reduces to $59,635,000, which is nearly a $24,500,000 reduction. The resultant phasing and implementation plan for the Water Works System is shown in Section 7.6.

<u>Southern Service Area (SSA) Storage and Distribution,</u>

Costs related to the development of the SSA alone are independent from the CT and LRI scenarios because the area growth will occur at a rate independent than that of the main Water Works System north of I-90. As the rate of development in this area is an unknown, development of the SSA is divided into three phases, and Section 7.1 provides a detailed description of the equivalent P.E. thresholds which would necessitate a subsequent capital improvement or phase of development.

Well No. 17 and Well No. 17 WTP, while placed in the SSA under the CT scenario above, are not necessary for the water demands of the SSA itself. Therefore, the Supply and Treatment component is removed, and the remainder of the projected capital improvements for the SSA are broken out as follows:

- *SSA Storage:*
  - Phase 2: EWST No. 7 (1.00 MG) $7,355,000
- *SSA Distribution:*
  - Phase 1: 18,000 LF 16" Water Main Loop from stub under IL-47 $6,327,000
  - Phase 3: 3,100 LF 16" Water Main Extension from Sandwald Rd. $1,536,000

The total cost for the SSA capital improvements is $15,218,000.

Although both population and approximate timeframes for improvements were provided as part of the Master Plan Phasing and Implementation Plans, it will ultimately be the water demands on the system that dictates when and what improvements will need to be constructed. As the Village continues to mature, expand, and practice water conservation strategies, its water demands will evolve. It is recommended the Village continuously monitor and evaluate its Water Works System as the Village develops. The staging of these water works improvements is dependent on the construction schedule and financing of the annexed and proposed developments. The Phasing and Implementation Plan must continually be reviewed and should be modified based on the rate of development and where the development is occurring.

Wastewater System Evaluation and Recommendations

The topography along with the potential wastewater generation projections of the undeveloped portions of the Village's planning area was reviewed. A proposed wastewater collection plan was developed for the Village's Southern Service Area (SSA) utilizing a phased implementation plan involving the use of private sewage disposal during the initial light development phase, followed by the installation of gravity sewers and a two-phased Western Area Lift station with two (2) phased force mains to be installed when development PE thresholds are approached. Additionally, an Eastern Lift Station is proposed with a force main and gravity sewer connection to the Western Lift Station. When development initiates in the SSA, the Village will need to determine the best short and long-term options to service the entire area.

The anticipated total costs for the SSA area based on the evaluation are summarized below.

<u>Southern Service Area Collection System</u>

Gravity Trunk Sewers	$4,800,000
Two-Phased Western Lift Station	$3,500,000
First Western Lift Station 6" Force Main under I-90	$2,000,000
Second Western Lift Station 6" Force Main to Existing 16" Stub	$800,000
Eastern Lift Station, 6" Force Main, and 12" Gravity Sewer to Western Lift Station	$4,500,000

While expansion of the East WWTP is not contemplated in the future, the plant will require some operation and maintenance improvements and regulatory/capacity upgrades:

<u>East WWTP Operation and Maintenance Improvements</u>

Replace bearings and aerator shafts on Oxidation Ditch No. 2	$426,000
Replace Aerobic Digester Air Pipes and Valves	$111,000
Biosolids Thickening and Dewatering Modifications	$743,000
Control Building No. 1 Electrical Renovation	$923,000
Refurbish Screen No. 2	$42,000
Upgrade Non-Potable Water System and Remove Dome on Clarifier No. 1	$263,000
Replace bearings and aerator shafts in Oxidation Ditch No. 3	$60,000
Moyno Pump Replacements (2 Pumps)	$128,000

<u>East WWTP Regulatory/Capacity Improvements</u>

Refurbish Raw Sewage/Excess Flow Pump	$188,000
Modify Oxidation Ditches for Total N Removal	$458,000
Convert Sand Filter Building to Tertiary Disk Filter Building/Phosphorus Removal	$1,425,000
Upgrade Effluent Parshall Flume	$50,000

It has been estimated that development within the West WWTP service area will reach a point where wastewater flows exceed the current capacity of the plant around the year 2042 (+15,000 P.E.). At that time, or at an appropriate amount of time in anticipation of that occurrence, the West WWTP will need to be expanded. In the meantime, operation and maintenance improvements will be necessary and potential regulatory-driven improvements have been planned. A summary of the proposed improvements is as follows:

West WWTP Operation and Maintenance Improvements

Automated Aerobic Digesters Controls	$68,000
Replace/Upgrade Comminutors / Screens	$425,000
New Garage	$345,000
Upgrade Non-Potable Water System	$210,000
Replace DO/ORP Probes on Oxidation Ditch No. 3	$57,000
Digester Diffuser Replacements	$68,000
Replace Polymer Feed Systems for Belt Filter Press and Gravity Belt Thickener	$135,000
Replace or Refurbish Raw Sewage Pumps Nos. 1 – 3	$180,000
New UV System	$593,000
Modify Oxidation Ditch Drainage System	$225,000
Replace Bearings and Aerator Shafts on Oxidation Ditches 1, 2, and 3	$192,000
New Administration / Laboratory Building	$1,458,000

West WWTP Regulatory/Capacity Improvements

Increase Sludge Storage Capacity	$338,000
Add Two New Digester Tanks and Blowers	$938,000
Add Third Pump to Raw Sewage Pump Station No. 2	$75,000
Add Second Filter in Sand Filter Building B	$713,000
Modify Oxidation Ditches for Total N Removal	$458,000

A proposed phasing and implementation plan for the proposed improvements also has been provided as part of this report, shown in Section 8.4.

Sustainable Source Water Assessment

This Section from the 2014 Master Plan was not assessed for the 2022 Master Plan Update, but has been included as a source of information for future planning.

Sustainable Water Works System and Wastewater System Planning

The nearly $24,500,000 capital cost difference between the CT and LRI water scenarios clearly demonstrates the financial benefits of a modest reduction in per capita water use through increased water conservation. To that end, this Comprehensive Water and Wastewater Systems Master Plan is a valuable planning tool and steppingstone for the Village's Water Works and Wastewater Systems. The next steps for the Village are to continue the existing policies regarding the Village's water conservation strategies and goals which have already shown a positive effect and reviewed as necessary, and to develop financing alternatives for the identified improvements. By continually evaluating water conservation opportunities, the Village will not only show how it continues to be a good steward of our limited resource of water, but it also has the potential to significantly reduce the required capital investment in its Water Works System. To be successful from a financial perspective, it also is recommended that the Village periodically review its water rates to determine how revenue will be impacted by a moderate decrease in water consumption resulting from water conservation measures. In addition, the Village could consider developing a formal emergency action plan to minimize water consumption during critical and/or extreme circumstances and whether the plan includes voluntary or mandatory actions.

The table below summarizes water use data from the 2014 Master Plan and this Master Plan, as well as possible goals for the future LRI Scenario. The data from the two Master Plans show that positive progress has been accomplished in all parameters (although the audits from the 2014 Master Plan were performed slightly differently than this one), and using that information allows the LRI values for the MDD:ADD Ratio and Water Usage (gpcpd) to be calculated as a goal to strive towards for sustainable water use. The LRI values for Outdoor Water Use and Water Loss are unable to be calculated, but have been estimated as a goal based on prior trends.

Parameter	2009 – 2013	2017 – 2021	Future LRI
MDD:ADD Ratio	2.16	1.93	1.76
Water Usage (gpcpd)	90	83	75.5
Outdoor Water Use	22%	17%	*12%*
Water Loss	17%[1]	9%[2]	*<10%*

1: Water Loss Data from Average of 2009 – 2013 Audits
2: Water Loss Data from 2020 Audit

This Master Plan advocates similar goals to those of the regional water supply planning efforts championed by CMAP. The water supply sources of the western portion of Northeastern Illinois know no political boundaries. Their geographic extent is such that their availabilities are dependent on everyone's wise use of the resource. Therefore, we also recommend the Village continue to build strong, collaborative relationships regionally for sustainable water use so the region and the Village of Huntley can extend the capacity of the local water resources for an economically and environmentally sustainable region.

SECTION 1: INTRODUCTION

The Village of Huntley is a progressive community that is situated in suburban Chicago's ‘Golden Corridor’ at the crossroads of Interstate 90 and Illinois Route 47, approximately 50 miles northwest of the Chicago Loop and 30 miles east of Rockford. The Village straddles two counties: McHenry County north of Kreutzer Road and Kane County to the south.

The Village was incorporated in 1851 and has been considered a small town with a rural character throughout its history. Farming was the Village’s primary economic driver and during the first boom years (1850s – 1920s), the Village also prospered from the local dairy industry. Manufacturing emerged in the Village in the 1930s and the mix of agricultural/rural, commercial, light industrial, and manufacturing opportunities fostered the Village’s steady growth trend until the 1990s. At that time, Chicago’s western urbanization coincided with attractive Village amenities that led to a rapid population surge lasting for nearly two decades. With available major transportation routes such as Interstate 90 and Illinois Route 47, the Village of Huntley offers families and businesses a rural environment with convenient access to adjacent metropolitan areas. Even with that growth, the Village has managed to preserve and enhance its desired small town character while thriving from new economic development.

With the significant population growth over those two decades, the Village’s utility infrastructure had also grown proportionately to meet the added demands. In the latter part of the 2000s and early part of the 2010s, however, the housing market declined and residential growth in the community slowed to a near standstill. With indicators for development pointing up, Village leadership determined it was an ideal time to reevaluate the asset planning and expansion approach of its Water Works and Wastewater Systems, and engaged EEI to assist with the completion of a Comprehensive Water and Wastewater Systems Master Plan. This report is an update of the previous Plan and includes current data and trends, extending the Plan to 2050.

1.1 Purpose

While the population growth for the Village of Huntley and Northeastern Illinois is expected to rebound, the Village has questioned whether future water use would continue at its current trend. In the development of the Chicago Metropolitan Agency for Planning’s (CMAP) Water 2050 plan, the Regional Water Supply Planning Group has concluded that the current supply of water within Northeastern Illinois will be unable to meet the region’s current trend of water use. Therefore, it is imperative that the region place a focus on developing a framework for water supply planning and management, including water conservation measures, as a means to extend our limited water supply resources.

With the Village of Huntley’s sustainability focus, and with the recommendations of Water 2050, the Village elected to evaluate the expansion of the Water Works and Wastewater Systems under two water demand scenarios. Utilizing water demand terminology from Water 2050, the Current Trends (CT) water demand scenario will evaluate the expansion of the system under "business as usual" water use patterns. Following a review of potential water conservation programs and establishment of water conservation goals, a Less Resource Intensive (LRI) water demand projection will be created. The system expansion will then be planned under the lower demand projection, as well. Lastly, the capital cost for the improvements needed to expand the system to meet both demand projections will be compared to determine the capital cost savings with the higher water conservation commitment.

In addition to defining the expansion of the Water Works and Wastewater Systems and evaluating the capital cost savings of a focused community-wide comprehensive conservation effort, this report also will present findings from a regulatory audit review, water modeling, a current and future pressure zone review, and an infiltration and inflow review within the wastewater system. With a balanced environment at this Master Plan's core, the Village of Huntley will have a roadmap for expanding and operating sustainable Water Works and Wastewater Systems.

1.2 Previous Water Works System Planning Documents

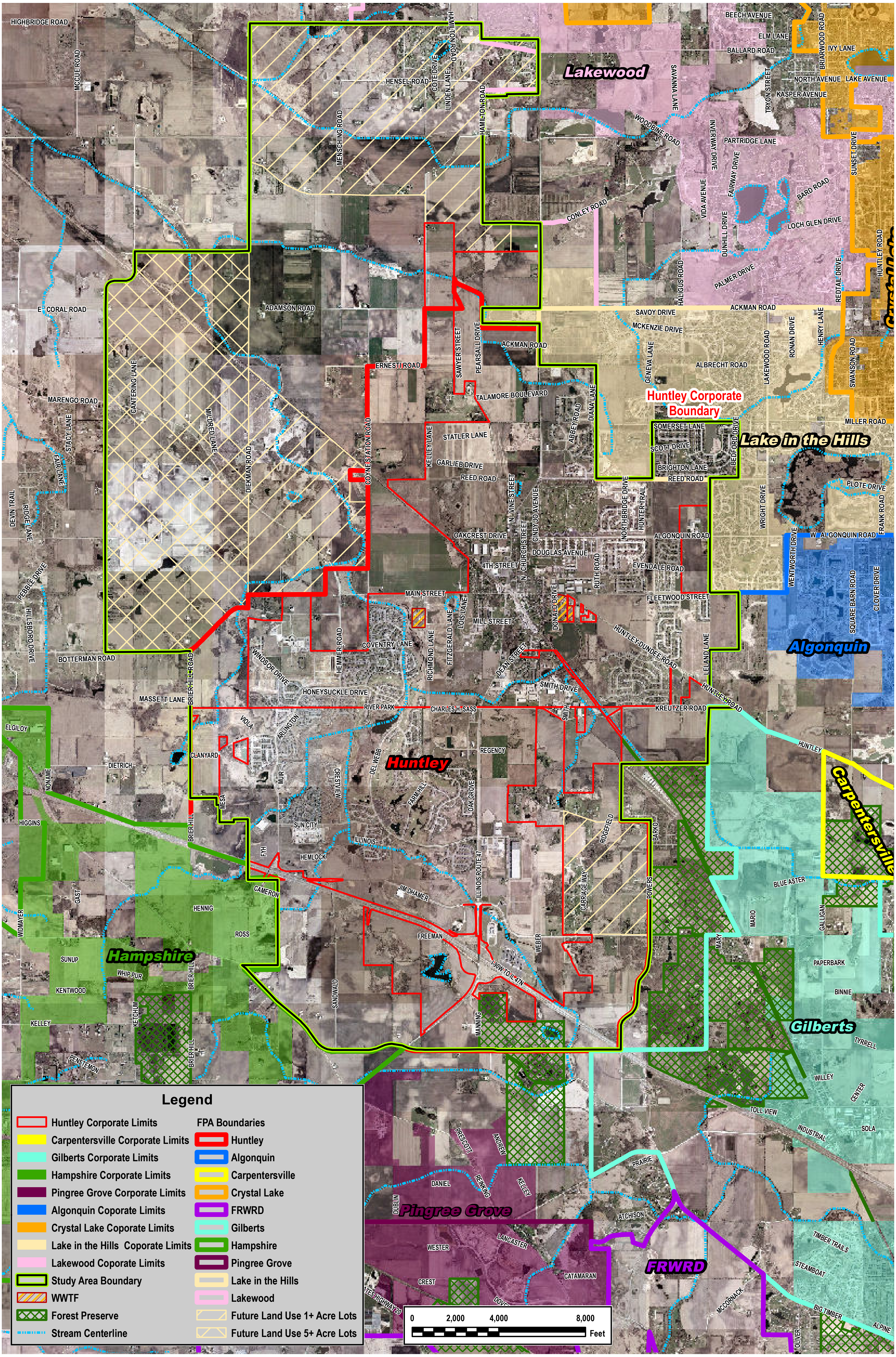
As the growth and water use patterns of the Village have changed, the Village of Huntley has continued to plan for the management and expansion of the infrastructure in its Water Works System. The most recent Water System Master Plan updates to the original 2002 Water System Master Plan were in 2005 and 2014. In 2007, an Aquifer Water Supply Report was completed and led to the Exploratory Test Hole Program Geotechnical Report for the area southeast of Kreutzer Road and Illinois Route 47 (just east of Walmart). A Water System Model was first developed as part of the 2002 Master Plan and was updated in 2008 and 2014 with a focus on the planning area south of I-90. Where applicable, the findings of these reports and studies are referenced and built upon within the context of this Master Plan.

1.3 Previous Wastewater System Planning Documents

Similar to the Water Works System, the Village kept pace with the rapid development within the community by properly planning for the expansion of its Wastewater System. The most recent Wastewater System planning documents prior to this Master Plan were the 1991 Wastewater Treatment Facilities Plan and associated updates in 1992, 1993 and 1999. A Sanitary Sewer Master Plan was prepared in 2005 and updated in 2014 to include the entirety of the Wastewater System. Where applicable, the findings of these reports and studies are referenced and built upon within the context of this Master Plan.

1.4 Study Area

The study area for this report, consisting of the Village's and neighboring corporate boundaries, is depicted on Exhibit No.1-1. The study area aligns with the Village's sanitary sewer service planning boundary, and is



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DATE: MAY 2022
PROJECT NO.: HU2102
BY: MJT
PATH: H:\GIS\PUBLIC\HUNTLYEY\HU2102\
FILE: HU2102_EXH 1-1 STUDY AREA.MXD

COMPREHENSIVE WATER AND WASTEWATER SYSTEMS MASTER PLAN

EXHIBIT 1-1
STUDY AREA

NORTH

consistent with current boundary agreements with adjacent communities as well. The current Village corporate limits encompass 14.13 square miles while the planning area outside of the corporate boundary adds another 20.09 square miles, for a total of 34.22 square miles within the study area. Exhibit No. 1-1 also identifies the current Village Facility Planning Area boundary, which encompasses 20.8 square miles.

It should be noted the Village has identified approximately 9.92 square miles within the planning area where the ultimate land use would be large lot (1+ and 5+ acres) residential. Since it is generally not cost effective to serve residential lots of this size with municipal water and wastewater service, it is assumed that water and wastewater service to those homes would be provided by individual wells and onsite wastewater management systems.

1.5 Historical Population

Table No. 1-1 provides the Village's population figures from 1970 to 2021. The Village of Huntley experienced relatively moderate growth between 1980 and 1990, growing from 1,646 persons in 1980 to 2,453 in 1990. Like many communities located in northeastern Illinois, Huntley grew significantly throughout the 1990's and early 2000's. From 1990 to 2000 the population grew over 133% whereas the decade of 2000 to 2010 saw an expansive growth of 324%. After 2010, the growth rate slowed and the Village's population increased to just over 26,000 people as identified in the American Community Survey conducted in 2016, and has been estimated at 29,444 for 2021 by Huntley First, the Village of Huntley's Economic Development organization.

Table 1-1: Historical Population
Village of Huntley, IL

Year	Population	Annual % Increase
1970	1,432	--
1980	1,646	1.40%
1990	2,453	4.07%
2000	5,730	8.85%
2005	16,719	23.88%
2010	24,291	7.76%
2016	26,632	1.55%
2021	29,444	2.03%

1.6 Projected Population

Forecasting future population patterns in a geographic location can be very complex. Economic conditions, social perspectives, governmental influences, environmental factors, and many other circumstances can disrupt population dynamics. A perfect example of a situation that altered the Village's potential population growth pattern occurred during the past three decades. With the rapid growth trends of the 1990s and early 2000s and the sizable amount of available land remaining to develop within the planning boundary, the Village was preparing for a continued precipitous population increase. However, with the subsequent downturn in the economy in the mid-2000s, the rate of population growth followed suit and slowed to a more moderate rate or even slight decline; the Village has had to plan for a moderate growth rate consistent with current patterns, all the while preparing for a potential upswing in the economy that could attract a massive influx of developers back to the Village. Nevertheless, reasonable population projections should be made utilizing the most current, best available sources of information in order to establish a baseline for determining immediate, near future, and long term Water Works and Wastewater System needs.

The Village of Huntley offers many opportunities for population growth with a significant amount of undeveloped land throughout the outer limits of the study area and infill within the existing Village limits. When a municipality in northeastern Illinois is preparing a Master Plan, the basis for population projections is often those published by the Chicago Metropolitan Agency for Planning (CMAP). The best available population projection for the Village of Huntley is approximately 58,997 people for year 2050 based on CMAP's data. Since the planning period for this Master Plan is approximately 30 years to year 2050, CMAP's projections coincide with the planning period of this document. Assuming a straight line growth rate from 2021 to 2050, the annual percent increase in population can be estimated at 3.19% of the 2021 population. Village staff concurs with the CMAP population forecasts in that they seem to complement the amount of land in the planning area destined for development and the Village amenities that will attract developers.

The projected population trends are summarized in Table No. 1-2 and graphed with the historical trends in Exhibit No. 1-2.

Table 1-2: Projected Population

Village of Huntley, IL

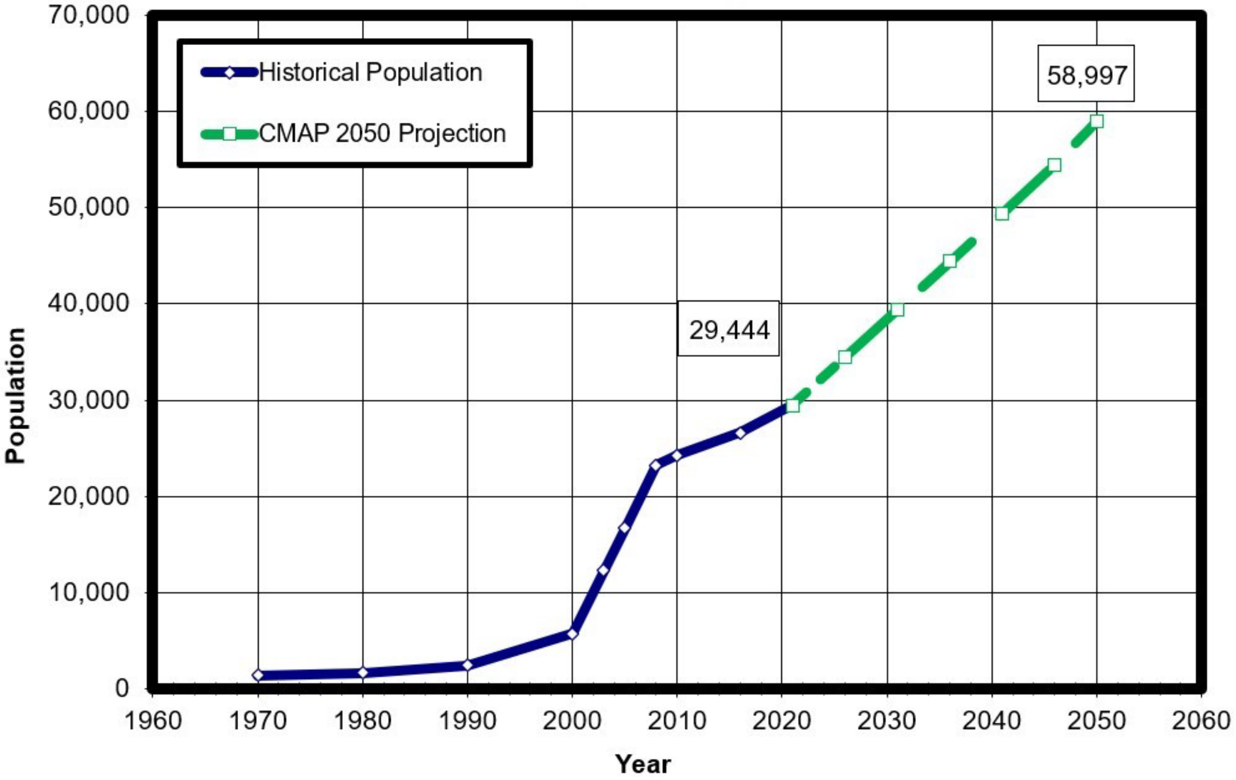
Year	Population	Annual % Increase
2021	29,444	--
2026	34,444	3.19%
2031	39,444	2.75%
2036	44,444	2.42%
2041	49,444	2.16%
2046	54,444	1.95%
2050$^{\Delta}$	58,997	2.03%

Notes:

$^{\Delta}$ CMAP 2050 CMAP population projection.

Exhibit 1-2: Historical and Projected Population Summary

Village of Huntley, IL



SECTION 2: EXISTING WATER WORKS SYSTEM

The Village of Huntley's existing Water Works System can be divided into five main components, namely: 1) supply, 2) treatment, 3) storage, 4) distribution and 5) controls. The condition of all Water Works System facilities is excellent, and it is clear that Village Staff operates and maintains the system with diligence and aptitude. In order to establish a foundation for asset management and system expansion, an inventory of the existing system must first be completed. Following a brief overview of the Village's Water Works System, this section of the report will provide that inventory.

2.1 Overview

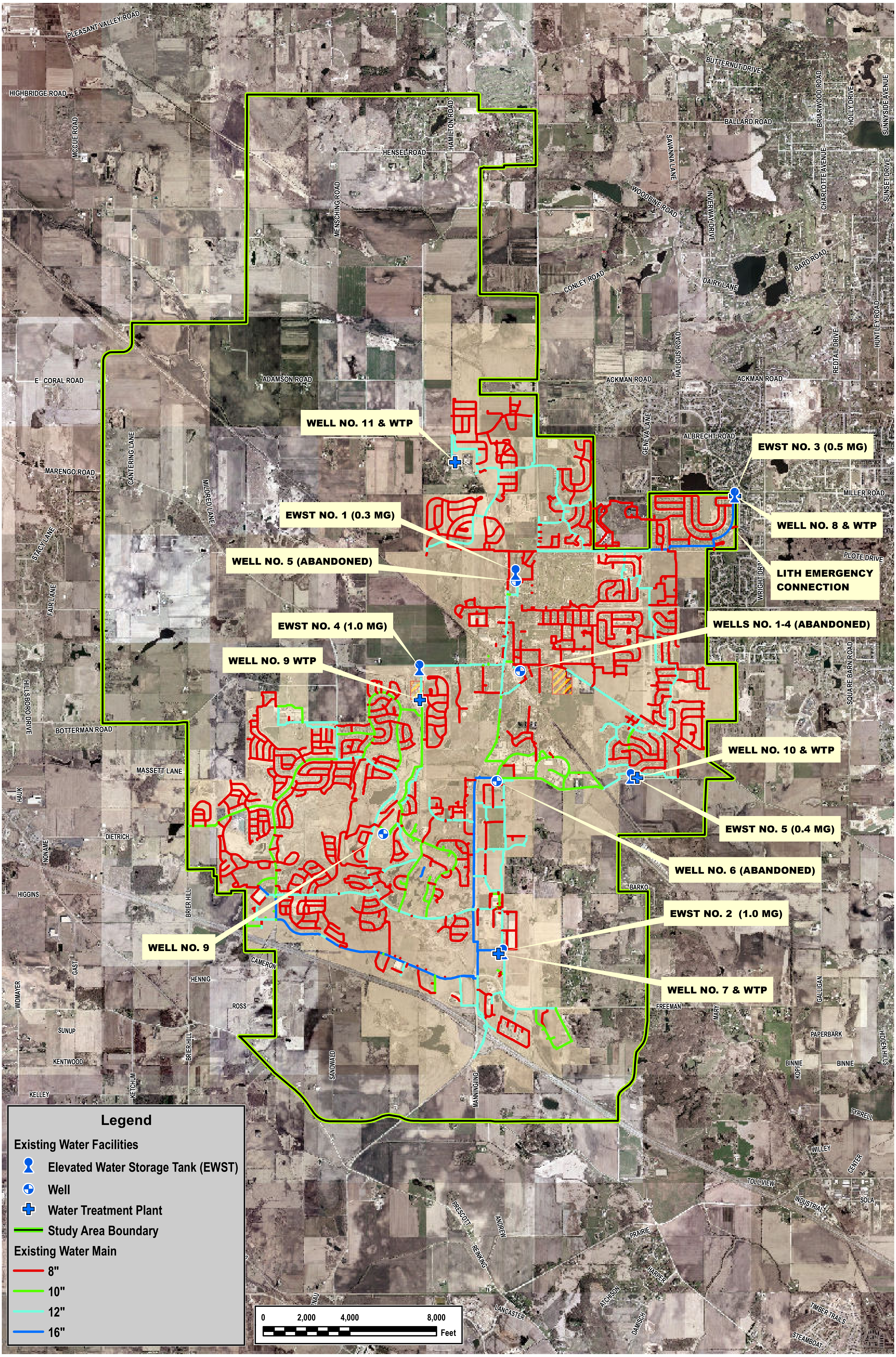
The Village of Huntley first established a public water supply in 1903 with the construction of a shallow sand and gravel well; over time it expanded its use of the localized sand and gravel aquifer resource, and by 1979 had drilled a total of six shallow public water supply wells. Due to supply limitations and objectionable iron concentrations in the localized shallow sand and gravel deposits, the Village began developing high capacity deep wells in 1994 and became completely dependent on deep sandstone aquifers by 1999.

All six shallow wells have been abandoned and as of now, the Village operates and maintains five deep wells that pump groundwater to five dedicated water treatment plants that distribute water to over 170 miles of water main and a combined 3.317 million gallons of elevated and ground water storage within one pressure zone. The water system currently serves almost 30,000 people within the Village along with a host of other government/institution, commercial, and industrial consumers. Exhibit No. 2-1 illustrates the locations of the Water Works System facilities. A more detailed evaluation of these Water Works System components is presented in the following sections.

2.2 Supply

The Village of Huntley currently utilizes the deep sandstone aquifer as its sole source of water supply since the last shallow sand and gravel well was abandoned in 1999. The construction and capacity characteristics of the Village's five deep water wells are summarized in Table No. 2-1 along with a summary of their pumping equipment and maintenance histories. The annual well usage from each well as a percentage of the total from 2017 through 2021 is graphically presented in Exhibit No. 2-2, which highlights the fairly consistent balance of well usage from year to year.

The following sections provide detailed descriptions of the Village's former and current sources of water supply.



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DATE:	MAY 2022
PROJECT NO.:	HU2102
BY:	MJT
PATH:	H:\GIS\PUBLIC\HUNTLEY\HU2102\
FILE:	HU2102_EXHI_2-1_WATER WORKS.MXD

COMPREHENSIVE WATER AND WASTEWATER SYTEMS MASTER PLAN

EXHIBIT 2-1
EXISTING WATER WORKS SYSTEM

NORTH

Table No. 2-1: Existing Water Supply Summary

Village of Huntley, IL

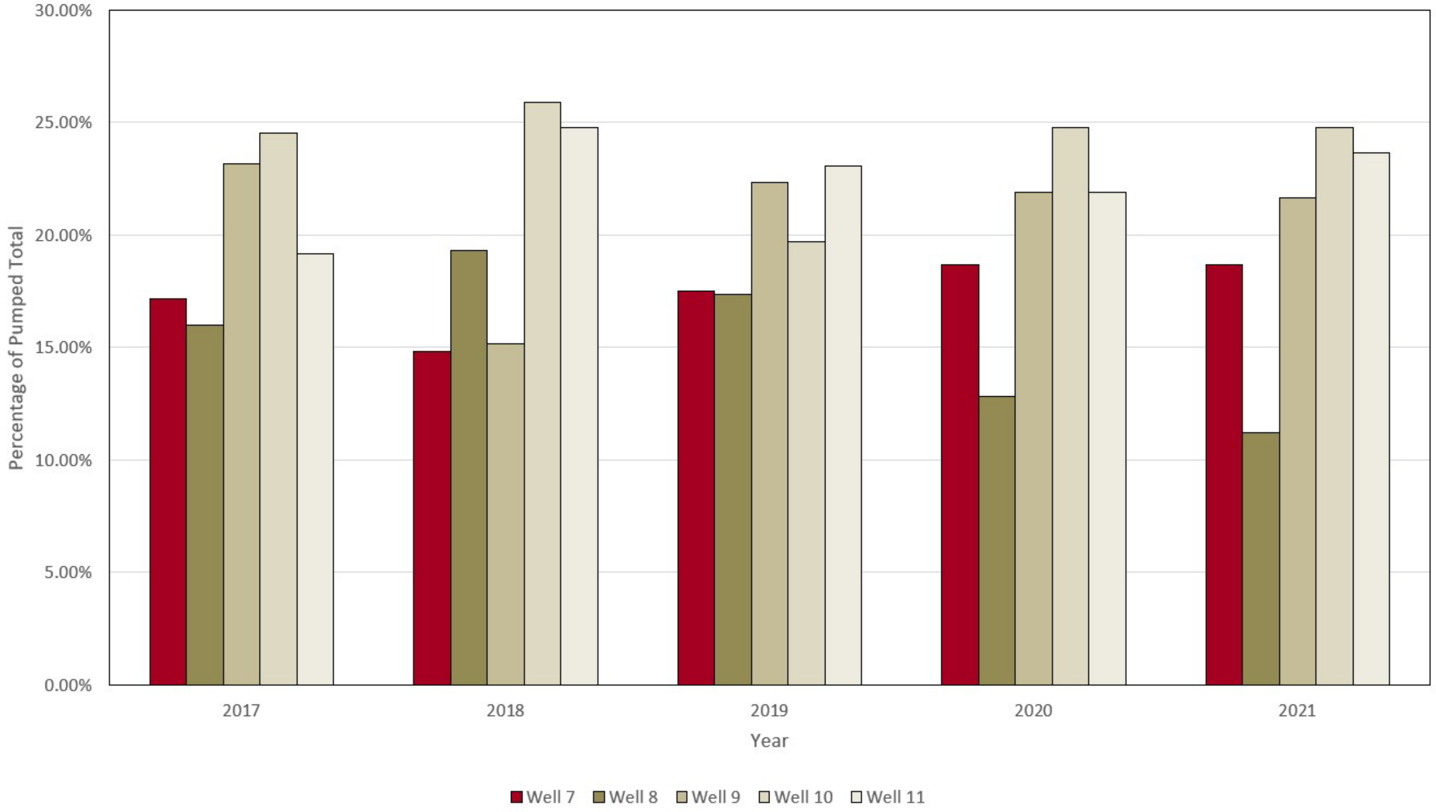
WELL NO. (STATE ASGD ID NO.)	AQUIFER[1]						DEPTH (BELOW GRADE)			EQUIPMENT INSTALL DATE	DESIGN CONDITION		INSTALLED MANUFACTURER AND TYPE		PUMPING ASSEMBLY CONDITION		COMMENTS
	SG	SL	GP	SP	IG	MS	WELL (FT)	CASING (FT)	PUMP (FT)		FLOW (GPM)	TDH (FT)	PUMP	MOTOR	PUMP	MOTOR	
7 (WL00839)					●		1,275	1,083	698	2018	800	750	FS/BJ 11MQH 13 Stage	FS/BJ 250 HP 14 H 460V	Not Serviced	Not Serviced	Emergency Repair - All New Column Pipe
										2016			FS/BJ 11MQH 13 Stage		New	Maintenance	Preventative Maintenance
										2011			FS/BJ 11MQH 13 Stage		Rebuilt	Maintenance	Preventative Maintenance
										2006			FS/BJ 11MQH 13 Stage		Rebuilt	Maintenance	Preventative Maintenance
										1994			FS/BJ 11MQH 13 Stage		New	New	Well Drilled and Developed w/Bulk Shooting
8 (WL01139)			●	●	●		1,260	665 (Liner at 970-1095)	799	2022	900	865	FS/BJ 12EMM 13 Stage	FS/BJ 250 HP 14 H 460V	New	Not Serviced	Assembly Pulled due to Lack of Production; Single Block Shot Development
									820	2021	914	880	FS/BJ 11MQH 15 Stage		New	Maintenance	Preventative Maintenance - New Power Cable
									799	2014	900	865	FS/BJ 11MQH 16 Stage		Rebuilt	Maintenance	Preventative Maintenance
									806	2008	900	865	FS/BJ 11MQH 16 Stage		Rebuilt	Maintenance	Assembly Pulled due to Reduced Performance; Added a Bowl Stage
									789	2006	900	810	FS/BJ 11MQH 15 Stage		Rebuilt	Maintenance	Preventative Maintenance; Added a Bowl Stage
									705	1997	900	755	FS/BJ 11MQH 14 Stage		New	New	Well Drilled & Developed with ?
9 (WL01249)					●		1,320	1,100	760	2018	1,000	720	FS/BJ 11MQH 15 Stage	FS/BJ 300 HP 14 H 460V	New	Maintenance	Preventative Maintenance - All Column Pipe Sandblasted and Recoated
										2012					Rebuilt	Maintenance	Preventative Maintenance
										2007					Rebuilt	Maintenance	Preventative Maintenance
										1998					New	New	Well Drilled and Developed w/Bulk Shooting
10 (WL01201)					●		1,330	1,120	739	2019	1,000	867	Goulds 12 CMC 13 Stage	FS/BJ 300 HP 14 H 460V	Rebuilt	Maintenance	Preventative Maintenance - All Column Pipe Sandblasted and Recoated
										2013					New	Maintenance	Preventative Maintenance
									750	2008		850	FS/BJ 11MQL 17 Stage		Rebuilt	Maintenance	Preventative Maintenance
										1999					New	New	Well Drilled and Developed w/2 lb Block Shots
11 (WL01731)					●		1,344	1,140	690	2017	1,000	670	FS/BJ 11MQH 13 Stage	FS/BJ 250 HP 14 H 460V	Rebuilt	Maintenance	Preventative Maintenance - Sandblasted and Recoated 16 Pieces of Column Pipe
										2011					New	New	Replacement due to Thrust Bearing Failure
										2007			Goulds 12CMC 10 Stage	Hitachi 250 HP 14" 460V	New	New	Well Drilled and Developed w/Double Block Shooting, Bulk Shooting, and Pressurizing
TOTAL FLOW CAPACITY - ALL WELLS:											4,700 GPM						
											6.77 MGD						
TOTAL FIRM CAPACITY (WITH LARGEST OUT) - ALL WELLS:											3,700 GPM						
											5.33 MGD						

Notes:

1. Aquifer Designations: SG = Sand & Gravel; SL = Silurian Dolomite; GP = Galena-Platteville Dolomite; SP = St. Peter (Ancell) Sandstone; IG = Ironton-Galesville Sandstone; MS = Mt. Simon Sandstone

Exhibit No. 2-2: Annual Well Usage (2017 – 2021)

Village of Huntley, IL



2.2.1 Shallow Sand and Gravel Wells (Abandoned)

Wells No. 1, 2, 3 and 4 were all located in the same general vicinity – approximately 300 feet south of Main Street and 200 feet west of Church Street, at the site of a 65,000 gallon wooden elevated water storage tank that was abandoned in 1971 and has since been demolished. Well No. 1, drilled in 1903 to a depth of 74 feet, was abandoned and capped in 1947. Well No. 2, also drilled to a depth of 74 feet, was abandoned and capped in 1954 after the completion of Wells No. 3 and 4 in 1953. Wells No. 3 and 4 were drilled to a depth of 74 feet and 63 feet, respectively, and are presently abandoned and capped. Well No. 5 was drilled to a depth of 95 feet in 1969 and located at the site of the current elevated water storage tank No. 1 – behind the Bakley Shopping Center approximately 1,000 feet north of Algonquin Road and 200 feet east of State Highway 47. Well No. 6 was drilled to a depth of 154 feet in 1979 and located along Kreutzer Road approximately 850 feet east of State Highway 47. Wells No. 5 and 6 have been abandoned and capped as well. Treatment for the shallow water supply was limited to chemical addition using chlorine, fluoride and phosphate prior to distribution.

By the mid-1990s, the Village's population was poised for a growth spurt, and it was evident that additional sustainable sources of water supply would be required to keep pace with the coming expansion. The localized shallow sand and gravel wells that were resourceful for the Village for nearly a century were strained from a flow capacity perspective, and were afflicted by objectionable water quality due to elevated iron and in some cases, manganese. The time had come to incorporate a high capacity deep groundwater aquifer system into the water supply strategy, and by 1999 all shallow sand and gravel wells were abandoned and sealed from the system.

When shallow Wells No. 1-6 were drilled, there was limited science and research available to aid in locating a public water supply shallow sand and gravel well, so these wells were likely located by random exploratory test drilling on available Village property. In response to the 2006 McHenry County Groundwater Resources Management Plan, the Village began taking the necessary steps to investigate alternative water supplies and commissioned an Aquifer Supply Planning Report in 2007. Even though the Village was by this time completely drawing water from the deep sandstone aquifer, it wished to further research shallow sand and gravel opportunities. Based on recommendations within the report, the Village proceeded with an exploratory test hole program for the area southeast of Kreutzer Road and Illinois Route 47 (just east of Walmart). Based on composite sampling of the exploratory test holes, it was determined that this site had very minimal potential for locating permeable sand and gravel deposits capable of sustaining a high capacity well, and therefore the shallow well initiative stalled.

2.2.2 Deep Sandstone Wells

The Village constructed its first deep sandstone water well in 1994, known as Well No. 7. By 1999, three additional deep wells were installed to keep pace with growing water demands. The newest deep well, Well No. 11, was installed in 2007, bringing the total to five water wells that draw water from one or more deep sandstone aquifers. The pumping equipment installed in the wells provides water at a rate from approximately 800 to 1,000 GPM, depending on the well and distribution system/hydraulic conditions. The combined raw water capacity of all of the Village's wells is 4,700 GPM, whereas the firm capacity with the largest well out of service is 3,700 GPM.

All of the Village's wells are completed into the Ironton-Galesville formation. Well No. 8 is also open to the Galena-Platteville and Glenwood-St. Peter, sometimes referred to as the Ancell, formations. Schematics for each of the Village's existing water wells are included in Appendix A of this report.

2.2.3 Well Water Quality

Table No. 2-2 presents a summary of the quality of the raw water from the Village's active wells. It should be pointed out that the values listed were obtained from the latest available data provided by the Village or obtained from the IEPA Drinking Water Watch website. It is recommended that the Village sample and test the raw water for those wells with results listed from sample collection dates more than a few years old.

The raw water from each well has a moderately high hardness (approximately 234 - 288 mg/L measured as calcium carbonate; $CaCO_3$). Wells No. 7, 9 and 11 have iron concentrations greater than the secondary

Maximum Contaminant Level (MCL) of 0.3 mg/L, but below the regulatory primary MCL of 1.0 mg/L. All of the wells have measured barium concentrations greater than the regulatory limit of 2 mg/L and combined radium greater than the regulatory limit of 5 picocuries per liter (pCi/L). The treatment systems used for each of the wells are effective at removing these contaminants from the raw well water.

2.3 Treatment

The Village of Huntley operates five water treatment plants, each assigned to a single well, to provide the community's water treatment needs. All five WTPs employ processes that provide drinking water which meets or exceeds federal and state drinking water quality standards. Cation exchange is used at every facility to remove barium, radium, hardness, and to a certain degree, iron from the connected deep well. Well No. 9 WTP also uses air stripping to remove hydrogen sulfide and iron impurities. Table No. 2-3 presents a summary of the finished water quality from the Village's WTPs.

Each WTP will be further discussed in detail in the following subsections.

Table No. 2-2: Well Water Quality Summary

Village of Huntley, IL

Well No.	Bedrock Aquifer[1]						Alkalinity	Total Hardness	Ca	Mg	pH	SO_4^{2-}	TDS	Na	Cl	NH_3	As	Ba	Fl	Fe	Mn	Ra-226	Ra-228	Comb. Ra	Comments
	SG	SL	GP	SP	IG	MS	(mg/L as $CaCO_3$)	(mg/L as $CaCO_3$)	(mg/L)	(mg/L)		(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/l as N)	(ug/l)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(pCi/L)	(pCi/L)	(pCi/L)	
Primary MCL							**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**10**	**2**	**4**	**1**	**0.15**	**N/A**	**N/A**	**5**	
Secondary MCL							**N/A**	**N/A**	**N/A**	**N/A**	**6.5-8.5**	**250**	**500**	**N/A**	**250**	**N/A**	**10**	**2**	**2**	**0.3**	**0.05**	**N/A**	**N/A**	**5**	
7 (WL00839)					●		295	217	48.0	24.0	7.25	ND	NR	8.3	ND	0.290	ND	6.500	0.390	0.100	ND	6.9	8.8	15.7	Data from 1997 IEPA Lab Sample, Radium data from 2014 Pace Laboratory Sample
8 (WL01139)			●	●	●		304	254	57.0	27.0	7.00	0.6	299	14.8	1.90	NR	NR	3.300	0.460	0.110	ND	NR	NR	7.3	Data from 2014 Master Plan
9 (WL01249)					●		281	225	49.0	25.0	7.25	ND	NR	7.9	1.38	0.24	ND	5.000	0.390	0.059	ND	14.8	8.9	23.7	Data from 2001 IEPA Lab Sample; Radium data from 2008 Midwest Laboratory Sample
10 (WL01201)					●		270	245	52.9	27.5	6.71	10.1	278	11.2	ND	ND	ND	4.340	0.385	0.211	ND	11.7	6.4	18.1	Data from 2009 IEPA Lab Sample; Radium data from 2014 Pace Laboratory Sample
11 (WL01731)					●		375	212	44.9	24.4	6.71	23.3	352	6.9	1.25	0.269	ND	4.460	0.313	0.161	ND	11.2	6.0	17.2	Data from 2011 IEPA Lab Sample; Radium data from 2007 First Environmental Sample

Notes:

[1] Aquifer Designations: SG = Sand & Gravel; SL = Silurian Dolomite; GP = Galena-Platteville Dolomite; SP = St. Peter (Ancell) Sandstone; IG = Ironton-Galesville Sandstone; MS = Mt. Simon Sandstone

Ca = Calcium; Mg = Magnesium; SO_4^{2-} = Sulfate; TDS = Total Dissolved Solids; Na = Sodium; Cl = Chloride; NH_3 = Ammonia; As = Arsenic; Ba = Barium; Fl = Fluoride; Fe = Iron; Mn = Manganese

NR = No Record Found; ND = Non Detect

🟥 Highlighted value indicates raw water concentration exceeds Primary MCL for parameter. In all cases, treatment is in place to reduce concentration below the MCL, and routine monitoring is required.

▨ Highlighted value indicates raw water concentration exceeds Secondary MCL for parameter. In some cases, treatment is in place to reduce concentration below the MCL, and routine monitoring is recommended.

🟧 Highlighted value indicates raw water concentration for parameter that may be approaching Primary or Secondary MCL or may cause water quality issues. In some cases, treatment is in place to reduce concentration below the MCL, and routine monitoring is recommended.

Table No. 2-3: Finished Water Quality Summary

Village of Huntley, IL

WTP	Alkalinity (mg/L as $CaCO_3$)	Total Hardness (mg/L as $CaCO_3$)	Ca (mg/L)	Mg (mg/L)	SO_4^{2-} (mg/L)	TDS (mg/L)	Na (mg/L)	Cl (mg/L)	As (ug/l)	Ba (mg/L)	Fl (mg/L)	Fe (mg/L)	Mn (mg/L)	Ra-226 (pCi/L)	Ra-228 (pCi/L)	Comb. Ra (pCi/L)	Comments
Primary MCL	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**10**	**2**	**4**	**1**	**0.15**	**N/A**	**N/A**	**5**	
Secondary MCL	**N/A**	**N/A**	**N/A**	**N/A**	**250**	**500**	**N/A**	**250**	**10**	**2**	**2**	**0.3**	**0.05**	**N/A**	**N/A**	**5**	
TP04 - Supply Well No. 7	260	16	3.5	1.7	ND	200	120	3.6	ND	0.40	0.676	0.010	ND	0.691	0.657	1.348	Data from 2021 IEPA Lab Sample
TP05 - Supply Well No. 8	250	18	3.9	2.0	1.4	210	120	3.0	ND	0.32	0.758	0.017	ND	ND	1.140	1.140	Data from 2021 IEPA Lab Sample
TP06 - Supply Well No.9	260	91	12.0	15.0	ND	300	90	4.2	ND	1.10	0.770	0.029	ND	ND	ND	ND	Data from 2021 IEPA Lab Sample
TP07 - Supply Well No. 10	250	9.2	2.0	1.0	1.4	320	140	4.5	ND	0.22	0.733	0.047	ND	ND	ND	ND	Data from 2021 IEPA Lab Sample
TP09 - Supply Well No. 11	220	13	3.0	1.4	5.6	380	140	4.2	ND	0.20	0.555	0.017	ND	1.030	ND	1.030	Data from 2020 IEPA Lab Sample (Radium data from 2021)

Notes:

Ca = Calcium; Mg = Magnesium; SO_4^{2-} = Sulfate; TDS = Total Dissolved Solids; Na = Sodium; Cl = Chloride; As = Arsenic; Ba = Barium; Fl = Fluoride; Fe = Iron; Mn = Manganese; Ra-22# = Radium;
Comb. Ra = Combined Radium 226 & 228
NR = No Record Found; ND = Non Detect

🟥 Highlighted value indicates water concentration exceeds Primary MCL for parameter. In all cases, treatment is in place to reduce concentration below the MCL, and routine monitoring is required.

▨ Highlighted value indicates water concentration exceeds Secondary MCL for parameter. In some cases, treatment is in place to reduce concentration below the MCL, and routine monitoring is recommended.

🟧 Highlighted value indicates water concentration for parameter that may be approaching Primary or Secondary MCL or may cause water quality issues. In some cases, treatment is in place to reduce concentration below the MCL, and routine monitoring is recommended.

2.3.1 Well No. 7 Water Treatment Plant (WTP)

The Well No. 7 WTP was constructed in 1993 to provide chemical treatment on water drawn from deep Well No. 7. Chemical treatment includes disinfection with chlorine gas, blended phosphates for corrosion control, and hydrofluosilicic acid for fluoridation. In 1996 the treatment process was expanded to include three vertical cation exchange vessels. Regeneration water from the cation exchange vessels is captured in the below-slab concrete backwash holding tank and then pumped into the sanitary sewer system. Emergency power consists of a 600 kW auto-start diesel generator that can operate Well No. 7 and all process equipment at the WTP. Exhibit No. 2-3 presents a flow diagram depicting Well No. 7 WTP unit processes. Table No. 2-4 provides summary information on Well No. 7 WTP unit processes.

An inventory and audit of each process identified some potential deficiencies or asset management elements that should be considered for the planning period.

- The cation exchange resin was last changed in 2008 after 12 years of service. Another resin change should be scheduled soon as the resin has now been in service for 14 years;
- The chemical feed scales and readers are reaching their service life and should be considered for replacement.

Exhibit No. 2-3: Well No. 7 Water Treatment Plant – TP 04 Process Flow Diagram

Village of Huntley, IL

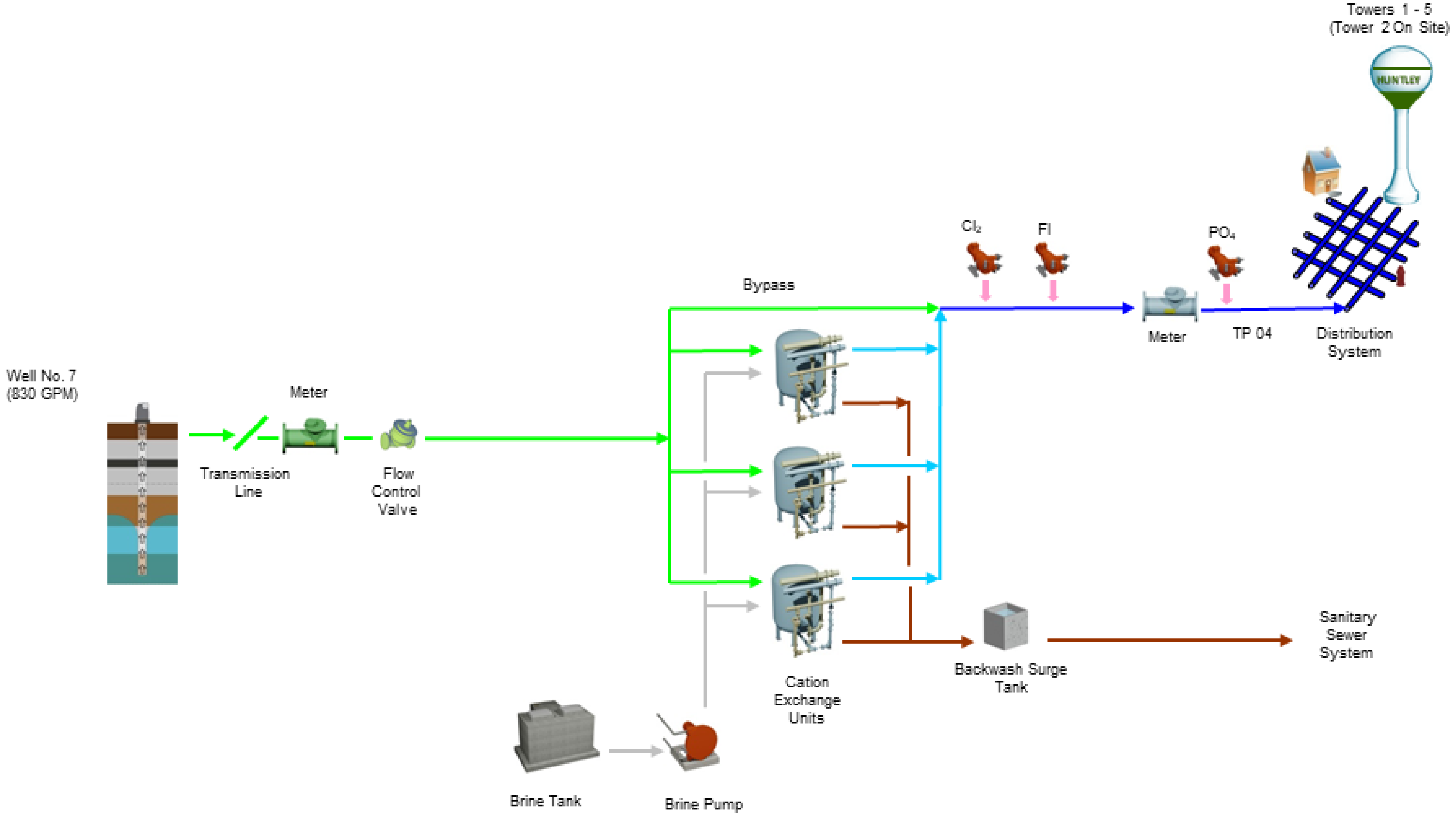


Table No. 2-4: Well No. 7 Water Treatment Plant Unit Process Summary

Village of Huntley, IL

Treatment Application Point No.	Process Unit	Components	Year Installed	Total Years in Operation	Last Modification	Condition	Size	Design Loading Rate[1]	Design Capacity	Comments and Recommendations
Well No. 7 Water Treatment Plant - 13550 IL Route 47										
TP04 - Supply Well No. 7	Cation Exchange (CE)	3 Vertical Pressure Vessels - 12" Gravel, 51" (211 cf) CE Resin	1996	26	2008 - Resin Change	Good	8' Dia x 8' Sidewall Height Each	Surface loading Rate: 4.3 GPM/SF @ 900 GPM	6.5 GPM/SF Max	Softening, Radium and Barium removal
	Backwash Pump	2 ABS Centrifugal Backwash Pumps	2009	13	2009	Good	120 GPM @ 15 FT TDH; 3 HP	N/A	120 GPM	Backwash not metered
	Brine Pump	March Centrifugal Brine Feed Pump	1996	26	UN	Good	82 GPM @ 85 FT TDH; 2 HP	N/A	82 GPM	
	Chlorine Gas Disinfection	Chemical Feed Equipment	1993	29	UN	Good	Dual Cylinder Scale, Booster Pump, Injector, Regulator, and Dual Switchover Valve	N/A	N/A	Added before entering distribution system; Consider new scale
	Hydrofluosilicic Acid	Chemical Feed Equipment	1993	29	UN	Good	1 Day Tank w/Scale; 1 Feed Pump: 1 GPH @ 110 PSI	N/A	N/A	Added before entering distribution system; Consider new scale
	Phosphate	Chemical Feed Equipment	1993	29	UN	Good	1 Day Tank w/Scale; 1 Feed Pump: 1 GPH @ 110 PSI	N/A	N/A	Ortho/Poly blend for corrosion control and sequestering; Added before distribution system; Consider new scale
	Electrical Gear	Motor Control Center	UN	UN	UN	Good	N/A	N/A	N/A	
	Controls	A/B PLC & OIT	UN	UN	2014	Good	N/A	N/A	N/A	1 Main PLC and 1 Softener PLC; New OIT's in 2014
	Emergency Electrical Supply	Diesel Generator	1993	29	UN	Good	600 kW w/Autotransfer Switch	N/A	N/A	Located outside at WTP No. 7 site and operates Well No. 7 and WTP No. 7

Notes:

[1] Design Loading Rates are per IEPA standards and/or published water treatment plant design manuals.

▨ Highlighted cell indicates process has some deficiency or recommended improvements based on audit. Refer to Comments and Recommendations and report text for details.

2.3.2 Well No. 8 Water Treatment Plant (WTP)

The Well No. 8 WTP was constructed in 1997 to treat water from deep Well No. 8. The process treatment train consists of three vertical cation exchange vessels, and chemical treatment includes disinfection with chlorine gas, blended phosphates for corrosion control, and hydrofluosilicic acid for fluoridation. Regeneration water from the cation exchange vessels is captured in the below-slab concrete backwash holding tank and then pumped into a sanitary sewer system that flows to the Lake-In-The-Hills Sanitary District. Emergency power consists of a 500 kW auto-start diesel generator that can operate Well No. 8 and all process equipment at the WTP. Exhibit No. 2-4 presents a flow diagram depicting Well No. 8 WTP unit processes. Table No. 2-5 provides summary information on Well No. 8 WTP unit processes.

An inventory and audit of each process identified some potential deficiencies or asset management elements that should be considered for the planning period.

- The cation exchange resin was last changed in 2017 after 20 years of service. Another resin change should be scheduled following 12 - 15 years of service;
- The chemical feed scales and readers are reaching their service life and should be considered for replacement.

Exhibit No. 2-4: Well No. 8 Water Treatment Plant – TP 05 Process Flow Diagram

Village of Huntley, IL

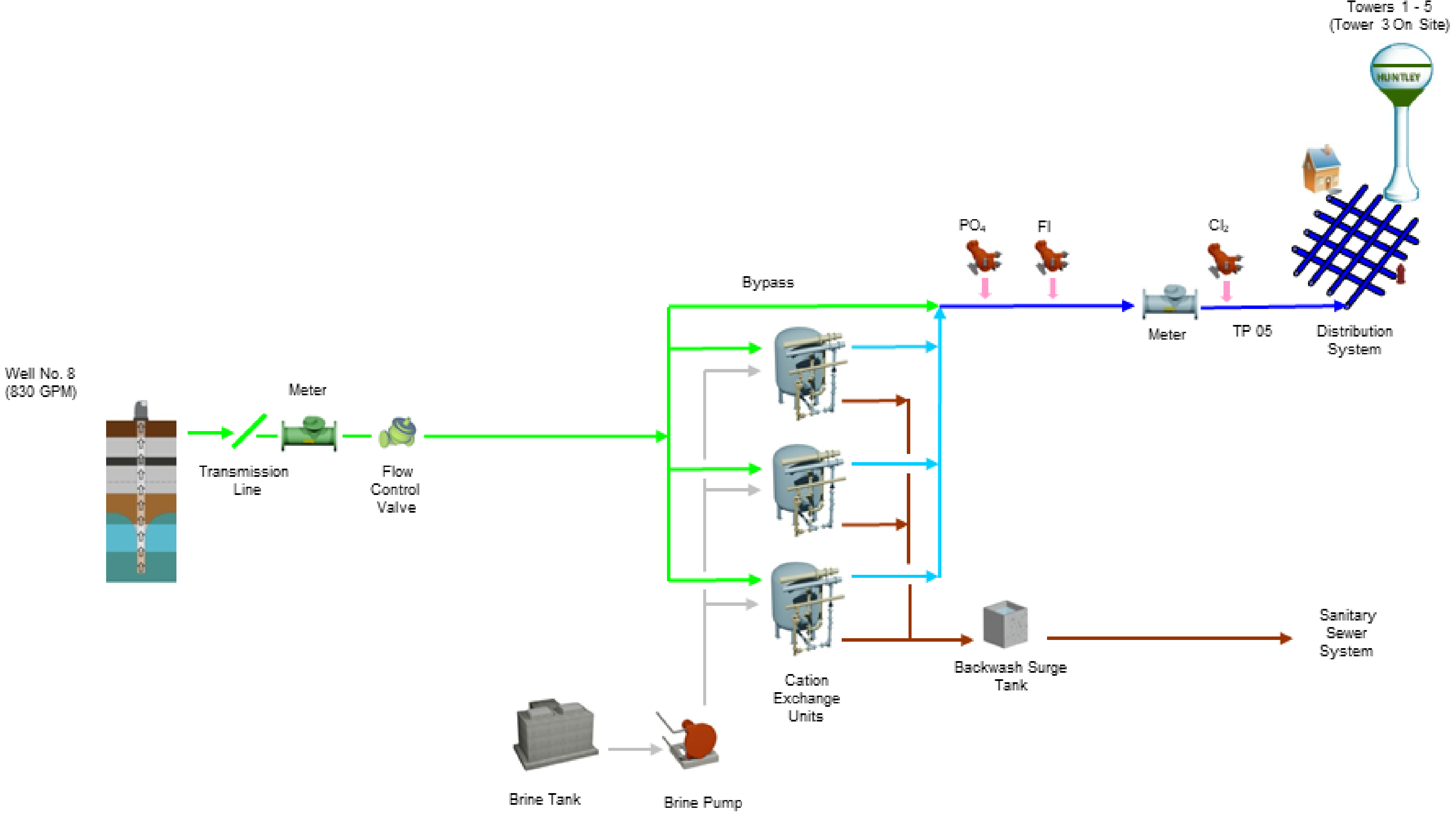


Table No. 2-5: Well No. 8 Water Treatment Plant Unit Process Summary

Village of Huntley, IL

Treatment Application Point No.	Process Unit	Components	Year Installed	Total Years in Operation	Last Modification	Condition	Size	Design Loading Rate[1]	Design Capacity	Comments and Recommendations
Well No. 8 Water Treatment Plant - 9644 Bedford Drive										
TP05 - Supply Well No. 8	Cation Exchange (CE)	3 Vertical Pressure Vessels - 12" Gravel, 48" (211 cf) CE Resin	1997	25	2017 - Resin/Media Change	Good	8' Dia x 8' Sidewall Height Each	Surface loading Rate: 4.3 GPM/SF @ 900 GPM	6.5 GPM/SF Max	Softening, Radium and Barium removal
	Backwash Pumps	2 ABS Centrifugal Backwash Pumps	2010	12	2010	Good	120 GPM @ 15 FT TDH; 3 HP	N/A	UN	Backwash to LITH SD; Meter installed 2022
	Brine Pump	March Centrifugal Brine Feed Pump	1997	25	UN	Good	82 GPM @ 85 FT TDH; 2 HP	N/A	82 GPM	
	Chlorine Gas Disinfection	Chemical Feed Equipment	1997	25	UN	Good	Dual Cylinder Scale, Booster Pump, Injector, Regulator, and Dual Switchover Valve	N/A	N/A	Added before entering distribution system; Consider new scale
	Hydrofluosilicic Acid	Chemical Feed Equipment	1997	25	UN	Good	1 Day Tank w/Scale; 1 Feed Pump: 0.5 GPH @ 100 PSI	N/A	N/A	Added before entering distribution system; Consider new scale
	Phosphate	Chemical Feed Equipment	1997	25	UN	Good	1 Day Tank w/Scale; 1 Feed Pump: 1 GPH @ 110 PSI	N/A	N/A	Ortho/Poly blend for corrosion control and sequestering; Added before distribution system; Consider new scale
	Electrical Gear	Motor Control Center	UN	UN	UN	Good	N/A	N/A	N/A	
	Controls	A/B PLC & OIT	UN	UN	2013	Good	N/A	N/A	N/A	1 Main PLC and 1 Softener PLC; New OIT's in 2013
	Emergency Electrical Supply	Diesel Generator	1997	25	UN	Good	600 kW w/Autotransfer Switch	N/A	N/A	Located outside at WTP No. 8 site and operates Well No. 8 and WTP No. 8

Notes:

[1] Design Loading Rates are per IEPA standards and/or published water treatment plant design manuals.

🟥 Highlighted cell indicates process has some deficiency or recommended improvements based on audit. Refer to Comments and Recommendations and report text for details.

2.3.3 Well No. 9 Water Treatment Plant (WTP)

The Well No. 9 Water Treatment Plant was constructed in 1999 to treat water from deep Well No. 9, which is physically located over one mile south of the WTP. Water from Well No. 9 is pumped through a raw water transmission main to the WTP where it is introduced to pre-chlorine gas treatment, followed by a forced draft aerator for iron oxidation and hydrogen sulfide removal. The water then drops down into a 61,000 gallon detention tank and is re-pressurized by one of two horizontal split-case high service pumps rated for 1,100 GPM each. The high service pumps send the water through three vertical cation exchange vessels. Before entering the system, the water is disinfected with gas chlorine. Blended phosphates are added for corrosion control and hydrofluosilicic acid is added for fluoridation. Regeneration water from the cation exchange vessels is captured in the below-slab concrete backwash holding tank and then gravity flows into the sanitary sewer system. Neither Well No. 9 nor the WTP is fitted with emergency power. Exhibit No. 2-5 presents a flow diagram depicting the treatment process at Well No. 9 WTP. Table No. 2-6 provides additional information on the unit treatment processes.

An inventory and audit of each process identified some potential deficiencies or asset management elements that should be considered for the planning period.

- The aeration media has not been changed in its 23 years of operation; staff should continue to monitor the media and wash or change out as deemed necessary;
- The cation exchange resin was changed out in 2014 after 15 years of operation. The resin should be programmed for a change in another 12-15 years;
- The chemical feed scales and readers are reaching their service life and should be considered for replacement.

Exhibit No. 2-5: Well No. 9 Water Treatment Plant – TP 06 Process Flow Diagram

Village of Huntley, IL

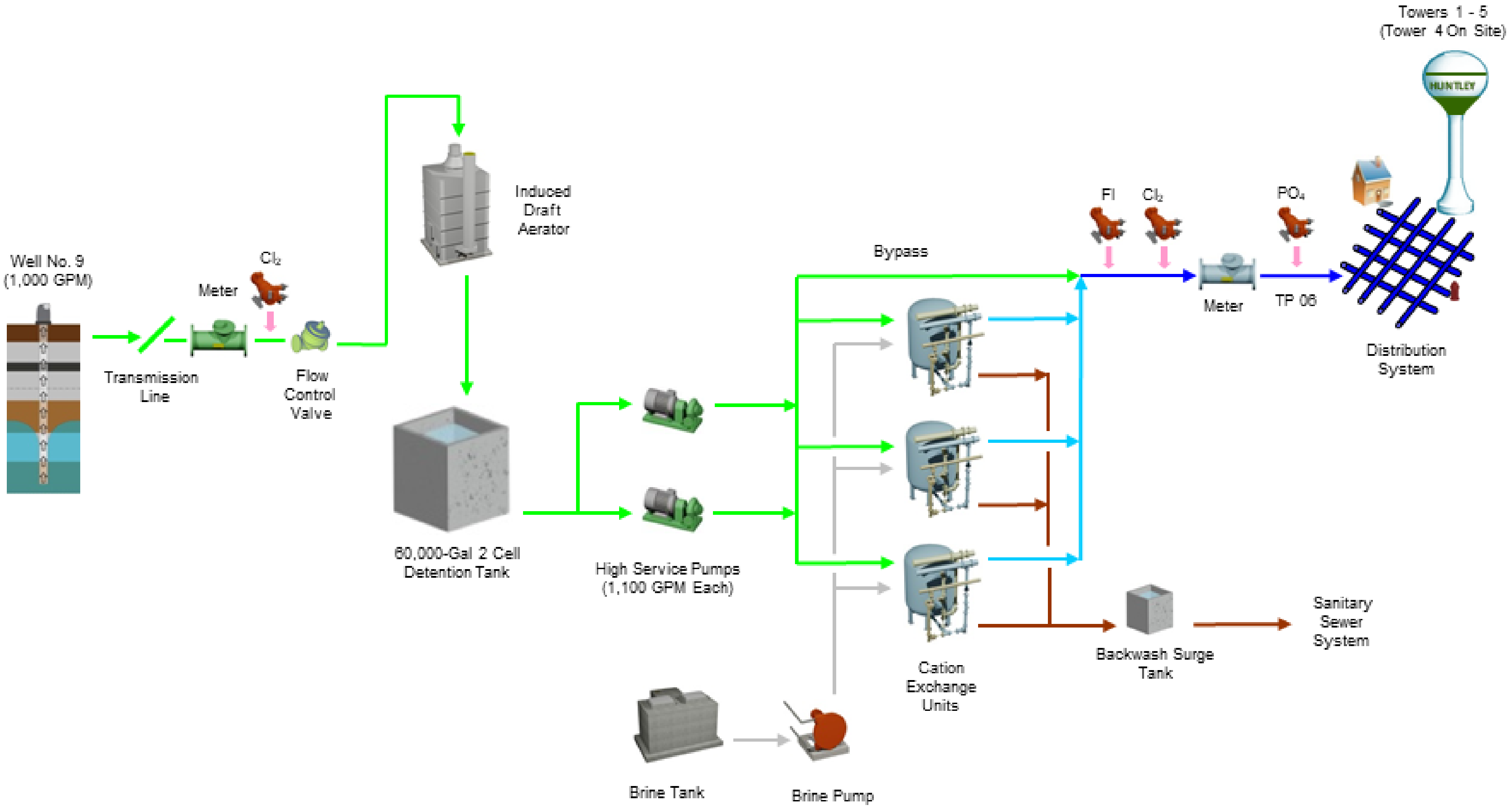


Table No. 2-6: Well No. 9 Water Treatment Plant Unit Process Summary

Village of Huntley, IL

Treatment Application Point No.	Process Unit	Components	Year Installed	Total Years in Operation	Last Modification	Condition	Size	Design Loading Rate[1]	Design Capacity	Comments and Recommendations
Well No. 9 Water Treatment Plant - 12601 Main Street										
TP06 - Supply Well No. 9	Chlorine Gas Disinfection	Chemical Feed Equipment	1999	23	UN	Good	Dual Cylinder Scale, Booster Pump, Injector, Regulator, and Dual Switchover Valve	N/A	N/A	Added prior to Detention Tank to oxidize hydrogen sulfide and iron; Consider new scale
	Aeration	1 Induced Draft Aeration Tower	1999	23	UN	Good	6'-6" W x 8'-6" L x 10'-0" H	N/A	1,000 GPM	For oxidation of hydrogen sulfide and iron; Monitor aerator media
	Detention Tank	Concrete Structure	1999	23	UN	Good	60,000 Gal	N/A	UN	
	High Service Pumps	2 Horizontal Split Case Centrifugal Pumps	1999	23	UN	Good	1,100 GPM @ 190 FT TDH; 75 HP	Firm Capacity 1,100 GPM	3.16 MGD	Across the line starters
	Cation Exchange (CE)	3 Vertical Pressure Vessels - 12" Gravel, 48" (212 cf) CE Resin	1999	23	2014 - Resin Change	Good	8' Dia x 8' Sidewall Height Each	Surface loading Rate: 4.3 GPM/SF @ 900 GPM	6.5 GPM/SF Max	Softening, Radium and Barium removal
	Backwash Tank	Concrete Structure Below Treatment Room Floor	1999	23	UN	Good	26,000 Gal	N/A	UN	Gravity discharge to West WWTF; Backwash not metered
	Brine Pump	March Centrifugal Brine Feed Pump	1999	23	UN	Good	82 GPM @ 85 FT TDH; 2 HP	N/A	82 GPM	
	Chlorine Gas Disinfection	Chemical Feed Equipment	1999	23	UN	Good	Dual Cylinder Scale, Booster Pump, Injector, Regulator, and Dual Switchover Valve	N/A	N/A	Added before entering distribution system; Consider new scale
	Hydrofluosilicic Acid	Chemical Feed Equipment	1999	23	UN	Good	1 Day Tank w/Scale; 1 Feed Pump: 0.5 GPH @ 100 PSI	N/A	N/A	Added before entering distribution system; Consider new scale
	Phosphate	Chemical Feed Equipment	1999	23	UN	Good	1 Day Tank w/Scale; 1 Feed Pump: 1 GPH @ 110 PSI	N/A	N/A	Ortho/Poly blend for corrosion control and sequestering; Added before distribution system; Consider new scale
	Electrical Gear	Motor Control Center	1999	23	UN	Good	N/A	N/A	N/A	
	Controls	A/B PLC & OIT	1999	23	2011	Good	N/A	N/A	N/A	1 Main PLC and 1 Softener PLC; New OIT's in 2011
	Emergency Electrical Supply	None								

Notes:

[1] Design Loading Rates are per IEPA standards and/or published water treatment plant design manuals.

▨ Highlighted cell indicates process has some deficiency or recommended improvements based on audit. Refer to Comments and Recommendations and report text for details.

2.3.4 Well No. 10 Water Treatment Plant (WTP)

Well No. 10 WTP was constructed in 2000 to treat water from deep Well No. 10. The process treatment train consists of pre-chlorine gas to oxidize iron and hydrogen sulfide followed by three vertical cation exchange vessels. Before entering the system, the water is disinfected with gas chlorine, blended phosphates are added for corrosion control, and hydrofluosilicic acid is added for fluoridation. Regeneration water from the cation exchange vessels is captured in the below-slab concrete backwash holding tank and then pumped into the sanitary sewer system. Emergency power consists of a 600 kW auto-start diesel generator that can operate Well No. 10 and all process equipment at the WTP. Exhibit No. 2-6 presents a flow diagram depicting Well No. 10 WTP unit processes. Table No. 2-7 provides summary information on Well No. 10 WTP unit processes.

An inventory and audit of each process identified some potential deficiencies or asset management elements that should be considered for the planning period.

- The cation exchange resin was changed out in 2015 after 15 years of operation. The resin should be programmed for a change in another 12-15 years;
- The chemical feed scales and readers are reaching their service life and should be considered for replacement.

Exhibit No. 2-6: Well No. 10 Water Treatment Plant – TP 07 Process Flow Diagram

Village of Huntley, IL

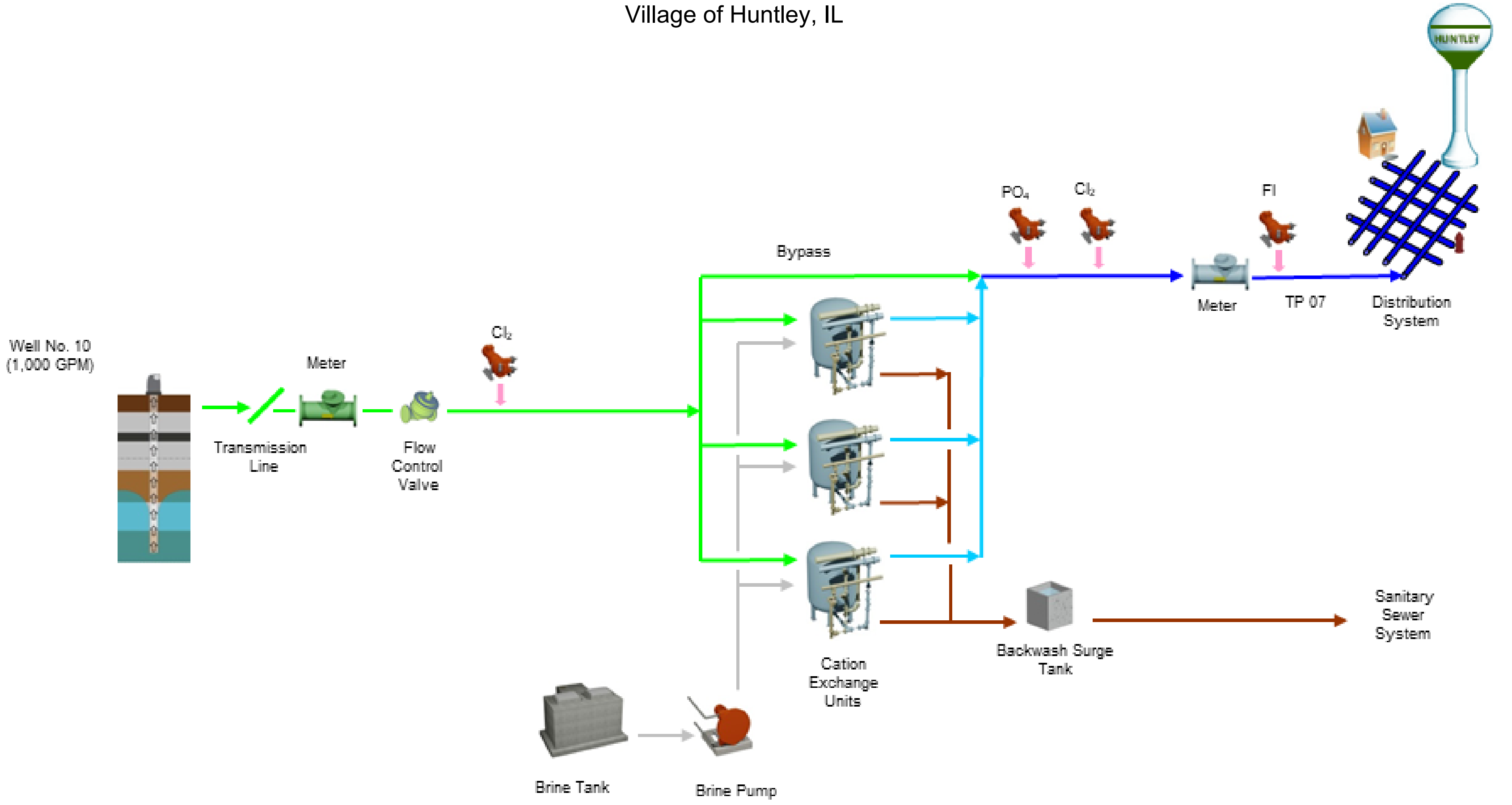


Table No. 2-7: Well No. 10 Water Treatment Plant Unit Process Summary

Village of Huntley, IL

Treatment Application Point No.	Process Unit	Components	Year Installed	Total Years in Operation	Last Modification	Condition	Size	Design Loading Rate[1]	Design Capacity	Comments and Recommendations
Well No. 10 Water Treatment Plant - 10770 Kreutzer Road										
TP07 - Supply Well No. 10	Chlorine Gas Disinfection	Chemical Feed Equipment	2000	22	UN	Good	Single Cylinder Scale, Booster Pump, Injector, Regulator, and Valve	N/A	N/A	Added before Cation Exchange vessels to oxidize hydrogen sulfide and iron; Consider new scale
	Cation Exchange (CE)	3 Vertical Pressure Vessels - 12" Gravel, 48" (212 cf) CE Resin	2000	22	2015 - Resin Change	Good	9' Dia x 8' Sidewall Height Each	Surface loading Rate: 3.8 GPM/SF @ 1000 GPM	6.5 GPM/SF Max	Softening, Radium and Barium removal
	Backwash Pumps	2 Ebara Centrifugal Backwash Pumps	2000	22	UN	Good	140 GPM @ 19 FT TDH; 2 HP	N/A	140 GPM	Backwash not metered
	Brine Pump	March Centrifugal Brine Feed Pump	2000	22	UN	Good	82 GPM @ 85 FT TDH; 2 HP	N/A	82 GPM	
	Chlorine Gas Disinfection	Chemical Feed Equipment	2000	22	UN	Good	Dual Cylinder Scale, Booster Pump, Injector, Regulator, and Dual Switchover Valve	N/A	N/A	Added before entering distribution system; Consider new scale
	Hydrofluosilicic Acid	Chemical Feed Equipment	2000	22	UN	Good	1 Day Tank w/Scale; 1 Feed Pump: 0.42 GPH @ 140 PSI	N/A	N/A	Added before entering distribution system; Consider new scale
	Phosphate	Chemical Feed Equipment	2000	22	UN	Good	1 Day Tank w/Scale; 1 Feed Pump: 1 GPH @ 110 PSI	N/A	N/A	Ortho/Poly blend for corrosion control and sequestering; Added before distribution system; Consider new scale
	Electrical Gear	Motor Control Center	2000	22	UN	Good	N/A	N/A	N/A	
	Controls	A/B PLC & OIT	2000	22	2012	Good	N/A	N/A	N/A	1 Main PLC and 1 Softener PLC; New OIT's in 2012
	Emergency Electrical Supply	Diesel Generator	2000	22	UN	Good	600 kW w/Autotransfer Switch	N/A	N/A	Located outside at WTP No. 10 site and operates Well No. 10 and WTP No. 10

Notes:

[1] Design Loading Rates are per IEPA standards and/or published water treatment plant design manuals.

▨ Highlighted cell indicates process has some deficiency or recommended improvements based on audit. Refer to Comments and Recommendations and report text for details.

2.3.5 Well No. 11 Water Treatment Plant (WTP)

The Well No. 11 Water Treatment Plant was constructed in 2007 to treat water from deep Well No. 11. Water from Well No. 11 is pumped to the WTP where it is introduced to pre-chlorine gas treatment for iron oxidation and hydrogen sulfide removal. The water then drops down into a 57,000 gallon detention tank and is re-pressurized by one of two horizontal split-case high service pumps rated for 1,100 GPM each. The high service pumps send the water through three vertical cation exchange vessels. Before entering the system, the water is disinfected with gas chlorine, blended phosphates are added for corrosion control, and hydrofluosilicic acid is added for fluoridation. Regeneration water from the cation exchange vessels is captured in the below-slab concrete backwash holding tank and then pumped into the sanitary sewer system. Emergency power consists of a 600 kW auto-start diesel generator that can operate Well No. 11 and all process equipment at the WTP. Exhibit No. 2-7 presents a flow diagram depicting the treatment process at Well No. 11 WTP. Table No. 2-8 provides additional information on the unit processes.

An inventory and audit of each process identified some potential deficiencies or asset management elements that should be considered for the planning period.

- The cation exchange resin has not been changed in the WTP's 15 years of operation and should be programmed soon for a change;
- The chemical feed scales and readers are reaching their service life and should be considered for replacement.

Exhibit No. 2-7: Well No. 11 Water Treatment Plant – TP 09 Process Flow Diagram

Village of Huntley, IL

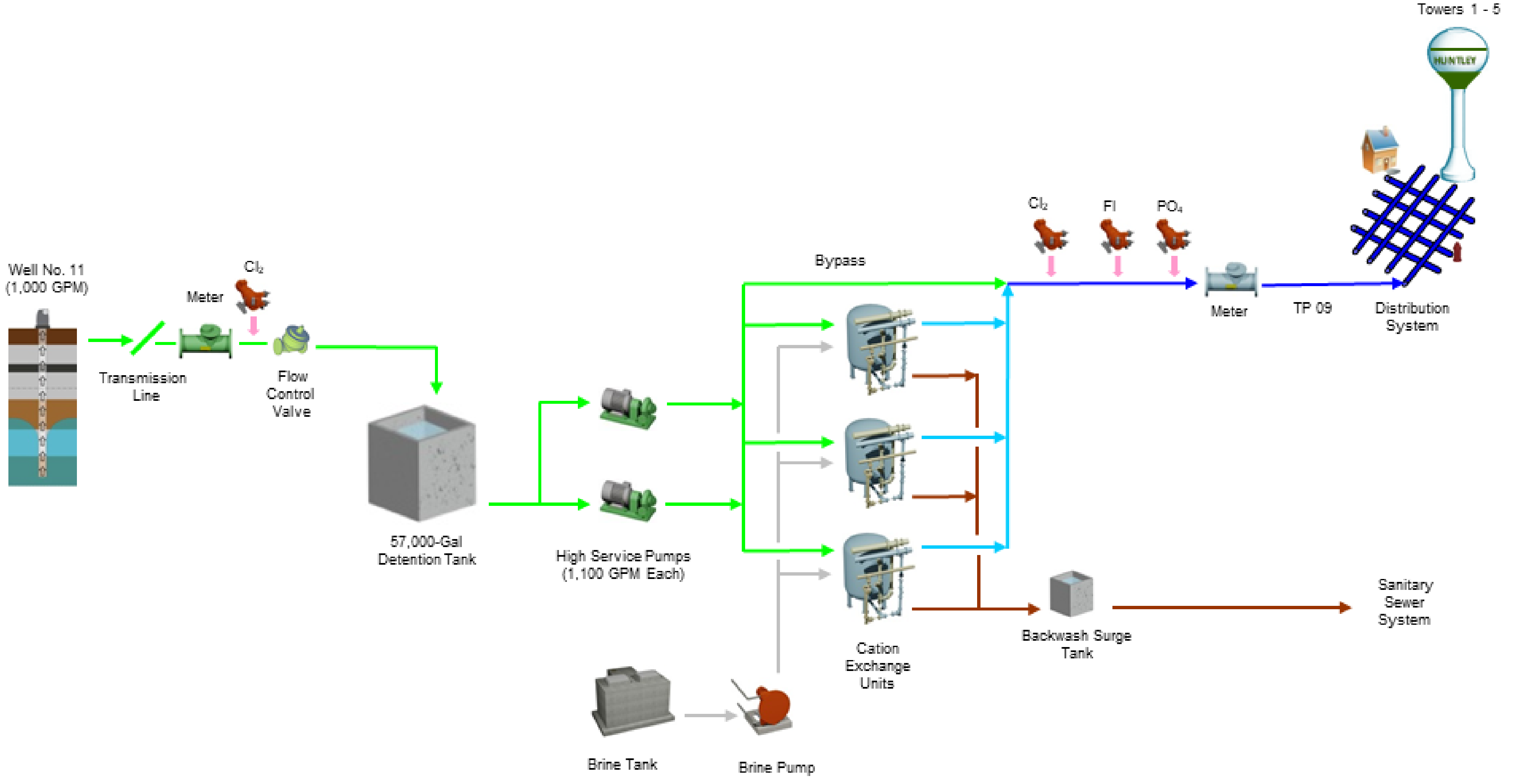


Table No. 2-8: Well No. 11 Water Treatment Plant Unit Process Summary

Village of Huntley, IL

Treatment Application Point No.	Process Unit	Components	Year Installed	Total Years in Operation	Last Modification	Condition	Size	Design Loading Rate[1]	Design Capacity	Comments and Recommendations
Well No. 11 Water Treatment Plant - 9250 S. Union Road										
TP09 - Supply Well No. 11	Chlorine Gas Disinfection	Chemical Feed Equipment	2007	15	UN	Good	Dual Cylinder Scale, Booster Pump, Injector, Regulator, and Dual Switchover Valve	N/A	N/A	Added prior to Detention Tank to oxidize hydrogen sulfide and iron; Consider new scale
	Detention Tank	Concrete Structure	2007	15	UN	Good	57,000 Gal	N/A	UN	
	High Service Pumps	2 Horizontal Split Case Centrifugal Pumps	2007	15	UN	Good	1,100 GPM @ 185 FT TDH; 75 HP	Firm Capacity 1,100 GPM	3.16 MGD	VFD's
	Cation Exchange (CE)	3 Vertical Pressure Vessels - 12" Gravel, 60" (318 cf) CE Resin	2007	15	UN	Good	9' Dia x 9' Sidewall Height Each	Surface loading Rate: 4.5 GPM/SF @ 1,000 GPM	6.7 GPM/SF Max	Softening, Radium and Barium removal
	Backwash Pumps	2 Marathon Motor w/March Wet End Centrifugal Backwash Pumps	2007	15	UN	Good	80 GPM @ 40 FT TDH; 2 HP	N/A	80 GPM	Backwash not metered
	Brine Pump	March Centrifugal Brine Feed Pump	2007	15	UN	Good	125 GPM @ 85 FT TDH; 2 HP (est.)	N/A	125 GPM (est.)	
	Chlorine Gas Disinfection	Chemical Feed Equipment	2007	15	UN	Good	Dual Cylinder Scale, Booster Pump, Injector, Regulator, and Dual Switchover Valve	N/A	N/A	Added before entering distribution system; Consider new scale
	Hydrofluosilicic Acid	Chemical Feed Equipment	2007	15	UN	Good	1 Day Tank w/Scale; 1 Feed Pump: 0.83 GPH @ 250 PSI	N/A	N/A	Added before entering distribution system; Consider new scale
	Phosphate	Chemical Feed Equipment	2007	15	UN	Good	1 Day Tank w/Scale; 1 Feed Pump: 1.75 GPH @ 150 PSI	N/A	N/A	Ortho/Poly blend for corrosion control and sequestering; Added before distribution system; Consider new scale
	Electrical Gear	Motor Control Center	2007	15	UN	Good	N/A	N/A	N/A	
	Controls	A/B PLC & OIT	2007	15	UN	Good	N/A	N/A	N/A	1 PLC for entire WTP
	Emergency Electrical Supply	Diesel Generator	2007	15	UN	Good	600 kW w/Autotransfer Switch	N/A	N/A	Located indoors at WTP No. 11 and operates Well No. 11 and WTP No. 11

Notes:

[1] Design Loading Rates are per IEPA standards and/or published water treatment plant design manuals.

▨ Highlighted cell indicates process has some deficiency or recommended improvements based on audit. Refer to Comments and Recommendations and report text for details.

2.4 Storage

As indicated previously, the Village's Water Department currently maintains 3.317 million gallons of water storage; 3.2 million gallons is contained in elevated storage with spheroid type storage tanks, and 0.117 million gallons is in ground storage detention tanks at two of the WTPs. The water storage components are distributed within one pressure zone, which will be further discussed in Section 2.4.1. Since water demands can be highly variable across the distribution system, a control valve is located at each water tower to regulate the water flow direction and water pressure throughout the system. The Village SCADA system allows programmable and remote operation of the control valves for optimal system performance. Exhibit No. 2-1, presented in Section 2.1, identifies the locations of all of the storage tanks, and Table No. 2-9 on the next page provides the capacity, type of storage, and pertinent elevations for each tank.

2.4.1 Pressure Zone Overview

Pressures and pressure zones directly correspond to the ground elevations and hydraulic grade lines of the Water Works System. If elevated tanks are part of the system, the water level within the tank typically controls the hydraulic grade line. One psi of pressure is equivalent to 2.31 feet of water (i.e., the elevation difference between the tank water level and the ground elevation at any location). Targeted pressure ranges are based on several different standards including AWWA, Ten State Standards, and the USEPA. These ranges are listed in Table No. 2-10.

In areas of variable topography, multiple pressure zones can be created to maintain consistent and adequate pressures throughout the service area and to generally meet the pressure ranges defined in Table No. 2-10. If necessary, booster pump stations and pressure reducing valve stations are placed at pressure zone boundaries to allow transfer of water between the different zones. A booster pump allows water to be transferred from a lower pressure zone to a higher pressure zone. Alternately, a pressure reducing valve allows water to be transferred from a higher pressure zone to a lower pressure zone.

The ground elevations throughout the Huntley planning boundary range from approximately 850 feet (northern limits) to 920 feet (southern and western limits) above mean sea level (MSL). There are isolated areas on the western edge of the Village where the ground elevations peak to 930 feet above MSL. The South Branch of the Kishwaukee River flowing generally east to west through the center of the Village is largely responsible for shaping the local topography, resulting in lower ground elevations in the moderate river valley that spans through the Village center. Towards the north planning area, north of Ackman Road, the surface elevation declines mainly due to the Kishwaukee Creek valley that orients east to west before the confluence with the South Branch of the Kishwaukee River. The southern planning limit is characterized by higher elevations mainly due to the fact that it borders the drainage divide between the Fox River and Kishwaukee River watersheds.

Table No. 2-9: Existing Water Storage Summary

Village of Huntley, IL

Site/ Tank Name	Type	Year Constr.	Capacity (Gallons)	Top of Foundation (Feet)	Headrange (Feet)	Overflow Elevation (Foot)	Comments
Elevated							
1	Elevated/ Spheroid	1970	300,000	895.75	1,008.25 - 1,038.25	1,038.25	Altitude Valve w/Controller; Overcoat in 2012
2	Elevated/ Spheroid	1994	1,000,000	906.50	998.25 - 1,038.25	1,038.25	Located at Well No. 7 Site; Altitude Valve w/Controller; Blasted & Recoated in 2009
3	Elevated/ Spheroid	1997	500,000	874.00	1,000.75 - 1,038.25	1,038.25	Located in Southwind Subdivision at Well No. 8 Site; Altitude Valve w/Controller; Blasted & Recoated in 2013
4	Elevated/ Spheroid	1999	1,000,000	874.00	998.25 - 1,038.25	1,038.25	Located at West WWTF Site (North of Well No. 9 WTP); Altitude Valve w/Controller; Blasted & Recoated in 2011
5	Elevated/ Spheroid	2000	400,000	887.50	1,000.75 - 1,038.25	1,038.25	Located in Wing Pointe Subdivision at Well No. 10 Site; Altitude Valve w/Controller; Blasted & Recoated in 2013
		Subtotal:	**3,200,000**				
Ground							
Well No. 9 Detention Tank	Ground	1999	60,000	862.83	863.83 - 872.67	872.67	
Well No. 11 Detention Tank	Ground	2007	57,000	882.50	883.33 - 893.00	893.25	
		Subtotal:	**117,000**				
		TOTAL:	**3,317,000**				

Notes:
UN = Unknown

Table No. 2-10: Recommended Pressures by AWWA, Ten State Standards, & USEPA

Village of Huntley, IL

Minimum Pressure	20 psi	All ground level points
	35 psi	All points within the distribution system
Maximum Pressure	100 psi	All points within the distribution system
Fire Flow Minimum	20 psi	All points within the distribution system
Ideal Range	50 - 75 psi	Residences
	35 - 60 psi	All points within the distribution system

Given the moderate elevation variances throughout the Village planning area, the Village is able to maintain adequate pressures with one pressure zone. Table No. 2-11 outlines the ground elevations throughout the pressure zone and the associated range of pressures at the corresponding ground elevation; the blue shaded area represents the ideal range of operating pressures (40-80 psi ±) and the corresponding ground elevation. With a max hydraulic grade line at 1,038.25 feet, the ground elevation range for ideal pressures is 910 to 850 feet. As discussed, there are isolated areas currently served by the Village Water Works System that approach 930 feet in elevation. The lighter shaded area on Table No. 2-11 represents the operating pressures between ground elevations of 910 and 930 feet. To maintain minimum ideal pressures in these isolated high ground areas, Village staff maintains the elevated water storage tanks above mid-level such that the water pressure is always above 40 psi. Exhibit No. 2-8 provides the hydraulic profile for the existing overall Water Works System.

Table No. 2-11: Pressure Zone Summary

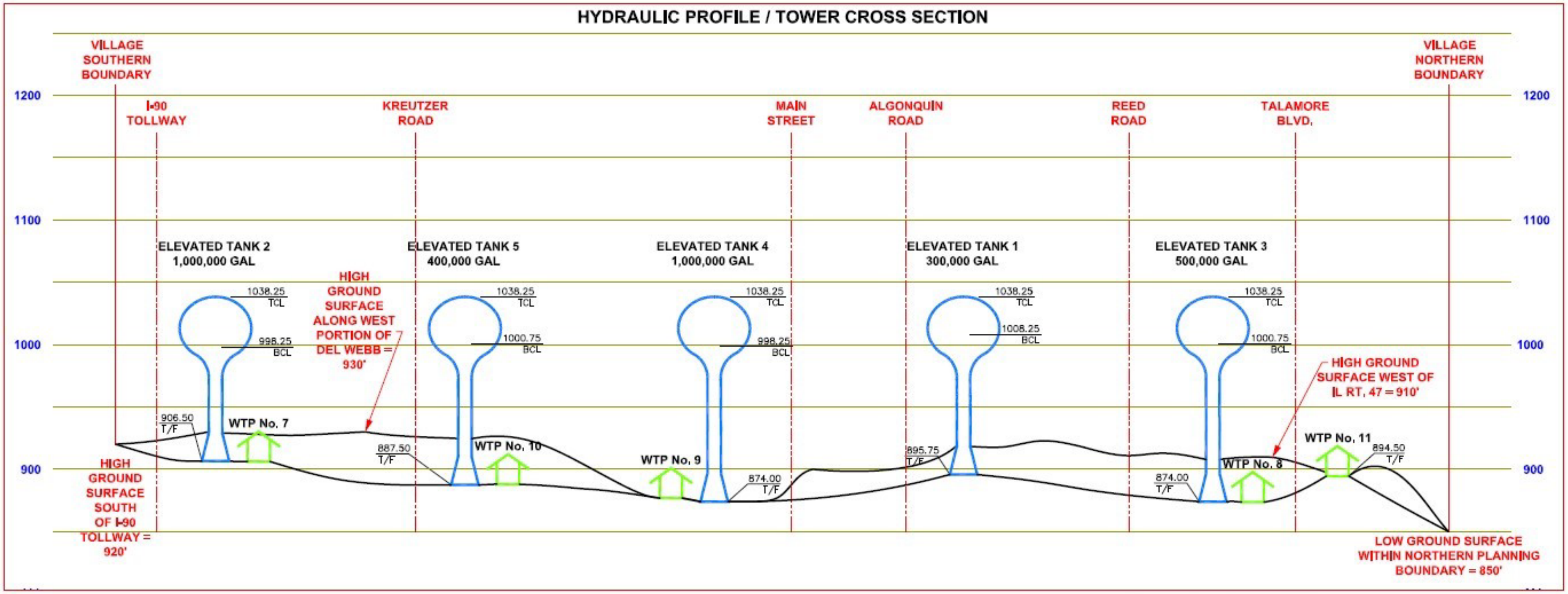
Village of Huntley, IL

	Hydraulic Grade Line			Ground	Static Pressure		
	High (Feet)	Mid (Feet)	Low Design (Feet)	Elevation (Feet)	High (Psi)	Mid (Psi)	Low Design (Psi)
Single Pressure Zone				950	38.2	31.7	20.9
EWST 1 (300,000 Gal)	1038.25	1023.25	1008.25	940	42.5	36.0	25.2
EWST 2 (1,000,000 Gal)	1038.25	1018.25	998.25	930	46.9	40.4	29.6
EWST 3 (500,000 Gal)	1038.25	1019.50	1000.75	920	51.2	44.7	33.9
EWST 4 (1,000,000 Gal)	1038.25	1018.25	998.25	910	55.5	49.0	38.2
EWST 5 (400,000 Gal)	1038.25	1019.50	1000.75	900	59.9	53.4	42.5
				890	64.2	57.7	46.9
				880	68.5	62.0	51.2
				870	72.9	66.4	55.5
				860	77.2	70.7	59.9
				850	81.5	75.0	64.2
				840	85.8	79.3	68.5
				830	90.2	83.7	72.9
				820	94.5	88.0	77.2
				810	98.8	92.3	81.5

Notes:
1) High Hydraulic Grade Line = Tank's TCL
2) Mid Hydraulic Grade Line = (Tank's TCL + Tank's BCL) / 2
3) Low Hydraulic Grade Line = Tank's BCL
4) If a zone has more than 1 tank, the static pressure is calculated at the lowest elevation.
5) The darker blue shaded area represents the ideal range of operating pressures (40-80 psi +/-) and corresponding ground elevation served.
6) The light blue shaded area represents ground surface elevations within the Village's service area that are marginally below ideal range, mainly located along the west edge of Del Webb and south of the Tollway; EWSTs 2 and 5 should always be above midlevel to properly service these areas.

Exhibit No. 2-8: Water Works System Hydraulic Profile

Village of Huntley, IL



LEGEND:

BCL = BOTTOM CAPACITY LINE
GAL – GALLONS
T/F = TOP OF FOUNDATION
TCL = TOP CAPACITY LINE
WTP – WATER TREATMENT PLANT

NOTES: (1) EXHIBIT NOT TO SCALE
(2) EXHIBIT REPRESENTS NORTH/SOUTH CROSS SECTION ALONG IL ROUTE 47

2.5 Distribution

The Village's water distribution system is an interconnected conveyance system that transfers water through approximately 170 miles of piping, ultimately providing water to the public for domestic, commercial, industrial, and fire protection uses. Depending on the well and WTP, either the well pumps or high service pumps pressurize the Water Works System and allow water to move throughout it. Since the system is served by one pressure zone, booster pump stations and pressure reducing valves are not necessary and have not been incorporated.

2.5.1 Water Main Network

The total amount of water main within the system is approximately 170 miles ranging in size from 4” to 16”. According to the Village GIS and staff, the system contains approximately 2,210 fire hydrants and 4,650 valves.

2.5.2 Lake in the Hills Interconnect

An interconnection with one or more separate Water Works Systems can provide for the transfer of water from one system to the next in the event of an emergency due to a localized disturbance or service disruption. The Village of Huntley shares an emergency water supply interconnection with the Village of Lake in the Hills (LITH) for this purpose. The interconnection is located at the Village boundary line along Bordeaux Drive in the Southwind Subdivision. Both Villages maintain and operate a separate valve to open the interconnection. According to the Village of Huntley staff, there is no record of an instance where the interconnection has been opened for emergency use.

A hydraulic analysis was completed to confirm that the hydraulic grade lines of the two systems are in the range that would allow an effective transfer of water that would be mutually beneficial to both systems. The top capacity line (TCL) of the LITH EWSTs in the pressure zone at the interconnection was confirmed with LITH staff to be 1,050 feet above MSL. As previously identified, the TCL in Huntley is 1,038 feet above MSL. With proper coordination, the hydraulic grade lines could be operated such that the transfer of water could be accomplished from one system to the next in the event of an emergency. However, since there is only one interconnection, the beneficiaries of the shared connection will be localized due to difficulties of transferring a single source of water across an entire distribution system. Therefore, as the Village continues to expand its shared borders with other communities, it is recommended that additional water system interconnection opportunities be identified and installed. More interconnections will equate to less vulnerability for its water system.

2.5.3 Historical Water Modeling Efforts

If properly constructed and calibrated, computer-aided hydraulic modeling of a distribution system can help predict the capabilities and pressure pipe flow behaviors under certain conditions such as steady state, extended period simulation and fire flow. Modeling can also be used to analyze the effects of modified or expanded infrastructure along with variable demands in the context of the entire water distribution system or sub-areas.

A water system model was first developed in Huntley using WaterCAD software as part of the 2002 Master Plan. The initial water modeling effort resulted in recommendations for distribution system enhancements including small diameter water main replacement (replace water main below 6” with minimum 8” main) and improvements to correct inadequate areas with fire flow. A full list of the recommended improvements can be found in the 2002 Master Plan and the 2005 Master Plan Update. The Village has implemented a water main replacement program to install improvements in accordance with the recommendations and also plans to continue allocating available resources to advance this initiative.

The water model was updated in 2008 with a focus on the planning area south of I-90. The existing water system water model was converted from WaterCAD to WaterGEMs software and was then updated to include all of the wells, storage facilities and distribution components installed at that time. The model was used to analyze hydraulic behaviors of the system when considering extension of a 12-inch watermain south of I-90 with variable water demands. The conclusions of the model suggested that the existing system with Wells No. 7 – 11 and EWSTs No. 1 – 5 in operation could distribute water through a 12-inch main crossing I-90 with an Average Day Demand of 524 GPM and a Maximum Day Demand of 1,200 GPM in that service area. The sustainable population equivalent of that service area was determined to be 6,800 P.E.

The existing water model was utilized and future alternative scenarios created for this master plan and report, with the same focus of analyzing the planning area south of I-90 using a base WaterCAD model as provided by the Village. The anticipated land usage for the planning area has changed from a mixed residential focus to a more commercial and industrial one with a smaller P.E., which presents a challenge in that it is more difficult to provide service for a smaller demand but also supply the required fire flows and room for growth to the full anticipated usage. A discussion of the water modeling analysis can be found in Section 7.1.

2.6 Water Works and Lift Station SCADA System Overview

The Village of Huntley utilizes a Supervisory Control and Data Acquisition (SCADA) system to monitor the operation of the supply, treatment, storage, and distribution components of the water system. Because they are located remotely, similar to the water system components, the sanitary lift stations are a part of the water system SCADA system as well.

The Water System and Lift Stations in Huntley share a common SCADA radio and server environment. In general, the Water/Lift Station SCADA environment consists of the following major components:

- SCADA Server and Thick Client PC
- Master Telemetry Unit (MTU) (PLC)
- Remote Telemetry Units (RTUs) (PLCs)
- Radio Communication Network

SCADA Server and Client: The Water/Lift SCADA Server is a Virtual Server located on the SCADA Virtual Host Server. The SCADA Software is Wonderware InTouch 2017 Version 3. The SCADA Server is "headless", meaning the operations staff does not interact directly with the SCADA Server during normal operation. A SCADA Thick Client PC is used for operator interface and 24x7 alarming. The Thick Client is a Dell OptiPlex 7070 workstation with Wonderware InTouch Client software and Win-911 Alarm software and a voice-grade telephony card. The Virtual Host Server and Thick Client are both located at the West WWTP. The SCADA server/client allow operations staff to view water and lift station system status and alarms, as well as make setpoint adjustments.

Master Telemetry Unit (MTU): The Water/Lift Station MTU consists of an Allen-Bradley SLC 5/05 Programmable Logic Controller (PLC) and radio located at the West WWTP. This PLC polls the water system and lift station sites sequentially using the serial DF-1 protocol through a radio system. The Wonderware InTouch SCADA Server uses a software I/O driver to provide read/write access to the SCADA data in the MTU PLC.

Remote Telemetry Units (RTUs): Each remote water system and lift station site includes a RTU which has an Allen-Bradley PLC and radio. Most of the RTUs use newer MicroLogix Series PLCs, while some use the older Allen-Bradley SLC series PLCs. The RTU PLCs transmit local data to the MTU over the radio system.

Radio Communication Network: The MTU communicates with the RTUs using a point-to-multipoint, unlicensed 900MHz radio network that is approximately 25 years old. The radios are MDS/GE Model 9810. The communication protocol is serial DF-1. The Well 9 water tower near the West WWTP is used as a repeater point.

SECTION 3: EXISTING WASTEWATER SYSTEM

The Village of Huntley's Wastewater System consists of a wastewater conveyance system (sanitary sewers and lift stations) and two Wastewater Treatment Plants (WWTPs). Both the conveyance system and the WWTPs are in excellent condition, and it is evident that the Village staff takes pride in maintaining the system for its long-term use in the community. The purpose of this section of the report is to inventory the Wastewater System so that any existing deficiencies can be identified. It also will provide the foundation for the discussion of future system expansion.

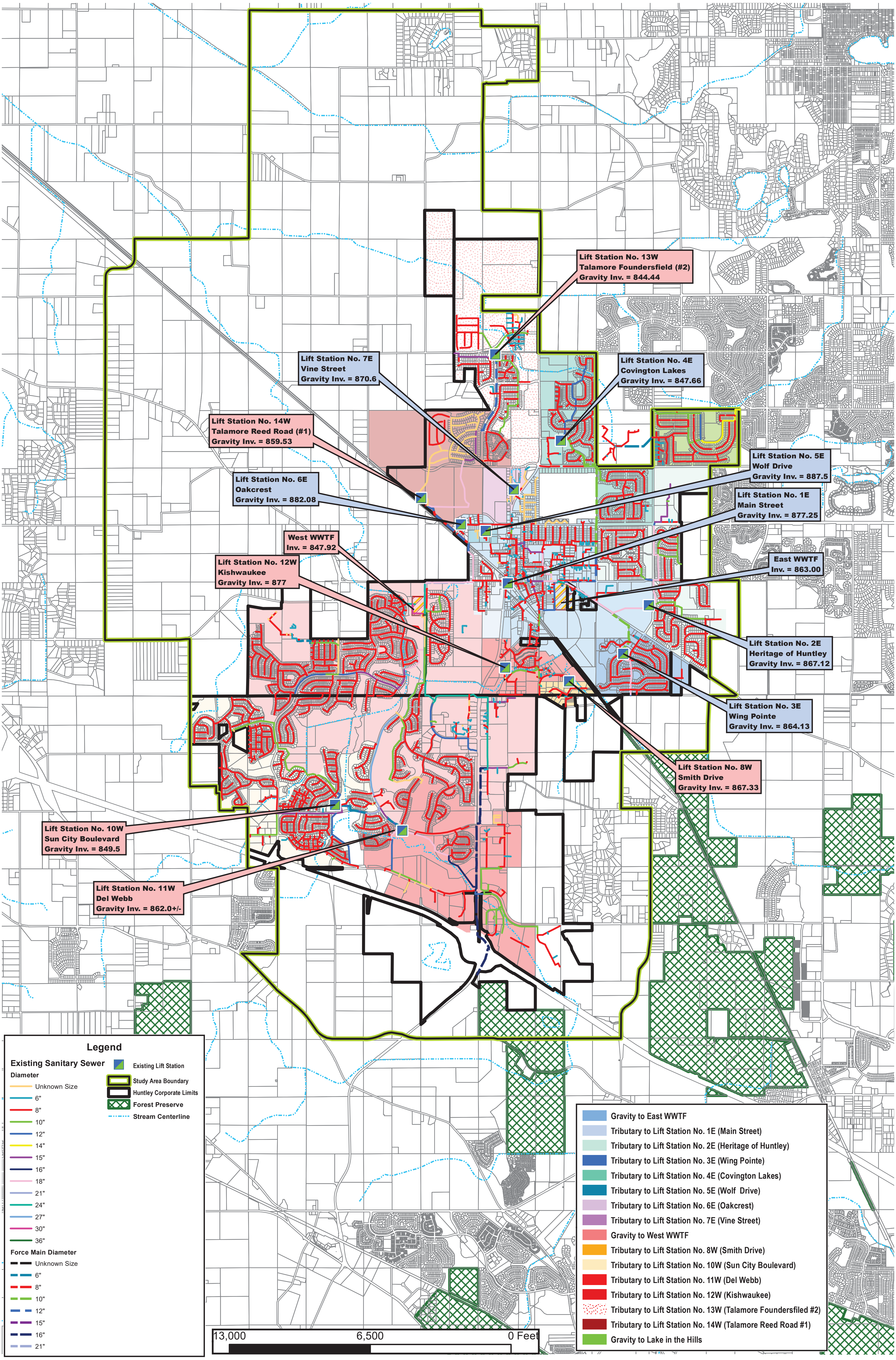
3.1 Overview

The Village of Huntley municipal wastewater collection, conveyance, and treatment system was first installed in the late 1940s. Its first WWTP, now called the East WWTP, was located east of Route 47, just south of the intersection between Main and Bakley Streets. The sanitary sewer system has expanded accordingly with the development of areas within the Village, and the increase in flows has required expansion of the East WWTP several times to its current Design Average Flow (DAF) capacity of 1.8 MGD. As the Village's planning boundaries continued to expand and the limitation of expansion capability at the East WWTP property was in sight, the Village planned for a second WWTP. The West WWTP was constructed in 1999, located west of Route 47 near the southwest corner of the intersection of Main Street and Kreutzer Road, with a DAF capacity of 2.6 MGD.

3.2 Sanitary Sewer System

The Village's sanitary sewer network consists of sanitary sewer conveyance pipes ranging in size from 8" to 36". Most of the original vitrified clay pipe (VCP) network remains in service, but all of the pipe segments have been lined. Given the significant system expansion in the 1990s and 2000s, the majority of the sanitary sewer pipe network is polyvinyl chloride (PVC) pipe. Exhibit No. 3-1 provides an overview of the Village's existing sanitary sewer collection system and includes pipe diameters for currently GIS-identified pipes.

Exhibit No. 3-1 also identifies the service areas tributary to the East WWTP in shades of blue, whereas all of the service areas tributary to the West WWTP are shaded in red. The Southwind Subdivision, where wastewater is transferred to the Lake in the Hills Sanitary District, is shaded in green. The combined service area tributary to the West WWTP is larger than the combined service area tributary to the East WWTP since the West WWTP DAF is greater than that of the East WWTP.



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DATE:	JUNE 2022
PROJECT NO.:	HU2102
BY:	MJT
PATH:	H:\GIS\PUBLIC\HUNTLEYEY\HU2102\
FILE:	HU2102_EXH_3-1_PLANNING SYSTEM.MXD

COMPREHENSIVE WATER AND WASTEWATER SYSTEMS MASTER PLAN

EXHIBIT 3-1
EXISTING COLLECTION SYSTEM

NORTH

While portions of the sanitary sewer network are more than 70 years old, Village staff has reported that the sanitary sewer network is in good condition. The Village follows through on an annual sanitary sewer system maintenance program, which includes jetting, root cutting, and televising portions of the system each year. The Village has rehabilitated old manholes, lined segments of the old VCP, and has been lining manholes in recent years, all of which help reduce the amount of infiltration and inflow (I&I) to the system, demonstrating the Staff's diligence with its annual maintenance and rehabilitation program.

The Village of Huntley sanitary sewer collection and conveyance system utilizes 13 lift stations to convey wastewater where an unimpeded gravity flow, cost-effective route to one of the WWTPs was not an option. The collection system service areas, including the areas tributary to each lift station, are depicted in Exhibit No. 3-1. A summary of each of the lift stations is included in Table No. 3-1. Given the generally flat topography of the Village, it naturally follows that the system contains so many lift stations. All of the lift stations are in good condition. Seven of the lift stations have onsite backup electrical generators, while five have portable generator connection capabilities. One has no backup generator capability at all.

In July 2022, the Jim Dhamer Lift Station (9W), located at Route 47 and Jim Dhamer Drive, was removed. A new 16-inch gravity interceptor (Eakin Creek Interceptor) was installed that collects the associated tributary lift station flow and discharges to an existing 18-inch interceptor located just west of Windy Prairie Drive in Del Webb. The alignment of the 16-inch interceptor roughly parallels Eakin Creek. The 18-inch interceptor flows westward and discharges to Del Webb Lift Station (No. 11W).

3.3 East Wastewater Treatment Plant (WWTP)

An aerial overview of the East WWTP is included in Exhibit No. 3-2. While there are limited records of the original WWTP construction in 1950, it appears that the plant contained an Imhoff tank as the primary treatment process. Trickling filters were added in 1960, and in 1977, with the presumed need to meet lower ammonia discharge standards, rotating biological contactors (RBCs) were added to the plant. In 1988, the plant was expanded to 0.61 MGD, involving the addition of two primary clarifiers, the northwest Orbal configuration oxidation ditch, an additional final clarifier, the filter building, aerobic digestion improvements, and a sludge storage area. In 2000, the plant was expanded to 1.2 MGD, which added the screening building, two (2) Lakeside closed-loop reactor oxidation ditches in the northeast part of the plant, two (2) secondary clarifiers, and a RAS/WAS pump station upgrade.

The plant was expanded to its current capacity of 1.8 MGD and in 2002 and 2007; that two-phase expansion added the west Orbal configuration oxidation ditch, two additional secondary clarifiers, the ultraviolet disinfection system, a dewatered sludge storage pad, and the north garage. In 2017, numerous processes at the plant underwent rehabilitation and an alum chemical feed facility in a standalone building was added for phosphorus removal. In 2023, the ultraviolet disinfection system will be replaced.

Table No. 3-1 Lift Station Inventory

Village of Huntley, Illinois

Lift Station No.	Lift Station Name	Ground Elevation (ft)	Bottom Elevation (ft)	Wet Well Diameter (ft)	Force Main Size (in)	Force Main Length (ft)	Gravity Sewer Inv. (ft)	Gravity Sewer Diam. (in)	Bypass Information	Pump Number	Pump Vendor	TDH (ft)	Pump Rating (gpm)	Year Constructed	Pump Type	Building[e]	Generator[e]	Maintenance[e,j]
Tributary to East WWTF																		
1E	Main Street	889.5	868.43	6	6	281	877.25	6	Bypass is available	1	ABS	27	405	2012	Submersible	No	Yes - Portable	
										2	ABS	27	405					
2E	Heritage of Huntley[b]	893.21	861.61	10	10[a]	113[a]	867.12	18	4" Bypass Connection (Quick Coupling)	1	ABS	27[a]	500[a]	2001	Submersible	No	Yes - On-site	2011 - New Transducer Installed 2013 - New SCADA Antenna 2013 - New Shoe Guide Pump No. 3 2015 - New Floats 2016 & 2017 - 3 New Pumps 2017 - New OIT 2019 - New Impellers for Pumps Nos. 1 & 2 2020 - No VFD 2021 - New Transfer Switch 2022 - New PLC and Impeller for Pump. No. 3
										2	ABS	27[a]	500[a]					
										3	ABS	27	500					
3E	Wing Pointe[c]	885.1	857.33	10	10[a]	2,480[a]	864.13	16	4" Bypass Connection (Quick Coupling)	1	Wemco-Hidrostal E5K-S	47.5[a]	900[a]	2000	Submersible	No	Yes - On-site	2009 - New Backup Floats 2010 - New Impellers for Both Pumps 2014 - New VFD 2020 - No VFD 2021 - New PLC and Transfer Switch
										2	Wemco-Hidrostal E5K-S	47.5[a]	900[a]					
4E	Covington Lakes[d]	875	841.7	10	10[a]	9,400[a]	847.66	12	4" Bypass Connection (Quick Connect Cap)	1	Wemco	98[a]	865[a]	2003	Submersible	Yes	Yes - On-site	2011 - New Backup Floats 2014 - New Impeller for Pump No. 3 2018 - New Impellers for Pumps Nos. 1 & 2 2018 - New OIT
										2	Wemco	98[a]	865[a]					
										3	Wemco	98[a]	865[a]					
5E	Wolf Drive	901[i]	883.5	4	2[a]	262[a]	887.5	6		1	ABS	22.3[a]	30	1999	Submersible	No	Yes - On-site	2009 - Replaced Relays 2017 - New Pumps, Check Valves, Base Elbows, and Guide Rails
										2	ABS	22.3[a]	30					
6E	Oakcrest	895.7	877.5	5	3[a]	281[a]	882.08	6		1	Hydromatic	28[a]	30[a]	2003	Submersible	No	Yes - Portable	2017 - Added SCADA, OIT, PLC, and Transducer
										2	Hydromatic	28[a]	30[a]					
7E	Vine Street	889[i]	867	6	4[a]	206[a]	870.6	6		1	Hydromatic	29[a]	250[a]	1999	Submersible	No	Yes - Portable	
										2	Hydromatic	29[a]	250[a]					
Tributary to West WWTF																		
8W	Smith Drive	877[i]	862.9	5	4	19	867.33	8		1	Flygt	10[a]	125[a]	1992	Submersible	No	No	2015 - New Pumps Nos. 1 & 2, New Floats 2016 - New Valves and Check Valves 2016 - Added SCADA
										2	Flygt	10a	125[a]					
9W	Jim Dhamer	Removed in 2022. Flows divert to new 16" Eakin Creek Interceptor which transports flow to the Del Webb Lift Station (No. 11W)																
10W	Sun City	879[g]	845	10	3	1,191[a]	849.5	12		1	Wemco	43[a]	900	1999	Submersible	No	Yes - Portable	2008 - New Impeller for Pump No. 1 2012 & 2020 - Repaired and Cleaned Check Valves 2020 - New Transducer
										2	Wemco	43[a]	900					
										3	Wemco	43[a]	900					
11W	Del Webb	880[i]	857	8 / 12	6 / 12[a]	250 / 250[a]	862	12		1	Wemco	31 / 45[a]	250	1999	Submersible	No	Yes - Portable	2008 - New Impellers for All Thre Pumps 2009 - New Main Power Breakers 2012 - New OIT
										2	Wemco	31 / 45[a]	250					
										3	Wemco	31 / 45[a]	250					
12W	Kishwaukee	897.6	871	6	6	1,890	877	12		1	Hydromatic	140[a]	400[a]	1992	Submersible	Yes	Yes - On-site	2009 - Pump No. 1 and Backup Pump Total Rebuild 2010 - New Guide Rails 2012 - Retrofit SCADA 2013 - Pump No. 2 Total Rebuild 2015 - New Base Elbows, Guide Shoes, Check Valves, and Valves for Both Pumps 2021 - New Transfer Switch
										2	Hydromatic	140[a]	400[a]					
13W	Talamore Foundersfield (Talamore #2)[h]	877.00	838.00	10	12	4,100	844.44	8 / 12	4" Bypass Connection (Quick Coupling)	1	Wemco	83	1,200	2006	Submersible	Yes	Yes - On-site	2010 - New Impeller Lining and Impeller 2014 - New SCADA Antenna 2019 - New Impeller for Pump No. 2 2021 - Raised SCADA Antenna
										2	Wemco	83	1,200					
14W	Talamore Reed Road (Talamore #1)[h]	873.4	853.93	12 x 7	12	2,838	859.53	8 /12 18?	4" Bypass Connection (Quick Coupling)	1	Wemco	68.5	1,200	2006	Submersible	Yes	Yes - On-site	2011 - Transfer Switch Repair 2013 - Pump No. 1 Total Rebuild 2015 - New Float
										2	Wemco	68.5	1,200					
										3	Future	--	--					

a: Information source - IEPA Construction Permit.

b: Except as otherwise denoted, all information was obtained from Record Drawings for Heritage of Huntley Sanitary Lift Station and Forcemain dated 2/11/02.

c: Except as otherwise denoted, all information was obtained from Record Drawings for Wing Pointe Off-site Sanitary and Water Main Improvements revised 6/7/02.

d: Except as otherwise denoted, all information was obtained from Final Engineering Plans for Covington Lakes Sanitary Pumping Station and Forcemain revised 7/8/02.

e: All Building, Generator, and Maintenance Information provided in the last three columns was obtained from a list of the lift stations provided by the Village.

f: Invert and rim for the Jim Dhamer lift station was obtained from a partial profile and plan provided to EEI by the Village (it did not have a name or date on it).

g: Information was obtained/estimated from Del Webb's Sun City Neighborhood No. 21 plans, Sheet 35.

h: Except as otherwise denoted, information was obtained from Talamore Lift Station plans.

i: Ground elevations were obtained from Google Earth.

j: Maintenance notes: Items such as driveway sealcoating and vactor/cleanout of wet well not included; also if pump is replaced any maintenance done to previous pump removed from history prior to replacement

🟩 Values obtained from Village staff.

WEST WWTF

EAST WWTF

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NO.	DATE	REVISIONS

DATE: MAY 2022
PROJECT NO.: HU2102
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FILE: HU2102_EXH_3-2_WWTF.MXD

COMPREHENSIVE WATER AND WASTEWATER SYSTEMS MASTER PLAN
VILLAGE OF HUNTLEY, ILLINOIS

EXHIBIT 3-2
WWFTS OVERVIEW

3.3.1 NPDES Effluent Requirements

The East WWTP discharges to the Huntley Branch of the Kishwaukee River under the National Pollutant Discharge Elimination System (NPDES) Permit No. IL0029238 which has an expiration date of 1/31/26. A copy of the current NPDES permit for the plant is included in Appendix B. The effluent standards of the plant are consistent with other Northeastern Illinois WWTPs discharging to low flow streams, although the barium effluent limit of 2.0 mg/L is sometimes difficult to meet at this plant. It is a 10/12 plant with the Carbonaceous Biological Oxygen Demand (Five Day CBOD5) effluent limit in mg/L as the former and the Total Suspended Solids (TSS) in mg/L as the latter.

The plant has a seasonal ammonia-nitrogen effluent standard range of 1.1 – 1.4 mg/L as a monthly average. As stated, dissolved oxygen, pH, and fecal coliform standards are typical. The plant recently received a Total Phosphorus effluent standard of 1.0 mg/L with its latest NPDES permit, with a future standard of 0.5 mg/L by 2030. While current nutrient reduction initiatives for point dischargers appear to be primarily focused on Total Phosphorus, Total Nitrogen reduction is also being discussed. While it does not appear a Total Nitrogen effluent standard is imminent, the future potential should be considered when evaluating nutrient removal options at either of their plants.

3.3.2 Current Capacity and Operations

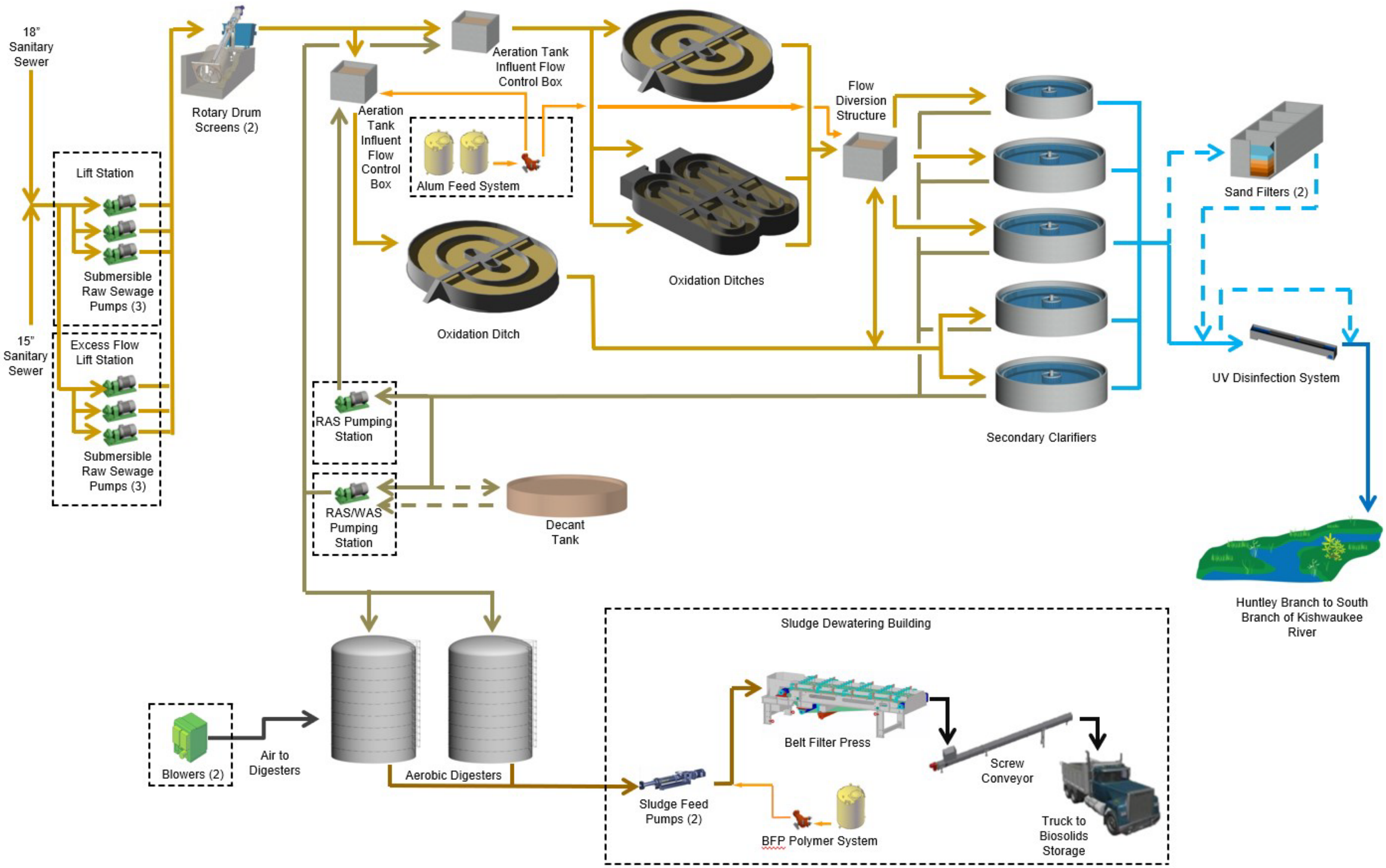
Exhibit No. 3-3 is a process flow diagram of the plant. The East WWTP currently treats approximately 1.1 MGD of wastewater on an average day or 61% of the DAF capacity of 1.8 MGD. The Design Maximum Flow (DMF) is 4.5 MGD and the Peak Hour Flow (PHF) is 5.4 MGD. The East WWTP treatment train consists of fine screens, oxidation ditches, secondary clarification, and ultraviolet disinfection. Alum is fed within the liquid treatment train to aid in the removal of barium and phosphorus from the liquid phase stream to meet the pertinent water quality standards. The plant also contains two (2) rapid sand filter basins, which have been removed from service.

Biosolids treatment consists of waste-activated sludge (WAS) being removed from the liquid train and aerobically digested in two (2) above-ground steel tanks to the Class B stabilization level. The plant has a gravity sludge thickener tank, which is currently not in service. Digested sludge is mechanically dewatered via a belt filter press using polymer addition. Digested, dewatered sludge is stored on-site until disposal via land application.

Expansion of this plant is not expected in the planning time frame due as the wastewater service area tributary to this plant is not expected to generate more flow than the current DAF capacity of the plant. However, current unit process capacity issues or potential future nutrient standards could generate the need to modify the existing facilities and/or add new facilities.

Exhibit No. 3-3: East WWTP Process Flow Diagram

Village of Huntley, IL



The East WWTP is well run and is generally in very good condition. Table No. 3-2 provides a summary of the condition and capacity of each of the unit processes. The oldest unit processes in the plant, which were constructed in the 1988 expansion, are the Excess Flow Raw Sewage Pumps, the Northwest Oxidation Ditch, Secondary Clarifier No. 1, and the East RAS/WAS Pumping Station, the Filter Building, and two the Aerobic Digesters. Other than the sand filter building, all of these 30+ year old unit processes remain in reasonable condition. Ongoing maintenance and some rehabilitation activities are still critical and necessary to the satisfactory operation of the plant.

3.3.3 Plant Issues

There are some issues with the WWTP that need to be resolved. Rehabilitation of some of the aging components of the WWTP is required, such as the aerator shafts and bearings on the oxidation ditches, the valves and piping on the aerobic digesters, and the non-potable water system. There are also electrical upgrades required for Control Building No.1, which is currently not up to current electrical codes.

On a capacity basis, the current raw sewage/effluent flow pump capacities are insufficient to convey the peak hour flow of 5.4 MGD. The Effluent Parshall flume is also insufficient to convey the design maximum flow of 4.5 MGD.

The biosolids treatment train could become more productive by re-introducing WAS thickening. The thickening of WAS helps increase the capacity of the aerobic digesters. Additional capacity in the aerobic digesters allows the belt filter presses to be run more optimally, producing a higher solids cake, which reduces disposal costs. Replacing the existing aging belt filter press with a combination gravity belt thickener/belt filter press would help improve operations.

Future regulatory improvements include modifying the oxidation basis for more stringent total nitrogen effluent limits as well as renovating the existing out-of-service sand filters into tertiary cloth disk filters that will be required to meet the forecasted 2030 total phosphorus effluent limit of 0.5 mg/L.

The next section describes the proposed capital improvements recommended for this plant in more detail.

3.3.4 Proposed Capital Improvements

Recommended improvements are based on a variety of factors, including achieving compliance with new effluent regulations, meeting required capacity, replacing old/obsolete equipment, and upgrading processes to increase efficiency and lower costs. The recommendations are based on visual inspection of the facilities, interviews with plant staff, discussions with equipment vendors, and industry engineering judgment.

Improvements are prioritized on a projected need basis over time. The most critical needs are scheduled for the immediate future (meaning within 5 years), while less vital needs are segmented into future time frames of near future (6 to 15 years), and long term future (16 to 30 years). This organization provides for appropriate capital improvement planning.

The following is a listing of the major recommended improvements with a brief description of each. Unit processes with critical needs are highlighted in red in Table No. 3-2.

1) Oxidation Aerator Bearings and Shafts: The oxidation ditches function by strategically placing mechanical aerators around the ditch to impart oxygen to the activated sludge process and assist with mixing the tanks. These are wearing mechanical components that run 24/7 and are requiring replacement due to the age of the oxidation ditches. The implementation of these improvements is split into two phases: Oxidation Ditch No. 2 within 5 years, and Oxidation Ditch No. 3 within the 6-15 year period.

2) Aerobic Digester Air Piping and Valves: The aerobic digester piping and valves have started to deteriorate and become non-functional. Leaking air lines waste energy. It is proposed to remove and replace all the digester air lines and valves. This improvement is planned for implementation within 5 years.

3) Electrical Control Building No. 1 Improvements: The current WWTP electrical infrastructure is between 20 and 30 years old and is a hodge-podge of various improvement projects over the decades. Control Building No. 1, which houses most of the critical plant electrical controls, is non-compliant with current electrical codes. It is proposed to renovate Control Building No. 1 by removing unused electrical infrastructure and relocating electrical equipment into a code-compliant plant. This improvement is planned for implementation within 5 years.

4) Refurbish Screen No. 2: The raw sewage screens operate in a harsh environment and wear out quicker than most equipment. It is proposed to refurbish the screen with new mechanism and motor. This improvement is planned for implementation within 5 years.

5) Combined Raw Sewage Pumps/Excess Flow Pumps: Three (3) of the combined raw sewage pump/excess flow pumps require immediate refurbishment. It is recommended that these pumps be refurbished by replacing their support elbows, discharge pipes, and guard rails. This improvement is planned for implementation within the next 5 years.

6) Biosolids Thickening and Dewatering Modifications: The existing gravity WAS thickener is undersized and not in service. The existing belt filter press is in good condition but will be approaching the end of its service life in about 10 years.

   It is proposed to demolish the existing gravity thickener and replace (or add) a combination belt filter press that combines a gravity belt thickener with the pressure belt filter press. This modification would allow WAS to be thickened before digestion, as well as dewatering of digested sludge, using the same equipment. This improvement allows for greater operational efficiency, avoids a need for more digester capacity, and reduces sludge disposal costs. This improvement is planned for implementation in the 6-15 year period.

7) Upgrade Non-Potable Water (NPW) System: The non-potable water (NPW) system recycles treated effluent water for use in various plant facilities. The existing NPW pumping system is inefficient, runs nearly constantly, and thus requires new pumps to be installed every few years due to excessive wear and tear. The system would benefit from a thorough hydraulic review of the NPW system and upgrading with a new NPW pump skid to improve operations. This improvement is planned for implementation in the 6-15 year period.

8) Effluent Parshall Flume: The existing Parshall flume does not meet the current rated capacity. Based on the hydraulic profile of the plant, the flow through the UV channel into the Effluent Parshall Flume may be restricted by the current flume size. This restriction may start to occur when peak flows at the plant approach 4.0 MGD.

   It is recommended to monitor effluent flows; as they increase in frequency towards the 4.5 MGD DMF of the plant, the Effluent Parshall flume should be replaced with a larger, higher capacity unit. This improvement is planned for implementation in the 16-26 year period.

9) Modify the Oxidation Ditches for Additional Total Nitrogen Removal: Increasingly stringent total nitrogen effluent limits are on the 10 to 20-year horizon. The East WWTP oxidation ditches can be modified to perform additional total nitrogen removal by changing the location and operation of the aerators to facilitate simultaneous nitrification/denitrification as well as establishing dedicated denitrification anoxic zones. This may also require internal recycling pumps and piping in the ditches to help make the biological processes more efficient. This improvement is planned for implementation in the 16-26 year period.

10) Sand Filters Building Conversion/Phosphorus Removal: The sand filter building currently is not in operation. The WWTP has an excess amount of secondary clarifier capacity and has had no issues meeting the Total Suspended Solids effluent standards (24.0 mg/L daily maximum and the 12.0 mg/L monthly average) nor the current Total Phosphorus effluent standard of 1.0 mg/L due to the use of the alum chemical feed facility.

    If tertiary filtration is deemed necessary in the future, such as when the Total Phosphorus standard of 0.5 mg/L is applied to the plant and the Village cannot meet it with its existing processes, then the sand filter building could be repurposed and placed back into the treatment train. Given the reasonably good condition of the structure, it is likely it can be converted to an alternative filtration process such as disk filters. This improvement is planned for implementation in the 16-26 year period.

TABLE NO. 3-2: EXISTING TREATMENT UNITS CONDITIONS & CAPACITIES - EAST WWTP

Village of Huntley, IL

Treatment Unit	Components	Year Installed	Total Years in Operation	Last Modification	Condition	Size	Design Loading Rate - IEPA Standards	Design Avg Capacity*/PHF (MGD)	Comments and Recommendations
Headworks	Raw Sewage Pumps	2000	22	2022 - Impellers Replaced	OK	3 @800 gpm	Meet PHF w/ Largest Out	2.30 / 5.33** (All Raw Sewage Pumps work together as one Pump Station)	Undersized for PHF of 5.4 MGD w/ Largest Out of Service** Consider upsizing all pumps to 900 gpm and reconfiguring lift station piping.
	Excess Flow Raw Sewage Pumps	1988	34	2002 - 3 Pumps Replaced	OK	3 @700 gpm			
	Manually-Cleaned Bypass Bar Rack Screens	2000	22	N/A	OK	1.25-inch Clear Spacing	-	1.33	Consider Continued Service
	Rotary Drum Screens - 2 Lakeside Rotomat Screens	2000	22	2017 - Rebuilt Screen	OK	7 mm Openings (1/4-inch)	< 2.5 ft/s at PHF	2.67 (1.33 Ea)	Consider Continued Service
		2002	20	2008 - Rebuilt Screen & Valves	OK	7 mm Openings (1/4-inch)			
Oxidation Ditches	Oxidation Ditch No. 1 (Northwest) - Envirex 2-Ring Orbal	1988	34	2019 - New Disc	Good	30,700 ft^3	24 hr HRT @DAF	1.82	Generally Only Used to Hold Excess Flows
	Oxidation Ditch No. 2 (Northeast - 2) - Lakeside Closed Loop Reactors	2000	22	2017 - New DO/ORP Probes, Rotating Plate Weirs, Aerator Motors w/VFDs, and Gear Box	Good	140,800 ft^3	24 hr HRT @DAF		Consider Continued Service
	Oxidation Ditch No. 3 (West) - Envirex 2-Ring Orbal	2002	20	2017 - New Aerator Motors w/VFDs and DO Probe	Good	72,000 ft^3	24 hr HRT @DAF		Consider Continued Service
Secondary Clarification	Secondary Clarifier No. 1	1988	34	N/A	OK	1,257 ft^3 (40' Dia - 15'-4" SWD)	1,000 gal/ft^2/d @PHF (w/ Tertiary Filters; 600 gal/ft^2/d @PHF w/o Tertiary Filters)	2.91	Not Req'd for IEPA Standards; Consider Alternate Use
	Secondary Clarifiers Nos. 2 and 3	2000	22	N/A	Good	6,637 ft^3 (65' Dia - 15'-4" SWD)	1,000 gal/ft^2/d @PHF (w/ Tertiary Filters; 600 gal/ft^2/d @PHF w/o Tertiary Filters)		Consider Continued Service
	Secondary Clarifiers Nos. 4 and 5	2002	20	N/A	Good	6,637 ft^3 (65' Dia - 15'-4" SWD)	1,000 gal/ft^2/d @PHF (w/ Tertiary Filters; 600 gal/ft^2/d @PHF w/o Tertiary Filters)		Consider Continued Service
RAS/WAS Pumping	West RAS Pump Station - 2 Submersible Pumps	2002	20	2020 - New Pumps, Check Valves, and Isolation Valves	Good	2 @510 gpm	100% DAF w/ Largest Out	2.26***	Consider Continued Service
	East RAS/WAS Pump Station 2 RAS Subm. Pumps 2 WAS Subm. Pumps	1988	34	2021 - New Pumps, Check Valves, and Isolation Valves	OK	2 @550 gpm (RAS Pumps) 2 @350 gpm (WAS Pumps)	100% DAF w/ Largest Out		Consider Continued Service
Sand Filters	Two Filter Bays	1988	34	2002 - New Bridges and Equipment	Poor	2 @180 SF	5 gpm/sf @ PHF w/ Largest Out	1.30	Out of Service
UV Disinfection	Two Channels - 3 UV Banks Ea. Channel	2000	22		Good	1 Channel @ 4.5 MGD	100% PHF	2.40	Replacement with Wedeco Duron UV in 2022-2023
Effluent Parshall Flume	One Flume w/ ULT	2000	22	N/A	Good	12-inches Throat Width	100% PHF	1.50****	Consider Replacing with 18-inch Flume
Sludge Decant Tank	One Tank	2002	20	N/A	OK	22' Dia - 12'-6" SWD	--	--	Operationally Limited; Consider Alternate Use
Aerobic Digesters	Aerobic Digester No. 1	1988	34	2012 - New Domes 2014 - New Diffusers	Good	44,179 ft^3 (50' Dia - 22'-6" SWD)	3.0 ft^3/P.E. (+ 25% VOL) (No Mech. Thickening)	1.88	Consider Continued Service
	Aerobic Digester No. 2	1988	34	2012 - New Domes 2014 - New Diffusers	Good	31,172 ft^3 (42' Dia - 22'-6" SWD)	3.0 ft^3/P.E. (+ 25% VOL) (No Mech. Thickening)		Consider Continued Service
Blowers	Two Positive Displacement Blowers	2013	9	N/A	Good	2 @1,208 scfm	30 cfm / 1,000 ft^3 w/ Largest Out	0.96	Does Not Meet IEPA Regs, but Capacity Sufficient for Needs
Sludge Dewatering	One Belt Filter Press w/2 PC Feed Pumps, Polymer Feed System, and Discharge Conveyor	2000	22	2016 - New PLC in Press Control Panel 2019 - Feed Pump #1 Rebuilt	Good	1.5 Meter Press	--	1.80*****	Consider Continued Service
Sludge Storage	Sludge Storage Building	2000	22	N/A	Good	38,220 ft3 (65' x 105' x 5.6')	150 days storage	1.80******	Consider Continued Service
Alum Feed System	Pump Skid w/2 Metering Pumps; 2 Chem. Storage Tanks	2017	5	N/A	Good	2 @15.6 GPH 2 @2,000 Gal Tanks	32 days storage	1.80	Consider Continued Service

Notes:

WWTF Design Average Flow Capacity = 1.80 MGD; Design Maximum Flow (DMF) = 4.5 MGD; Peak Hourly Flow (PHF) = 5.40 MGD

* Design Average Flow (DAF) = Peak Hydraulic Flow (PHF) / 3.0 when PHF is Design Parameter

** 1.15 MGD DAF Capacity Each With Largest Out in Each of the Two Raw Pump Stations. PHF pumping capacity calculated using two (2) pumps at 800 gpm and three (3) 700 gpm pumps.

*** 1.52 MGD DAF Capacity With Largest Out in Each of the Two RAS Pump Stations

**** Effluent Parshall Flume May Flood UV When Flows Exceed 4.5 MGD Due to Plant Hydraulics (1.44 ft Depth Available Upstream of Flume)

***** Based on Processing 19,060 GPD of Sludge from Digesters and Dewatering 5 Days/Wk (1% Solids from Digesters and Dewatering to 15%)

****** Based on Dewatering 5 Days/Wk and Producing 357 CF/Day

XXX Red Text Indicates Unit Process Is Operationally and Regulatory Deficient Or Is No Longer In Use

▨ Highlighted Unit Processes are Unit Processes With Critical Needs

A summary of the Proposed Improvements for the East WWTP is as follows in order of need:

1. Replace bearings and aerator shafts on Oxidation Ditches Nos. 2 and 3.
2. Replace Aerobic Digester Air Piping and Valves.
3. Control Building No. 1 Electrical Improvements
4. Refurbish Screen No. 2
5. Refurbish Raw Sewage Pumps/Excess Flow Pumps
6. Biosolids Thickening and Dewatering Modifications.
7. Upgrade Non-Potable Water System and Remove Clarifier No. 1 Dome.
8. Moyno Pump Replacements
9. Modify the Oxidation Ditches for Additional Total Nitrogen Removal
10. Sand Filter Conversion/Phosphorus Removal
11. Upgrade Effluent Parshall Flume

3.4 West Wastewater Treatment Plant (WWTP)

The West WWTP was constructed in 1998 and improved through subsequent phases; Phase 1 (original construction), provided a DAF capacity of 0.65 MGD and included the 24” diameter influent sewer, influent lift station, northern screening structure, Oxidation Ditch No. 1 (northern oxidation ditch), Secondary Clarifiers No. 1 and 2 (northernmost clarifiers), Sand Filter Building A (northern sand filter building), the UV Disinfection system and the Effluent Parshall flume. The biosolids management approach in Phase 1 included the use of the outer ring of the three-ring oxidation ditch for aerobic digestion, sludge dewatering with a belt filter press, and biosolids storage on a concrete pad. The current Administration/Laboratory building, which also included the blowers for the aerobic digestion process and the belt filter press, was constructed as part of Phase 1.

The Phase 2 improvements, which were completed in 2001, added Oxidation Ditch No. 2 (middle ditch) and Secondary Clarifier No. 3. Excess capacity in the other treatment processes that were constructed as part of Phase 1 allowed the plant to be rated for a DAF of 1.6 MGD.

The Phase 3 improvements, which were completed in 2006, expanded the plant to a DAF of 2.6 MGD and a DMF capacity of 6.5 MGD. They included the construction of Raw Sewage Pump Station No. 2, the second screening building, the two-ring Oxidation Ditch No. 3 (southern oxidation ditch), and Secondary Clarifiers Nos. 3 – 5, Sand Filter Building B, and additional UV disinfection capacity. The alum chemical feed building was installed as part of this phase due to the addition of a Total Phosphorus standard of 1.0 mg/L to the NPDES permit of that time. A new bank of aerobic digesters was installed along with a new building that housed a new gravity belt thickener and new blowers. Finally, the sludge storage pad was expanded to increase the biosolids storage capacity of the plant.

3.4.1 NPDES Effluent Requirements

The West WWTP is permitted to discharge to the South Branch of the Kishwaukee River under the National Pollutant Discharge Elimination System (NPDES) Permit No. IL0070688 with an expiration date of 07/31/2025. A copy of the current NPDES permit for the plant is included in Appendix B. The WWTP only discharges during a portion of the year because the effluent from the plant is land-applied throughout the Del Webb Community during the growing season (April – October).

Consistent with the East WWTP, the West WWTP has a CBOD5/TSS effluent daily maximum limit of 20/24 mg/L with a 10/12 mg/L effluent monthly effluent. The seasonal Ammonia-Nitrogen effluent standards range from 1.0 – 1.5 mg/L as a monthly average, and a monthly Total Phosphorus effluent standard of 1.0 mg/L. The dissolved oxygen, pH, and fecal coliform standards are also typical.

The total phosphorus limit will be reduced to 0.5 mg/L in 2030. However, the NDPES permit has certain qualifiers that could push the limit to 2035. Also, the upcoming NARP (Nutrient Assessment Reduction Plan) due in 2024 could impact that limit as well. Recommended improvements for meeting the 0.5 mg/L effluent limit will be scheduled around the 2030 – 2035 time frame as described herein.

3.4.2 Current Capacity and Operations

An aerial overview of the West WWTP is included in Exhibit No. 3-2, and Exhibit No. 3-4 shows a process flow diagram of the plant. The West WWTP currently treats approximately 1.2 MGD of wastewater on an average day or about 46% of its DAF of 2.6 MGD. Its treatment train consists of screening, oxidation ditches, secondary clarification, filtration, and ultraviolet disinfection. Alum is fed to aid in the removal of barium and phosphorus from the liquid phase stream to meet the pertinent water quality standards.

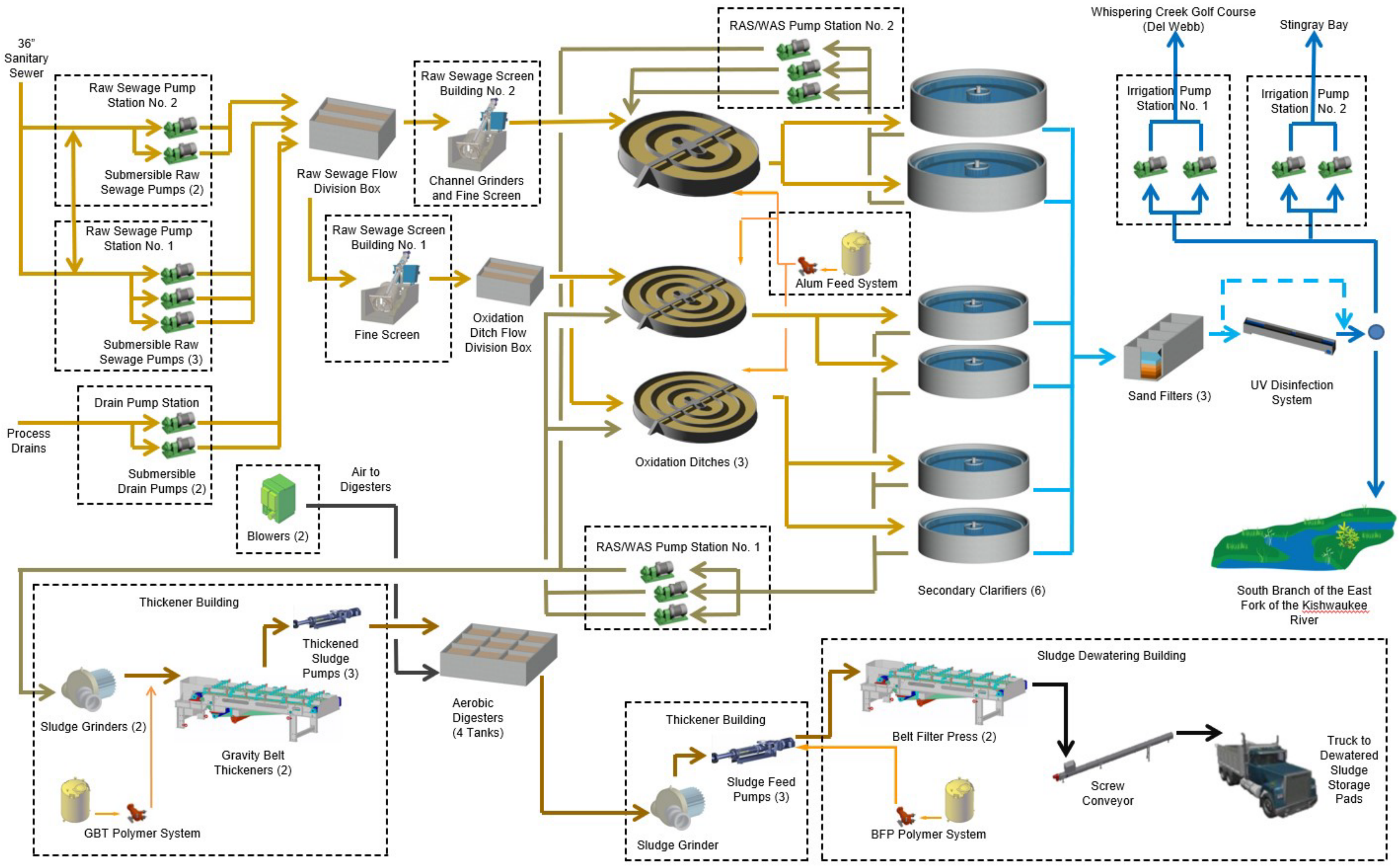
The biosolids treatment train consists of thickening with gravity belt thickeners, aerobic digestion, and mechanical dewatering with the use of a belt filter press. Dewatered sludge is stored on-site and disposed of via land application.

Based on the flows from current and future tributary areas to the West WWTP forecasted in Section 4, it is likely that this plant could require expansion towards the end of the planning period (circa 2050). Due to the uncertain nature of forecasting flows over a long period, no plans for a plant expansion are required at this time. In particular, development in the Village's Southern Service area is expected to increase flows over time but not sufficiently enough to require expansion of the WWTP.

The West WWTP is well run and is also in very good condition. Table No. 3-3 provides a summary of the condition and capability of existing West WWTP treatment units. There are recommended improvements that will aid in the efficient long-term operation of the plant as the oldest components are 24 years old and are organized by priority.

Exhibit No. 3-4: West WWTP Process Flow Diagram

Village of Huntley, IL



3.4.3 Plant Issues

One issue is drainage of the oxidation ditches which is currently limited by the capacity of the Drain Pumping Station. This station receives flow from all process drains, including the oxidation ditches, but the pumping capacity is limited such that it can take days to fully drain the oxidation ditches. Oxidation ditch drainage times can be significantly increased by rerouting the oxidation ditch drain piping to a raw sewage pump station.

The operation of the existing aerobic digesters is limited by manual control of the dissolved oxygen levels within each digester. The process can be significantly improved by adding dissolved oxygen probes within each of the four digester structures, connecting the probes to the digester control system, and automating the blower output to optimize the digester operation. An automated process would reduce electricity costs, improve biosolids digestion and reduce biosolids disposal costs.

The second raw sewage screen installed at the plant has been an ongoing maintenance issue and its longevity is in question. Staff has reported they can keep the screen operational for a short period but plans should be made as soon as possible. Additionally, the comminutor portion of the screen has a high headloss that has caused the influent channel to overflow during periods of high flows.

As previously stated, the Administration/Laboratory/Sludge Dewatering/Blower building was constructed as part of Phase 1 of the plant. While the Phase 3 Improvements gave the staff additional room with the removal of the blowers, there is still just one bathroom and shower that is insufficient for staff needs and also may be non-compliant regarding ADA and gender utilization. It should be noted that the existing facilities are not just utilized for the West WWTP but also for the operation of WTP No. 9.

While the Administration/Laboratory portion of this building was sufficient for the initial operation of the plant, the staff needs will outgrow its current size and necessitate larger working spaces. In addition, there currently is no weather-protected space for the staff to work on vehicles and equipment. Construction of a new Garage building is thus recommended to accommodate these needs for the immediate future and an Administration/Lab building is recommended for the latter half of the planning period.

Finally, two lingering issues have been the operation of the non-potable water system and oxidation ditches. The bladders on the storage tanks of the non-potable system have failed multiple times, and the entire system would benefit from an upgrade. Also, the DO/ORP probe replacement for Oxidation Ditch No. 3 was slated to be a part of the improvements in 2018 but was omitted due to budget issues; updating the DO and ORP probes is still necessary and should be completed within the next 5 years.

While the majority of the unit processes at the plant have a capacity that is larger than the plant's rated DAF capacity of 2.6 MGD, some unit processes have a capacity lower than 2.6 MGD. Inspection of Table No. 3-3 shows there are three unit processes highlighted in red. In general, all of the biosolids treatment train unit processes will need to be upgraded as flows increase toward the DAF capacity of the plant. Sludge storage will require expansion in the immediate future as average daily flows exceed 1.53 MGD. Additional aerobic digesters and blowers will need to be installed as the plant approaches average daily flows of 1.76 MGD.

These needs are less critical and are geared more toward the latter part of the planning period when flows or regulation may require changes to the WWTP processes: A third pump should be added to Raw Sewage Pump Station No. 2, and a second filter should be added to the Sand Filter Building B for phosphorus removal, and modifications to the Oxidation Ditches for Total Nitrogen removal, similar to the East WWTP.

3.4.4 Proposed Capital Improvements

Recommended improvements are based on a variety of factors, including achieving compliance with new effluent regulations, meeting required capacity, replacing old/obsolete equipment, and upgrading processes to increase efficiency and lower costs. The recommendations are based on visual inspection of the facilities, interviews with plant staff, discussions with equipment vendors, and industry engineering judgment.

Improvements are prioritized on a projected need basis over time. The most critical needs are scheduled for the immediate future (meaning within 5 years), while less vital needs are segmented into future time frames of near future (6 to 15 years) and long term (16 to 30 years). This organization provides for appropriate capital improvement planning.

The following is a listing of the major recommended improvements with a brief description of each. Unit processes with critical needs are highlighted in red in Table No. 3-3.

1) Automated Aerobic Digester Controls: To improve digester process control and efficiency, new dissolved oxygen probes will be added along with an automated control system to regulate blower output according to actual proceed needs. This improvement will improve operations and reduce costs. This improvement is planned for implementation within the next five years.

2) Replace/Upgrade Comminutor/Screen: Replace the existing screen, which is at the end of its service life and nearing failure, with a similar or alternative screen. Remove the comminutor to reduce the headloss issues that cause occasional flooding. This improvement is planned for implementation within the next five years.

3) Rehabilitate Non-Potable Water (NPW) System: The non-potable water (NPW) system recycles treated effluent water for use in various plant facilities. The existing NPW pumping system is inefficient and requires new pumps and bladder tanks.

   The system would benefit from a thorough hydraulic review of the NPW system and upgrading with new NPW pumps and bladders tanks to improve operations and reduce energy usage. This improvement is planned for implementation within the next five years.

4) New Garage: There is inadequate storage for equipment and vehicles at the West WWTP. Currently, equipment and vehicles are stored all over the plant site, which is inefficient for operations and does not

allow for adequate maintenance. A new garage is proposed to allow for vehicle and equipment storage and maintenance. This improvement is planned for implementation within the next five years.

5) Replace the DO/ORP Probes in Oxidation Ditch No. 3: The DO/ORP probes help control the activated sludge process as well as biological phosphorus removal. The existing probes are past their service life and should have been replaced in 2018. Recommend replacing all DO/ORP probes with an updated version in the oxidation ditches. This improvement is planned for implementation within the next five years.

6) Digester Diffusers Replacement: The diffusers distribute air within the digesters for treatment. These perforated rubber disks wear out and must be replaced. Otherwise, the airflow and distribution into the digesters become harder to control and energy is wasted This improvement is planned for implementation within the next five years.

7) Replace Polymer Feed Systems for Belt Filter Press and Gravity Belt Thickener: The polymer storage and chemical feed systems for the Belt Filter Press and Gravity Belt Thickener increase the biosolid's dewatering functionality. These systems are nearing the end of their service life. This improvement is planned for implementation within the next five years.

8) Increase Sludge Storage Capacity: The existing sludge beds are deteriorating and are becoming non-functional. Additionally, they do not provide sufficient sludge storage capacity. Propose to install new sludge storage beds or a new storage structure that will increase sludge storage capacity and provide for more efficient operations. This improvement is planned for implementation within the next five years.

9) New or Refurbished Raw Sewage Pumps: The existing Raw Sewage Pumps 1-3 will be nearing the end of their service life and should be replaced or refurbished. This improvement is planned for implementation in the 6-15 year period.

10) New UV System: The UV disinfection system was part of the original plant and will be approaching the end of its service life. As such, maintenance and parts become more difficult. Similar to what is being done for the East WWTP, a new, more energy-efficient UV system will replace the existing one. This will reduce maintenance and energy costs. This improvement is planned for implementation within the 6-15 year period.

11) Modifications to Oxidation Ditch Drainage System: Draining of the oxidation ditches is a slow process that is limited by the current piping configuration which drains the ditches to the Drain Pumping Station. This pumping station does not have sufficient capacity to drain the ditches in a reasonable time frame. Proposed improvements include the installation of new piping from each ditch and a junction chamber to divert tank drainage flows to the existing raw sewage pump stations. This will greatly reduce tank drainage times and increase the efficiency of oxidation ditch maintenance. This improvement is planned for implementation within the 6-15 year period.

12) Oxidation Aerator Bearings and Shafts: The oxidation ditches function by strategically placing mechanical aerators around the ditch to impart oxygen to the activated sludge process and assist with mixing the tanks. These are wearing mechanical components that run 24/7 and are requiring replacement due to the age of the oxidation ditches. The improvement is planned within the 6-15 year period.

13) Additional Aerobic Digester Tanks and New Blowers: The current aerobic digester capacity is less than recommended by IEPA. Additionally, the existing blowers are oversized for the application and do not allow for turning down the airflow to meet process needs, thus wasting energy. It is proposed to add two (2) new concrete digesters to increase capacity as well as replace the existing large blower with two or smaller blowers with automated dissolved oxygen control which can be modulated to match the process conditions. This improvement is planned for implementation within the 6-15 year period.

14) Add Second Filter to Sand Filter Building B/Phosphorus Removal: Adding a second filter will increase filter capacity and assist in removing phosphorus. This improvement is planned for implementation in the 6-16 year period.

15) Add Third Pump to Raw Sewage Pump No. 2: It is estimated that a third raw sewage pump will be required to handle flows more efficiently in the next two decades. This improvement is planned for implementation in the 16-26 year period.

16) Modify the Oxidation Ditches for Additional Total Nitrogen Removal: Increasingly stringent total nitrogen effluent limits are on the 10 to 20-year horizon. The East WWTP oxidation ditches can be modified to perform additional total nitrogen removal by changing the location and operation of the aerators to facilitate simultaneous nitrification/denitrification as well as establishing dedicated denitrification anoxic zones. This may also require internal recycling pumps and piping in the ditches to help make the biological processes more efficient. This improvement is planned for implementation in the 16-26 year period.

17) New Administration/Lab Building: The current WWTP does not have a proper administration/laboratory building, there is insufficient space for current operations and the restroom facilities need expansion and updating to adhere to ADA and gender utilization requirements. It is proposed to construct a modern, efficient administration building with a new laboratory that will streamline operations and provide additional storage and maintenance spaces. An upgraded laboratory can be used for the analysis of the East WWTP operations as well as the water treatment plants. This improvement is planned for implementation in the 16-26 year period.

Based on the above discussion, a summary of the needed improvements at the West WWTP is as follows in order of need:

1) Increase Sludge Storage Capacity
2) New Garage
3) Replace/Upgrade Comminutor/Screen
4) Automated Aerobic Digesters Controls
5) Rehabilitate/Upgrade Non-Potable Water System
6) Replace DO/ORP Probes on Oxidation Ditch No. 3
7) Digester Diffuser Replacements
8) Replace Polymer Feed Systems for Belt Filter Press and Gravity Belt Thickener
9) Replace or Refurbished Raw Sewage Pumps Nos. 1-3
10) New UV System
11) Modify Oxidation Ditch Drainage
12) Replace Bearings and Aerator Shafts on Oxidation Ditches 1, 2 and 3
13) Additional Aerobic Digester Tanks and New Blowers
14) Add Third Pump to Raw Sewage Pump Station No. 2
15) Add Second Filter to Sand Filter Building B/Phosphorus Removal
16) Modify the Oxidation Ditches for Additional Total Nitrogen Removal
17) New Administration/Laboratory

TABLE NO. 3-3: EXISTING TREATMENT UNITS CONDITIONS & CAPACITIES - WEST WWTP

Village of Huntley, IL

Treatment Unit	Components	Year Installed	Total Years in Operation	Last Modification	Condition	Size	Design Loading Rate - IEPA Standards	Design Capacity* (MGD) or Other Unit	Comments and Recommendations
Headworks	Raw Sewage Pump Station No. 1	1998	23	2010 - New Impellers	OK	3 @1,080 gpm	Meet PHF w/ Largest Out	2.75 / 8.26**	Consider Continued Service
	Raw Sewage Pump Station No. 2	2006	15	2019-2020 - Replaced Check Valves	OK	2 @2,500 gpm	Meet PHF w/ Largest Out		Consider Continued Service
	Fine Screen #1 - Lakeside Screen w/Auger	1998	23	2022 - Rebuilt Screen	OK	6 mm Openings (1/4-inch)	< 2.5 ft/s at PHF	3.90 (1.6 MGD Old + 2.4 MGD New)	Consider Replacing Communitors/Screens in Near Future
	Fine Screen #2 - JWC Screen w/Auger and Muffin Monster Channel Grinder	2006	15	2015 - Replaced Channel Grinder	OK	6 mm Openings (1/4-inch)			
Oxidation Ditches	Oxidation Ditch No. 1 (Northern) - Envirex 3-Ring Orbital	1998	23	2019 - Replaced Disc	Good	158,000 ft^3	24 hr HRT @DAF	3.90	Continue Continued Service
	Oxidation Ditch No. 2 (Middle) - Envirex 3-Ring Orbital	2001	20	2019 - Replaced Disc	Good	158,000 ft^3	24 hr HRT @DAF		Consider Continued Service
	Oxidation Ditch No. 3 (Southern) - Envirex 2-Ring Orbital	2006	15	2011 - Replaced Bearing Aerator #2	Good	205,600 ft^3	24 hr HRT @DAF		Consider Continued Service
Secondary Clarification	Secondary Clarifier Nos. 1 and 2	1998	23	2019 - Replaced Drive System	OK	1,963 ft^3 (50' Dia - 14'-8" SWD)	1,000 gal/ft^2/d @PHF (w/ Tertiary Filters; 600 gal/ft^2/d @PHF w/o Tertiary Filters)	3.84	Consider Continued Service
	Secondary Clarifier No. 3	2001	20	2022 - Replaced Drive System	OK	1,963 ft^3 (50' Dia - 14'-8" SWD)	1,000 gal/ft^2/d @PHF (w/ Tertiary Filters; 600 gal/ft^2/d @PHF w/o Tertiary Filters)		Consider Continued Service
	Secondary Clarifier No. 4	2006	15	2021 - Replaced Drive System	Good	1,963 ft^3 (50' Dia - 14'-8" SWD)	1,000 gal/ft^2/d @PHF (w/ Tertiary Filters; 600 gal/ft^2/d @PHF w/o Tertiary Filters)		Consider Continued Service
	Secondary Clarifiers Nos. 5 and 6	2006	15	N/A	Good	5,675 ft^3 (85' Dia - 15'-7" SWD)	1,000 gal/ft^2/d @PHF (w/ Tertiary Filters; 600 gal/ft^2/d @PHF w/o Tertiary Filters)		Consider Continued Service
RAS/WAS Pumping	RAS/WAS Pump Station No. 1 - 2 RAS Subm. Pumps, 1 WAS Subm. Pump	1998	23	2006 - Added WAS Pump	OK	2 @1,675 gpm (RAS Pumps) 1 @325 gpm (WAS Pump)	100% DAF w/ Largest Out	7.56***	Consider Continued Service
	RAS/WAS Pump Station No. 2 - 2 RAS Subm. Pumps, 1 WAS Subm. Pump	2006	15	2022 - Replaced Check Valve on Pump #2	Good	2 @1,900 gpm (RAS Pumps) 1 @325 gpm (WAS Pump)	100% DAF w/ Largest Out		Consider Continued Service
Sand Filters	Sand Filter Building A - North	1998	23	N/A	OK	2 @575 SF	5 gpm/sf @PHF w/ Largest Out	2.76	Consider Continued Service
	Sand Filter Building B - South	2006	15	N/A	OK	1 @575 SF			Consider Continued Service
UV Disinfection	Two Channels - 2 UV Banks Ea. Channel	2006	15	N/A	Good	2 Channels @ 3.9 MGD Ea.	100% PHF	2.60	Consider Continued Service
Effluent Parshall Flume	One Flume w/ ULT	1998	23	2019 - Replaced Flow Meter	Good	12-inches Throat Width	100% PHF	3.48	Consider Continued Service
Sludge Thickening	2 Gravity Belt Thickeners w/2 Sludge Grinders & 3 PC Feed Pumps	2006	15	N/A	OK	2 1.0 Meter GBT's	--	--	Consider Continued Service
Aerobic Digesters	4 Aerobic Digester Tanks	2006	15	2012 - Replaced Valves	Good	66,000 ft^3 (4@1,100 SF 15'-0" SWD)	3.0 ft^3/P.E. (+ 25% VOL) (Thickening to 2% Solids) = Total Required Capacity of 99,000 CF	1.76	Consider Adding 2 Tanks; Add Automated Controls
Blowers	Two Positive Displacement Blowers	2006	15	N/A	Good	2 @2,640 scfm	30 cfm / 1,000 ft^3 w/ Largest Out of Service. Total new blower capacity requires is 3,300 cfm	2.31****	Consider Adding One Blower with Digester Expansion
Sludge Dewatering	Belt Filter Press w/2 PC Feed Pumps, Polymer Feed System, and Discharge Conveyor	2000	21	2017 - Replaced Conveyor Liner	Good	1 Meter Press	--	3.25*****	Consider Continued Service
	Belt Filter Press w/Feed Pump, Polymer Feed System, and Discharge Conveyor	2017	4	N/A	Good	1.5 Meter Press			Consider Continued Service
Sludge Storage	Sludge Storage Beds	1998	23	2006	OK	7,670 ft^2 (4 ft Sludge Height)	150 Days Storage	1.53******	Consider Doubling Storage Capacity
		2006	15	N/A	Good	7,125 ft^2 (5.5 ft Sludge Height)			
Alum Feed System	Pump Skid w/3 Metering Pumps; 1 Chem. Storage Tank	2006	15	N/A	OK	2 @5.3 GPH 1 @12.2 GPH 6,436 Gal Tank	10 Days Storage	14.82*******	Consider Continued Service
Drain Pump Station	2 Pumps	1998	23	2017 - Replaced Impellers	Good	2 @600 GPM	--	--	******** Undersized Pumps; Consider Alt. Ox Ditch Drainage Plan Using Raw Sewage Pumps

Notes:

WWTF Design Average Flow Capacity = 2.60 MGD; Design Maximum Flow (DMF) = 6.5 MGD; Peak Hourly Flow (PHF) = 7.8 MGD

* Design Average Flow (DAF) = Peak Hydraulic Flow (PHF) / 3.0 when PHF is Design Parameter

** 2.24 MGD DAF Capacity if One 1,080 GPM Pump and One 2,500 GPM Pump Out of Service; 8.26 MGD PHF Capacity if One 2,500 GPM Pump Out of Service

*** 5.14 MGD DAF Capacity if Largest in Each RAS Station Out of Service

**** 2,970 CFM Required for Digester Volume of 99,000 CF

***** Based on Processing 55,090 GPD of Thickened Sludge from Digesters and Dewatering 5 Days/Wk (2% Solids from Digesters and Dewatering to 19%)

****** Based on Dewatering 5 Days/Wk and Producing 1104 CF/Day

******* Assumes Phosphorus is Limiting Factor; Bio-P Removal to 2.0 mg/L and Chem-P Polishing to 0.5 mg/L

******** One Pump Running at Full 600 gpm would Drain Ox. Ditch #1 or #2 in 35.2 Hours, and Ox. Ditch #3 in 45.8 Hours; May also be limited by 8" drain lines from each Ditch

XXX Red Text Indicates Unit Process Is Operationally and Regulatory Deficient Or Is No Longer In Use

▨ Highlighted Unit Processes are Unit Processes With Critical Needs

3.5 Wastewater SCADA System Overview

The Village of Huntley utilizes a Supervisory Control and Data Acquisition (SCADA) system to monitor the operation of the wastewater system. The Wastewater Treatment Plant SCADA system consists of the following primary components:

- SCADA Server and Thick Client PC;
- West WWTP Control Panels;
- East WWTP Control Panels;
- Ethernet Communication Network;

SCADA Server and Client: The WWTP SCADA Server has been replaced by a Virtual Server located on the SCADA Virtual Host Server. The SCADA Software is Wonderware InTouch 2012. The SCADA Server is “headless”, meaning the operations staff does not interact with the SCADA Server. A SCADA Thick Client is used for the operator interface and alarm. The Thick Client is a Dell OptiPlex 7010 workstation with Wonderware InTouch Client software and Win-911 Alarm software. The Virtual Host Server and Thick Client are both located at the West WWTP. The SCADA server/client allows operations staff to view WWTP system status and alarms, as well as make setpoint adjustments.

West WWTP Control Panels: The West WWTP consists of several control panels throughout the plant that uses Allen-Bradley CompactLogix Series Programmable Logic Controllers (PLCs). The PLCs communicate on a peer-to-peer Ethernet network to the SCADA server. The Wonderware System Platform SCADA Server uses a software I/O driver to provide read/write access to the SCADA data in each of the PLCs.

East WWTP Control Panels: Minimal information is currently tied into the SCADA server from the East WWTP. A PLC at the East WWTP communicates to the West WWTP Water/Lift MTU using the 900MHz wireless system. The data is read-only, so no operational changes to the East WWTP can currently be made from the West WWTP.

Ethernet Communication Network: The PLCs at the West WWTP are connected using fiber optic and use Allen Bradley’s newer Ethernet/IP protocol. The SCADA server is connected to this network and communicates directly to each PLC on the network (peer-to-peer topology).

Planned Improvements: TBD

SECTION 4: HISTORICAL WATER USE AND WASTEWATER FLOWS

The Village of Huntley's historical water use and wastewater flow has risen along with the Village's growth in population. The purpose of this section of the report is to first provide a summary of the Village's historical water production and use, followed by a review of historical wastewater flows and effluent quality.

4.1 Historical Water Use

The Village of Huntley Water Department tracks water production in daily, monthly, and yearly increments. Water use by all of the Village of Huntley residents, businesses, industrial users and government/ institutions is tracked through monthly meter readings.

The historical total water use, or essentially the total amount of source water utilized in the production and distribution of potable water within the Village's Water Works System, was analyzed from January 1, 2017 – December 31, 2021. Table No. 4-1 summarizes the total raw water pumped by the Village's Water Department.

Table No. 4-1: Historical Water Production

Village of Huntley, IL

YEAR	2017	2018	2019	2020	2021	AVG.
ESTIMATED POPULATION	26,632	26,632	27,451	29,563	29,444	
ANNUAL PUMPAGE	846,465,000 GAL	811,755,000 GAL	761,051,000 GAL	838,760,000 GAL	955,755,000 GAL	842,757,200 GAL
MAXIMUM MONTHLY PUMPAGE	97,130 GAL	96,298 GAL	87,580 GAL	111,022,000 GAL	112,091,000 GAL	
MAXIMUM DRY WEATHER MONTH	JUNE	JULY	JULY	AUGUST	JUNE	
AVERAGE DAILY PUMPAGE	2,319,082 GAL	2,223,986 GAL	2,085,071 GAL	2,297,973 GAL	2,618,507 GAL	
MAXIMUM AVERAGE DAILY PUMPAGE	3,238,000 GAL	3,106,000 GAL	2,825,000 GAL	3,581,000 GAL	3,740,000 GAL	
MAXIMUM DAILY PUMPAGE	4,857,000 GAL	4,092,000 GAL	4,011,000 GAL	4,453,000 GAL	4,920,000 GAL	
COMPUTED MAXIMUM HOUR	404,750 GAL	341,000 GAL	334,250 GAL	371,083 GAL	410,000 GAL	
COMPUTED MAXIMUM HOUR	6,746 GPM	5,683 GPM	5,571 GPM	6,185 GPM	6,833 GPM	
AVG. GAL./PERSON/DAY	87 GPCD	84 GPCD	76 GPCD	78 GPCD	89 GPCD	83 GPCD
RATIO OF MAX. DAY TO AVG. DAY	2.09	1.84	1.92	1.94	1.88	1.93

NOTES:
1. ESTIMATED POPULATION BASED ON ESRI DATA AND CMAP 2050 POPULATION PROJECTION DATA
2. ASSUMED RATIO OF MAX. HOUR TO MAX. DAY DEMAND (MHD:MDD) = 2.0

Assessment of this table indicates that the water use characteristics and metrics are fairly consistent with many northeastern Illinois communities during the same period. For instance, the maximum day demand to average day demand ratio (MDD:ADD) has averaged 1.93 for the past five years. It was at its maximum in 2017 at 2.09 which occurred during a year that must have had some significant day demand, perhaps due to a fire or some other event. The significance of the MDD:ADD ratio is that it is proportional to the amount of supply, treatment, and storage required for a municipality where a higher ratio results in greater supply, treatment, and storage requirements. The system must be designed to meet these requirements for every day of every year even while the increased demand may be limited to just a few days of each year. Therefore, this value should be minimized as much as possible. After 2017, the MDD:ADD ratio decreased and somewhat stabilized in parallel with slowly increasing average day demands and increased precipitation trends which is likely indicative of decreased water use for landscaping activities. In addition to the climate, the rate of development can also impact the MDD:ADD ratio because seasonal construction water use for activities such as watering newly placed sod increases the maximum day use. Therefore, once development reenergizes, or when the region experiences another drought, there is a potential that the MDD:ADD ratio could creep up again. The MDD:ADD average ratio of 1.93 for this report has decreased from the average ratio identified in the 2014 Master Plan, which was 2.16 and occurred during two drought years.

Another significant water use parameter to be mindful of is the average gallons (of water production) per person per day. A population equivalent (P.E.) is a unit of measure often utilized to determine the impact of existing and additional water consumers to the system. For many northeastern Illinois communities, one P.E. is typically in the range of 75 – 120 gpd. Lower values are oftentimes associated with established, mainly residential communities that practice water conservation, while larger values are typically observed in developing communities that may have a significant new construction or a commercial and industrial base that consumes a fair amount of water.

Inspection of Table No. 4-1 shows that the average water use per capita per day in the Village of Huntley over the past five years is approximately 83 gpcpd, which is in the range of expected values for the community. It has been decreasing from a high in 2017 until a jump in 2021 due to watering for increased development in a drought year. Population and demand have been increasing since the previous Master Plan in 2014, but since the average gallons per person per day is decreasing, it can be assumed that any conservation measures implemented since 2014 have had their desired impact; the average value of water usage in 2014 was 90 gpcpd. It should be noted that this water use per P.E. also accounts for all consumer types including residential, commercial, industrial, government/industrial, etc. Similar to the MDD:ADD ratio, this value has a direct impact on water system infrastructure and therefore, should be minimized when possible. Section 5 provides an overview of means to further reduce the MDD:ADD ratio and the water use per P.E., including water conservation goals and strategies, to accompany those which the Village has already incorporated.

4.1.1 System Evaluation

The water supply and storage systems of the Village were evaluated for adequacy using five parameters which generally rate the strength of the supply and storage systems. The parameters used are as follows:

1. *Ultimate Source Capacity* - The ability of the system to supply the maximum day demand with the largest well out of service.

2. *Reliable Source Capacity* - The ability of the system to supply the maximum day demand with all wells operating 16 hours per day.

3. *Peak Hour Storage* - The ability of the system to have sufficient storage to meet the peak hour demand for 4 hours without depleting storage more than 50 percent.

4. *Fire Flow* - The ability of the system to meet a design fire flow rate for the design period and meet maximum day demand with the largest well out of service. A common design fire flow is 3,000 gpm for 3 hours.

5. *Emergency Supply* - The ability of the system to supply the average day demand using elevated storage and supply sources with standby power generator systems only. Normally 80% of storage tank capacity is assumed to be available.

Table No. 4-2 summarizes the system analysis for the previous five calendar years (2017 – 2021). Table 4-3 indicates the corresponding excess or required capacity needed to meet 100% of each of the parameters listed above. Table Nos. 4-2 and 4-3 consider all existing active wells are online and that each water treatment plant is available to meet the Village's water demand.

For further clarification, a summary of the system analysis calculations using all active wells for calendar year 2021 (the year of the highest maximum daily demand over the analysis period) follows.

Test No. 1: *Ultimate Source Capacity* – The 2021 maximum day demand was 4,920,000 gallons per day (gpd). The total supply capacity for the water system is 6,480,000 gpd. To obtain the *Ultimate Source Capacity* of the existing system, the capacity of the largest well (Well No. 10, at 1,050 gpm or 1,260,000 gpd) is subtracted from the total well capacity:

Total Well Capacity = 6,480,000 gpd
Largest Well Capacity = 1,260,000 gpd
Ultimate Source Capacity = 4,968,000 gpd

Since the *Ultimate Source Capacity* (4,968,000 gpd) is slightly higher than the 2021 maximum day demand (4,920,000 gpd), the supply facilities are adequate for Test No. 1.

Table No. 4-2: Water Works System Evaluation – *Historical Analysis*

Village of Huntley, IL

TEST PARAMETERS	2017	2018	2019	2020	2021
1.0 Ultimate Source Capacity	413,400 GAL	1,178,400 GAL	1,259,400 GAL	457,400 GAL	48,000 GAL
2.0 Reliable Source Capacity	**-383,400 GAL**	381,600 GAL	462,600 GAL	**-181,000 GAL**	**-600,000 GAL**
3.0 Peak Hour Storage	40,000 GAL	295,000 GAL	322,000 GAL	174,667 GAL	19,000 GAL
4.0 Fire Flow	2,166,075 GAL	2,261,700 GAL	2,271,825 GAL	2,171,575 GAL	2,120,400 GAL
5.0 Emergency Supply	5,605,718 GAL	5,700,814 GAL	5,839,729 GAL	5,295,627 GAL	5,104,693 GAL

Table No. 4-3: Water Works System Evaluation – *Historical Analysis* Corresponding Available or Required Capacity

Village of Huntley, IL

TEST PARAMETERS	2017	2018	2019	2020	2021
1.0 Ultimate Source Capacity	287 GPM	818 GPM	875 GPM	318 GPM	33 GPM
2.0 Reliable Source Capacity*	**-399 GPM**	398 GPM	482 GPM	**-189 GPM**	**-625 GPM**
3.0 Peak Hour Storage	40,000 GAL	295,000 GAL	322,000 GAL	174,667 GAL	19,000 GAL
4.0 Fire Flow	2,166,075 GAL	2,261,700 GAL	2,271,825 GAL	2,171,575 GAL	2,120,400 GAL
5.0 Emergency Supply	5,605,718 GAL	5,700,814 GAL	5,839,729 GAL	5,295,627 GAL	5,104,693 GAL

* Assumes wells are operating 16 hours/day for Reliable Source Capacity.

Test No. 2: *Reliable Source Capacity* – The 2021 maximum day demand was 4,920,000 gpd. The *Reliable Source Capacity* is determined by calculating the maximum volume of water deliverable by the supply source(s) in 16 hours, or two-thirds of the daily well capacity (16 hours/day / 24 hours/day = 66%).

Total Well Capacity = 6,480,000 gpd

16 Hour Pumping Capacity = 6,480,000 gpd x $\frac{\text{16 hours}}{\text{24 hours}}$ = 4,320,000 gpd

The *Reliable Source Capacity* (4,320,000 gpd) is less than the 2021 maximum day demand (4,920,000 gpd), so the supply facilities are inadequate for Test No. 2.

Test No. 3: *Peak Hour Storage* – The 2021 peak hour demand is 410,000 gal/hr.

Peak Hour Demand = Max. Day Demand x 2 x $\frac{\text{1 day}}{\text{24 hours}}$

= 4,920,000 gpd x 2 x $\frac{\text{1 day}}{\text{24 hours}}$

= 410,000 gal/hr

The storage required to meet the peak hour demand for 4 hours is:

4-Hour, Peak Demand = 410,000 gal/hr x 4 hrs = 1,640,000 gal

The total storage capacity of the existing facilities, at their current operating levels, is 3,318,000 gallons, and therefore 50% of the existing facilities is 1,659,000 gallons. Since the required *Peak Hour Storage* for 4 hours (1,640,000 gal) is lesser than 50% of the existing facilities (1,659,000 gal), the storage facilities for Test No. 3 are adequate.

Test No. 4: *Fire Flow* – The maximum day demand plus fire flow demands for 3 hours is 1,155,000 gallons.

Maximum Day Demand (3 Hours) = 4,920,000 gpd x 3 hrs x $\frac{\text{1 day}}{\text{24 hours}}$ = 615,000 gal

Fire Flow Demand (3 Hours) = 3,000 gpm X 60 min/hr X 3 hrs = 540,000 gal

Maximum Day + Fire Flow = 1,155,000 gal

The total flow rate available from the system with the largest supply out of service is 3,450 gpm. The total amount of water from the remaining wells over 3 hours is 621,000 gallons. If 80% of the 3,318,000 gallons from EWST storage is available, there is 2,654,400 gallons available from storage. The total supply available for 3 hours is then 3,275,400 gallons.

Storage = 2,654,400 gal
Wells = + 621,000 gal
3,275,400 gal

Since the 3-hour maximum day demand plus fire flow (1,155,000 gal) is less than 80% of the available storage facilities and the available supply (3,275,400 gal), the facilities are adequate for Test No. 4.

Test No. 5: *Emergency Supply* – The 2021 average day demand is 2,618,507 gpd and 80% of the available storage is 2,654,400 gallons. With the exception of Well No. 9, the remaining wells are connected to an emergency generator and would be available for use during an emergency. Therefore, the total *Emergency Supply* is 7,723,200 gallons.

80% of Existing Storage = 3,318,000 x 80% = 2,654,400 gal
Emergency Generator Supply = + 5,068,800 gal
Total Emergency Supply = 7,723,200 gal

Since the Total Emergency Supply (7,723,200) is greater than the Average Daily Demand (2,618,507), the system is adequate for Test No. 5, *Emergency Supply*.

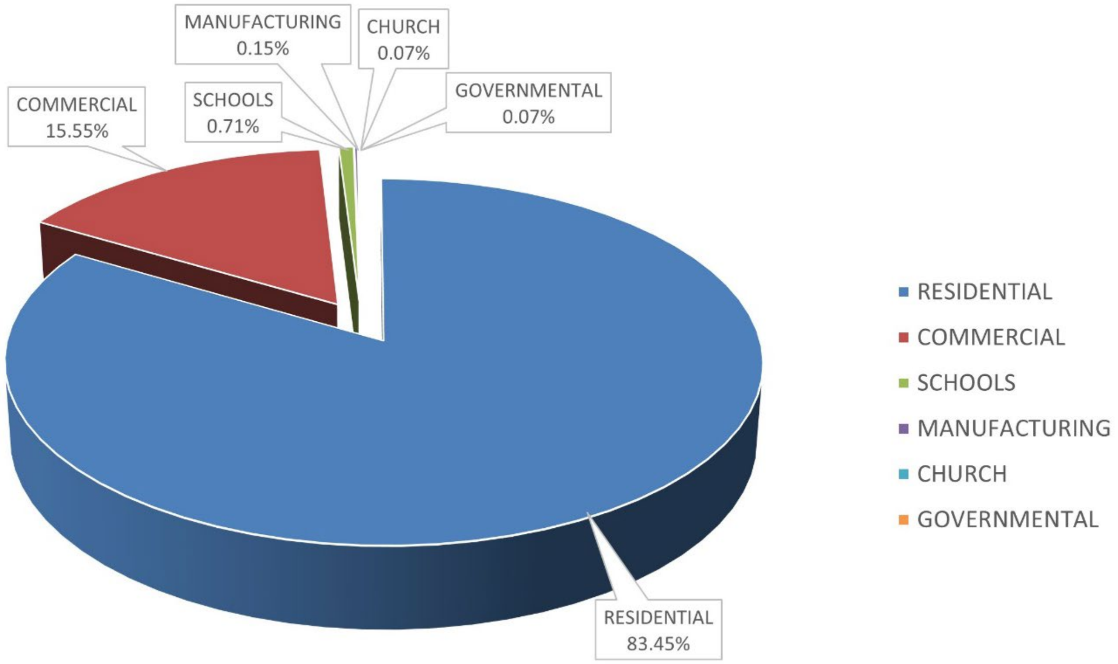
Inspection of Table Nos. 4-2 and 4-3 indicates that the water supply parameter *Reliable Source Capacity* was inadequate during the years of 2017, 2020, and 2021 – especially in 2021, which was a drought year. In the years 2018 and 2019, which had higher than average levels of precipitation, the water supply parameters were marginally adequate. *Peak Hour Storage* fluctuated over the period and came close to failing in years 2017 and 2021, the 2 years with the highest computed peak hour demand. The system passed the *Fire Flow* and *Emergency Supply* analysis over the period analyzed in large part because of the amount of storage available and the number of generators connected to the water supply sources.

4.1.2 Water Consumption

The Village's 2021 annual billing records were reviewed based on the various water use classifications. Exhibit No. 4-1 presents the water usage by consumer type for 2021. Residential usage within the Village consumes the largest percentage of water at over 83%. Industrial and Commercial users account for over 15% of the total annual billed water. The remaining 1% of the total annual water usage is divided between Schools, Manufacturing, Church, and Government, listed in the same order as the volume of water sold from highest to lowest.

Exhibit No. 4-1: 2021 Water Consumption by Customer Class

Village of Huntley, IL



4.1.3 Water Audit

As defined in the AWWA Manual M36: Water Audits and Loss Control Programs, 4th Edition (2016), Non-Revenue Water is the difference between system input volume (water produced) and billed authorized consumption. It consists of the following:

- Unbilled Authorized Consumption (fire hydrant flushing, water treatment plant process water, municipal buildings with non-metered water, etc.),
- Apparent Losses (non-physical losses such as unauthorized consumption (water theft), meter inaccuracies, systematic data handling errors, etc.), and
- Real Losses (physical losses from the distribution system and storage tanks up to the point of connection to the customer meter).

Water loss in the system equates to lost revenue for the utility. It is critical to the success of any water utility to manage and minimize water loss. In response to the need for consistent water loss auditing and benchmarking, AWWA released Version 5.0 of their free audit software in 2014, and Version 6.0 in 2020; this report uses Version 5.0 as it focuses on the Non-Revenue Water percentage as opposed to volume, and is preferred by IDNR. AWWA's macro-enabled Microsoft Excel-based audit program offers water utilities a tool to identify and record the apparent and real losses in their water system accurately and consistently. The audit provides a roadmap to help utilities reduce water waste and better prioritize infrastructure investments by identifying water losses that are viable to eliminate and economically recoverable. When performed over a series of successive years, the audit program allows utilities to create a benchmark and identify trends on the water loss in their systems. Another benefit of the audit is that it provides a yardstick by which to compare against other utilities or past performance overall. For instance, by completing the audit, several operational efficiency and financial performance indicators are calculated. A common operational efficiency performance indicator that many utilities refer to is the Infrastructure Leakage Index (ILI), which is a comparison benchmark that focuses on Real Water Losses. The ILI score ranges from 0 to 10 with a lower score representing a more robust distribution system.

The Village of Huntley has tracked its water loss using available resources for the past decade, and the data for the year of 2020 was obtained and entered into the AWWA audit program. Table No. 4-4 summarizes the basic water accounting results with a comparison to the results from the 2014 Master Plan, which averaged the audits for the years 2009 through 2013. For the 2020 audit, the water used for treatment processes (traditionally accounted for under Unbilled and Metered) was estimated at 5% as the meters on the backwash waste lines are currently non-operational, while water used for purposes such as flushing, fire-fighting and main breaks (Unbilled & Unmetered) was estimated at approximately 2%; both parameters, along with Water Billed & Metered, are accounted for under Authorized Consumption. Total Water Loss in the audit software is then determined by subtracting Authorized Consumption from the Treated Water volume. Made up of Apparent Losses and Real Losses, the Total Water Loss was about 9% of the Treated Water volume. Adding the Unbilled Water identified above to the Total Water Loss provides the Non-Revenue Water value which equaled to about 15% of Treated Water. The ILI score was approximately 0.62, which is purportedly indicative of a very tight distribution system.

Table No. 4-4: Water Accounting

Village of Huntley, IL

Year	Water Supply		Water Billed & Metered	Water Unbilled & Metered		Water Unbilled & Unmetered		Authorized Consumption (C+D+F)	Water Losses				Non-Revenue Water (D+F+K)		Infrastructure Leakage Index
	Pumped	Treated							Apparent	Real (A-H-I)	Total (I+J) or (A-H)				
	MG A	MG B	MG C	MG D	% E	MG F	% G	MG H	MG I	MG J	MG K	% L	MG M	% N	O
2020	843.10	840.24	710.69	0.000	0.00%	57.624	6.86%	768.32	22.100	49.814	71.91	8.56%	129.54	15.42%	0.62
2009 - 2013	810.66	799.61	649.09	11.055	1.37%	11.725	1.45%	671.87	24.066	114.726	138.79	16.93%	161.57	19.75%	1.96

Notes:

1. Water Unbilled & Metered is traditionally treatment process water but for 2020 the Village included process water with Water Unbilled & Unmetered.
2. Water Unbilled & Unmetered is from PW records and includes water volume estimates for flushing, fire fighting, main breaks, etc.
3. Apparent Water Losses are estimated based on customer metering inaccuracies, systematic data handling errors, and theft.
4. Real Water Losses are physical water losses from the pressurized system and storage tanks, up to the point of customer consumption, estimated by subtracting Authorized Consumption and Apparent Losses from the Water Supplied/Treated.

Comparing these values to the ones from 2014, it is easy to see that the Non-Revenue Water percentage has dropped due to the decrease in Apparent, Real, and Total Water Losses. However, beyond the obvious reasons of improved water main construction and maintenance to minimize leakage, the decrease could also be attributed to how some of the values used in the audits were obtained. One difference between the two audits is how the volumes for Supplied and Billed Water were determined. The values for those categories were obtained from two documents provided by the Village – operations reports, and billings reports. However, the two documents are not similarly aligned concerning monthly and yearly totals, because the billing report not only includes a period of two months over the billing period, but only half of the Village is billed each month, and the billing period starts and ends on the 5th of the month. The operations report data is provided in discrete months. It was attempted to align the billing report to the monthly report by interpolating the billing periods and rearranging the data so that only water billed during 2020 would be included in the audit. In comparison, the 2014 Report used the values straight from the two documents, so there is bound to be some discrepancy between the Supplied Water and the Billed & Metered volumes, and by extension, the Total Water Loss volume. The audit results would then not be as accurate, and any water not accounted for under Billing & Metered/Authorized Consumption would then be included in Total Water Loss.

Another difference between the two audits is how process water, traditionally under Unbilled & Metered, was accounted for. In the 2014 report, process water was simply calculated to be the volume of Treated Water subtracted from the volume of Pumped Water, since the exact volume of water used in ion exchange media regeneration at the Village cannot be measured due to non-operational flowmeters on the waste lines. However, the audit software does not consider Pumped Water in its calculations, only Treated Water. This would then cause the unaccounted-for volume of process water to be categorized under Total Water Loss and artificially inflate the Total Losses volume. For this report, the process water volume was estimated at 5% of the total treated volume. Since this volume was an estimate and was technically unmetered, process water was included with Unbilled & Unmetered Water.

For future years, it might be worth considering replacing the flowmeters on the ion exchange waste lines to better evaluate the true volume of water utilized during the regeneration process, and adding any water used at the wastewater treatment plants, for a more accurate total of water used by treatment processes. However, it should be noted that the amount of water ‘lost’ during treatment has improved, from an apparent 1.36% loss in previous years to 0.34% in 2020. This could be due to new effluent flowmeter installations at the plants in the past three years, which would likely be more accurate than the ones replaced.

The final value in Table No. 4-4, the Infrastructure Leakage Index (ILI), is also seemingly much improved from the previous Master Plan. Improved operations and various changes in data collection between the two audits will have reduced Real Water Loss since 2014, but the way in which a factor used in the ILI was determined has also changed from one Master Plan to the next. The ILI is a value derived from comparing the literal Real Water Loss to a theoretical Unavoidable Annual Real Loss (UARL), which represents the technical low limit of leakage that could be achieved if all of today’s best technology could be successfully applied. It is calculated based on multiplying different factors with the values of various elements of the distribution system, namely:

length of water main, number of services, average length of customer service line, and system pressure. In 2014, not only did the Village have a smaller total length of water main, but the value entered for the average length of customer service line was zero. This was likely due to some seemingly conflicting information within the audit software itself; on the Reporting Worksheet, the length of service line is listed as "the length of service line, beyond the property boundary, that is the responsibility of the utility," and Village policy stipulates that Village ownership of a service line ends at the curb stop. However, elsewhere in the workbook, a diagram shows that the length should be the distance from the curb stop near the property boundary to the water meter, and the only instance where the value could be zero is if the meter is located at the curb stop, which is not the case in Huntley. This factor is somewhat influential on the eventual value of the UARL, so a factor of zero in the calculation will also have an impact on the ILI. The other factor involved in the ILI calculation is Real Water Loss; if a utility has somewhat inaccurate data due to old water meters or an error in estimating water volume used for authorized activities, the Real Water Loss could be lower than what it actually is, which would throw off the calculation. Regardless of the actual value of the ILI, the Village has made significant improvements in reducing water loss from 2014 to 2020.

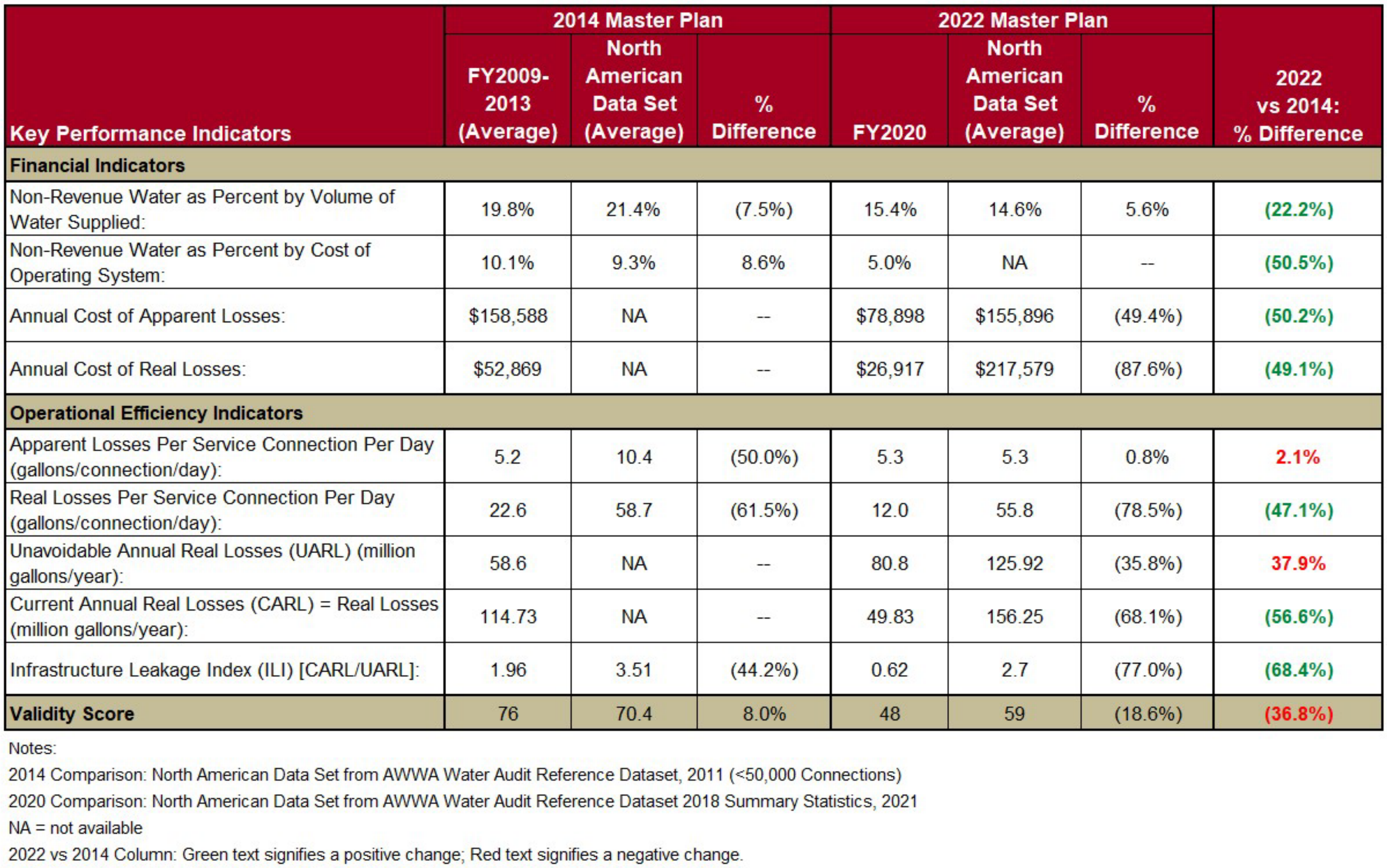
Currently, there are no water loss regulatory requirements or standards that apply to the Village of Huntley. However, in order to establish a reasonable goal for water loss, it is recommended that the benchmarking indicators of other utilities be reviewed for comparison. In 2011, as a result of a water audit data collection initiative, the AWWA Water Loss Control Committee (WLCC) created its first dataset of validated water audit data which had been posted for review by water utility stakeholders, titled *Validated Water Audit Data For Reliable Utility Benchmarking.* 21 utilities provided their water audit data for review and careful validation by members of the Committee's Water Audit Software Subcommittee. Data from the entire group of utilities was assembled with results that documented the first North American benchmark performance indicators using the AWWA water audit methodology. This was a significant step toward improving the level of accountability and the robustness of water audit data within North America.

In 2020, the AWWA WLCC furthered the process and assembled a more robust reference dataset of validated annual water audit data of 1,124 water systems from the states of California and Georgia and the Canadian province of Quebec. This dataset is called the *Water Audit Reference Dataset* (WARD), and was compiled from 2018 data using the AWWA Free Water Audit Software, Version 5.0, but was modified to match the parameters of the most recent Version 6.0 software.

Table No. 4-5 presents a comparison of the Village of Huntley's performance indicators alongside the WARD average indicators, as well as the dataset comparison from the 2014 Master Plan. It should be noted that the WARD does not have a separate category for utilities with fewer than 50,000 service connections as the previous benchmarking data did, but review of this table suggests that the Village of Huntley is performing better than the average of the water utilities compared against in the WARD, and significantly better when compared to the 2011 dataset for smaller utilities. Based on the water audit's values for the cost of water production per MG and the cost to consumers, the annual cost of Apparent and Real Losses is over $105,000 as demonstrated in Table No. 4-5. Minimizing this lost revenue should be an incentive for continued water loss reduction. Understanding that a certain amount of water loss is unavoidable (i.e. leakage that cannot be detected, all meters have a certain level of inaccuracy, etc.), it is recommended that the Village aim to achieve an economic level of water loss where the benefit of Water Works System Improvements to correct water loss is greater than or equal to the cost of the improvements. The Village has continued to move forward with this initiative by continuing to calculate how much water is being lost annually.

Table No. 4-5: Water Audit Summary and Comparison

Village of Huntley, IL



Key Performance Indicators	2014 Master Plan FY2009-2013 (Average)	2014 Master Plan North American Data Set (Average)	2014 Master Plan % Difference	2022 Master Plan FY2020	2022 Master Plan North American Data Set (Average)	2022 Master Plan % Difference	2022 vs 2014: % Difference
Financial Indicators							
Non-Revenue Water as Percent by Volume of Water Supplied:	19.8%	21.4%	(7.5%)	15.4%	14.6%	5.6%	**(22.2%)**
Non-Revenue Water as Percent by Cost of Operating System:	10.1%	9.3%	8.6%	5.0%	NA	--	**(50.5%)**
Annual Cost of Apparent Losses:	$158,588	NA	--	$78,898	$155,896	(49.4%)	**(50.2%)**
Annual Cost of Real Losses:	$52,869	NA	--	$26,917	$217,579	(87.6%)	**(49.1%)**
Operational Efficiency Indicators							
Apparent Losses Per Service Connection Per Day (gallons/connection/day):	5.2	10.4	(50.0%)	5.3	5.3	0.8%	**2.1%**
Real Losses Per Service Connection Per Day (gallons/connection/day):	22.6	58.7	(61.5%)	12.0	55.8	(78.5%)	**(47.1%)**
Unavoidable Annual Real Losses (UARL) (million gallons/year):	58.6	NA	--	80.8	125.92	(35.8%)	**37.9%**
Current Annual Real Losses (CARL) = Real Losses (million gallons/year):	114.73	NA	--	49.83	156.25	(68.1%)	**(56.6%)**
Infrastructure Leakage Index (ILI) [CARL/UARL]:	1.96	3.51	(44.2%)	0.62	2.7	(77.0%)	**(68.4%)**
Validity Score	76	70.4	8.0%	48	59	(18.6%)	**(36.8%)**

Notes:

2014 Comparison: North American Data Set from AWWA Water Audit Reference Dataset, 2011 (<50,000 Connections)

2020 Comparison: North American Data Set from AWWA Water Audit Reference Dataset 2018 Summary Statistics, 2021

NA = not available

2022 vs 2014 Column: Green text signifies a positive change; Red text signifies a negative change.

The Validity Score seen at the bottom of Table No. 4-5 is a composite rating of a utility's confidence in and accuracy of data entered into the audit software. While completing the audit, a utility evaluates the accuracy of the input data by grading each applicable data input on a scale of 1 to 10, using a description of the different grades to determine the selection based on the utility's policies and procedures. In order to keep the Validity Score consistent for better comparison from year to year, the grade descriptions have remained unchanged between different audit software versions. The audit software then weights each validity input and calculates an overall validity score on a range from 0 to 100. A lower score means that the data is less reliable and that the utility should focus on improving its data inputs so that the software can accurately assess the water system losses.

The Village's Validity Score dropped from the previous Master Plan to this one because the auditors have received more complete information regarding the Village's policies and procedures that allowed a better evaluation of the input data accuracy. According to the audit software, the Village may increase its Validity Score by addressing the following components: Volume from Own Sources (testing and calibrating the master meters located on the effluent piping of each water treatment plant on a semi-annual or annual basis, regardless of age), Billed & Metered volume (addressing policies regarding failed meter reads and implementing more stringent policies regarding customer meters), and Customer Metering Inaccuracies (replacing older customer meters before they reach the point of failure as well as performing regular meter accuracy testing). These will allow for more accurate data in the Treated, and Billed Metered Water categories which then influence the accuracy of the Total Water Loss volume. Continuous improvement in water accounting will allow the Village to strategically implement controls for reducing water loss and lost revenue.

Comparing the results of the 2022 Master Plan audit to those of the 2014 Master Plan in Table No. 4-5, the Village has improved in all Financial Indicators. Non-Revenue Water has decreased from 161.57 MG per year in 2014 to 129.54 MG in 2020 as shown in Table No. 4-4, which is a definite positive considering that the Pumped Water volume increased by over 30 MG at the same time. A lower Non-Revenue Water percentage results in savings for the Village – the total cost of water losses are half of what they were in 2014, according to the audit. The Village did not fare quite as well in comparing Operational Efficiency Indicators. The Apparent Losses per Service Connection Per Day indicator was slightly higher in 2020 as compared to 2014. Even though Apparent Losses have slightly dropped from 2014 to now, the number of Service Connections also dropped just enough to result in a 2% rise from 5.2 gal/connection/day to 5.3 gal/connection/day. This may be a result of slightly inaccurate data.

The Indicator with the most adverse change is the difference between Unavoidable Annual Real Losses (UARL) from 2014 to 2020. As mentioned in the discussion on the ILI index above (of which the UARL is a factor), the uncertainty between the values used to calculate the UARL in 2009-2013 and 2020 results in a marked increase. However, the validity of the UARL itself could be called into question – assuming the data used for the calculation is all correct, it is difficult to comprehend how a water works system could count a 10% water loss as the best possible outcome for water loss.

It is recommended that the Village heed the suggestions of the audit software and not only implement programs to test/calibrate WTP effluent water meters on a regular basis and test/replace household water meters, but it should also consider replacing the water meters on the waste lines of the ion exchange systems. Obtaining the most accurate data possible will then allow for a more accurate and functional audit.

4.2 Historical Wastewater Flows & Effluent Water Quality

The flows at each of the WWTPs were reviewed for calendar years 2017 – 2021. The water quality at each of the plants was also reviewed for the same time period. A summary of the flow and water quality analysis is as follows.

4.2.1 East WWTP

Exhibit No. 4-2 summarizes the recorded Average Daily 3-Month Low Flow in relation to the Average Daily Flow, the East WWTP design capacity, and the Critical Review Threshold from 2017 – 2021. Exhibit Nos. 4-3 through 4-5 summarize the East WWTP monthly average daily flows compared to the plant capacity and recorded precipitation for 2019, 2020, and 2021, respectively. 2019 had the highest yearly precipitation total on record for the past 5 years, 2020 had the highest incidence of flow to the plant in the past 5 years, and 2021 is a drought year for comparison. A review of Exhibit Nos. 4-2 through 4-5 indicate that flows to the East WWTP are for the most part below the DAF capacity of the plant at 1.8 MGD and the critical review threshold (80% of DAF) of 1.44 MGD. The exhibits also indicate that there is some connection between increased precipitation and increased flows at the plant; as the portion of the collection system tributary to the East WWTP is historically older, it would make sense that I&I is allowed.

Exhibit No. 4-2: East WWTP Average Daily 3-Month Low Flow

Village of Huntley, IL

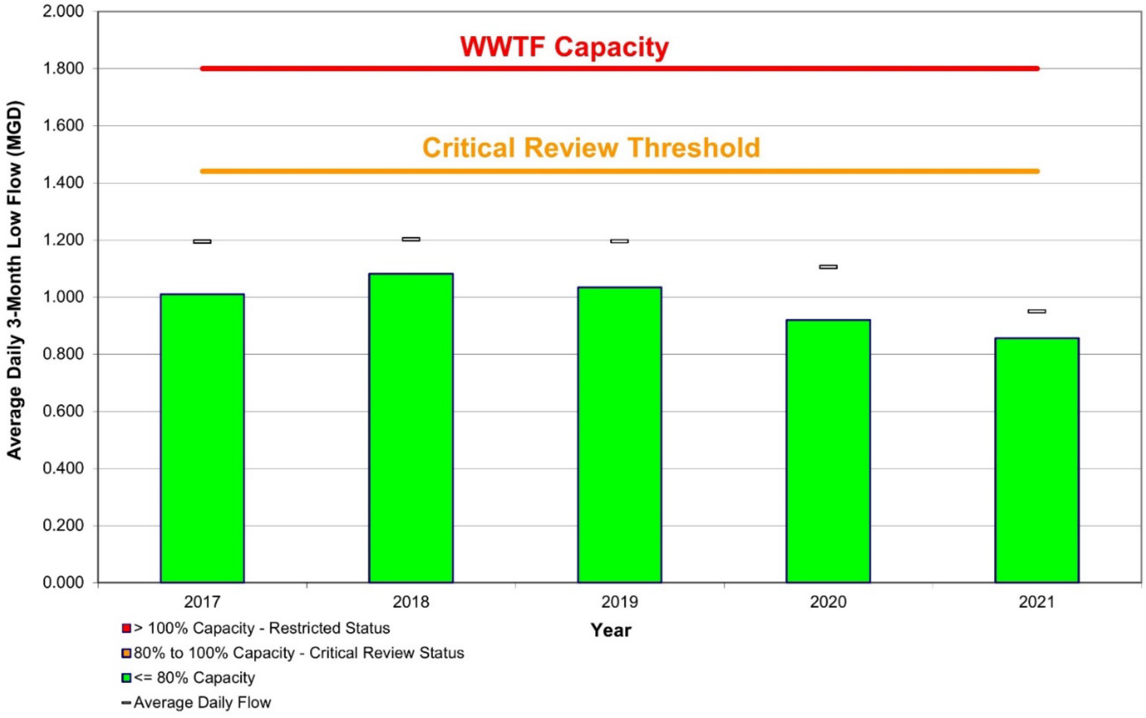


Exhibit No. 4-3: East WWTP 2019 Average Daily Flow

Village of Huntley, IL

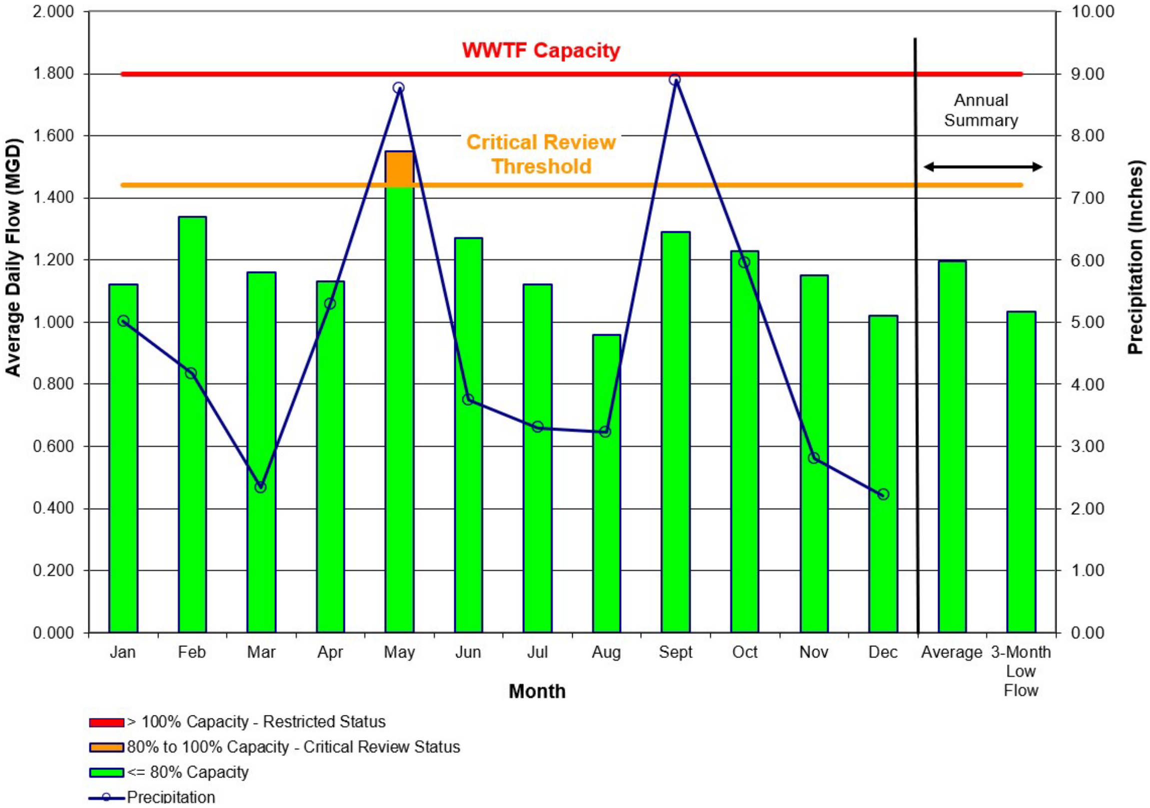


Exhibit No. 4-4: East WWTP 2020 Average Daily Flow

Village of Huntley, IL

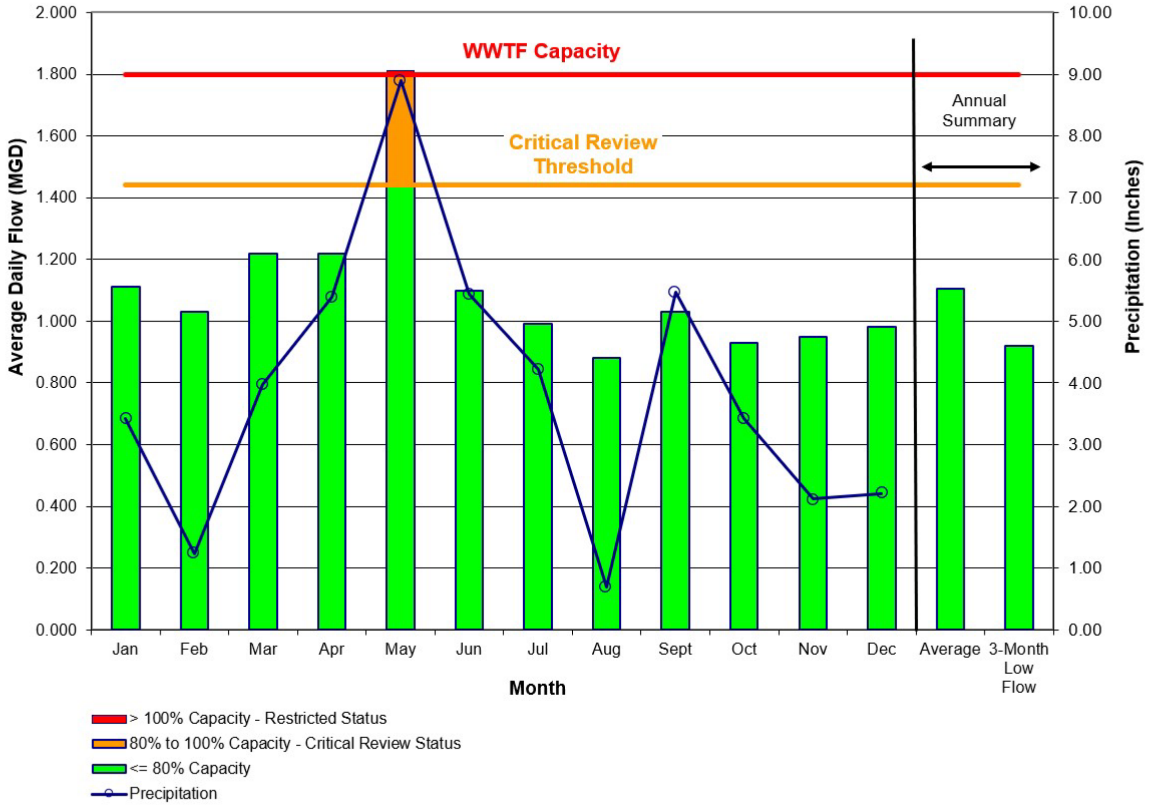
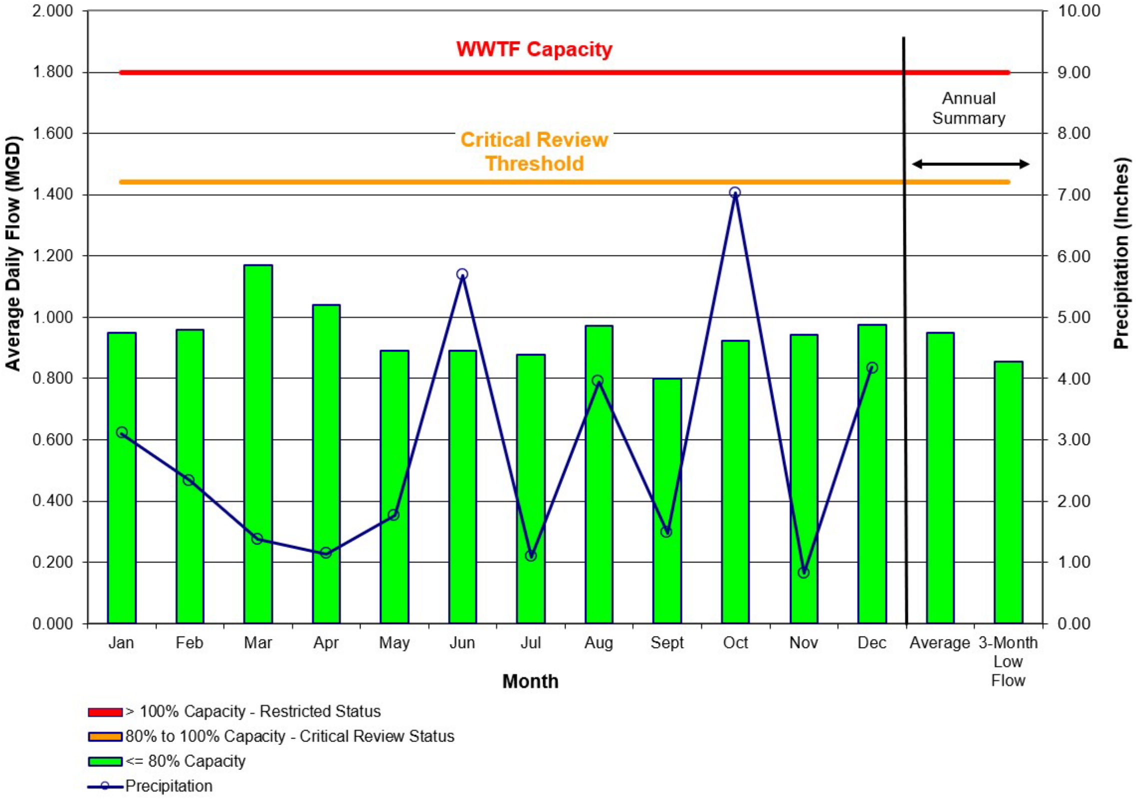


Exhibit No. 4-5: East WWTP 2021 Average Daily Flow

Village of Huntley, IL



The East WWTP Monthly Discharge Monitoring Reports (DMR) were reviewed for the period 2017 – 2021, and the data that was available is summarized in the tables within Appendix C. As the tables show, the plant is operating very well with regard to BOD, Total Suspended Solids (TSS), Barium, and Ammonia reduction, as well as phosphorus removal. It appears that the plant has been able to meet the effluent water quality permit limits for all five years.

Historically, the plant had been challenged to meet the effluent Barium standard of 2.0 mg/L in previous years, but the addition of aluminum sulfate to the west Oxidation Ditch and Secondary Clarifiers Nos.1 – 3 has put that issue to rest. The addition of alum to the biological process reduced the barium levels in the effluent, most likely due to barium sulfate precipitation and settlement in the sludge; so much so, that the plant is not required to test for barium in the effluent any longer in its NPDES permit. The alum feed system also helps to reduce the Total Phosphorus levels of the plant, which is easily meeting the standard of 1.0 mg/L that was added to its NPDES permit in 2021, and mostly meeting the future standard of 0.5 mg/L.

At the time of the previous Master Plan update in 2014, the average BOD influent concentration was 389 mg/L and the maximum was 660 mg/L over the previous five-year time period (where typical domestic waste BOD concentration would be 200 – 250 mg/L), and the East WWTP was receiving influent BOD loads near the design organic loading of the plant. Given the unbalanced hydraulic and organic loading of the plant, and the fact that the Village needed to free up capacity at the plant to take on additional growth within the community, the Village enacted a pretreatment ordinance in 2013. The Village then worked with the community's only significant industrial user, Dean's Foods, to work out a solution to their high strength dairy processing discharges. The solution was for Dean's Foods to install a pretreatment system. Following the installation of the pretreatment system in 2014, the influent organic loading to the East WWTP has receded. The average BOD influent concentration was 256 mg/L over the years 2017 – 2021 with a daily maximum of 441 mg/L.

The IEPA utilizes the average of the three low flow months in a 12 month period plus the capacity defined in the previous two years of sanitary sewer permits to determine the existing hydraulic load on a plant. Based on the average three month low flow values hovering around 1.0 MGD, it can be assumed that the East WWTP is currently loaded to around 55% of its DAF capacity. If we assume the sanitary sewer permits from the previous two years are minimal, and the total hydraulic loading is projected to be at 55% of the DAF, then the plant has 0.82 MGD, or 8,200 P.E., of unallocated capacity remaining at this time, similar to the value from the 2014 Master Plan.

4.2.2 West WWTP

Exhibit No. 4-6 summarizes the recorded Average Daily 3-Month Low Flow in relation to the Average Daily Flow, the West WWTP design capacity, and the Critical Review threshold from 2017 – 2021. Exhibit Nos. 4-7 through 4-9 summarize the West WWTP monthly average daily flows compared to the plant capacity and recorded precipitation for 2019, 2020, and 2021, respectively, for the same reasons as from the East WWTP summary: 2019 had the highest yearly precipitation total on record for the past 5 years, 2020 had the highest incidence of flow to the plant in the past 5 years, and 2021 is a drought year for comparison. A review of Exhibit Nos. 4-6 through 4-9 indicate that flows to the West WWTP are well below the DAF capacity of the plant at 2.6 MGD and the critical review threshold (80% of DAF) of 2.08 MGD. The exhibits also indicate that there is virtually no connection between increased precipitation and increased flows at the plant. Therefore, it is reasonable to conclude there is very low I&I contributing to the sanitary sewer system tributary to the West WWTP. Given the fact that the majority of the sanitary sewer system tributary to the West WWTP is less than 20 years old, this conclusion is logical.

Exhibit No. 4-6: West WWTP Average Daily 3-Month Low Flow

Village of Huntley, IL

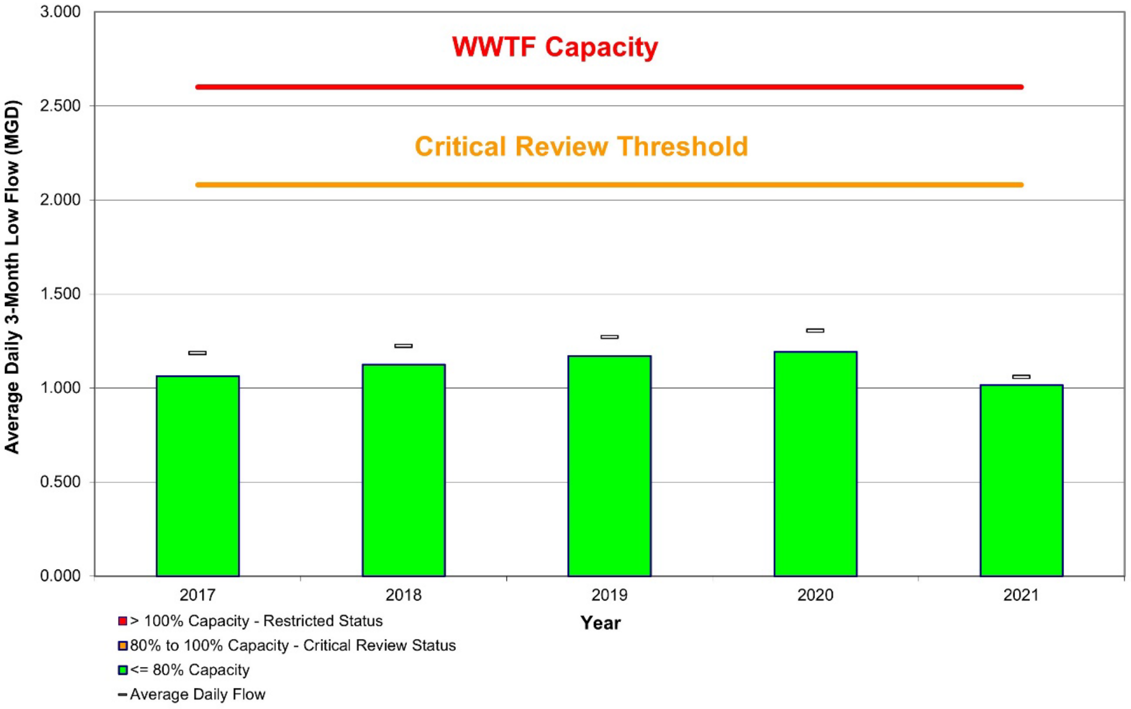


Exhibit No. 4-7: West WWTP 2019 Average Daily Flow

Village of Huntley, IL

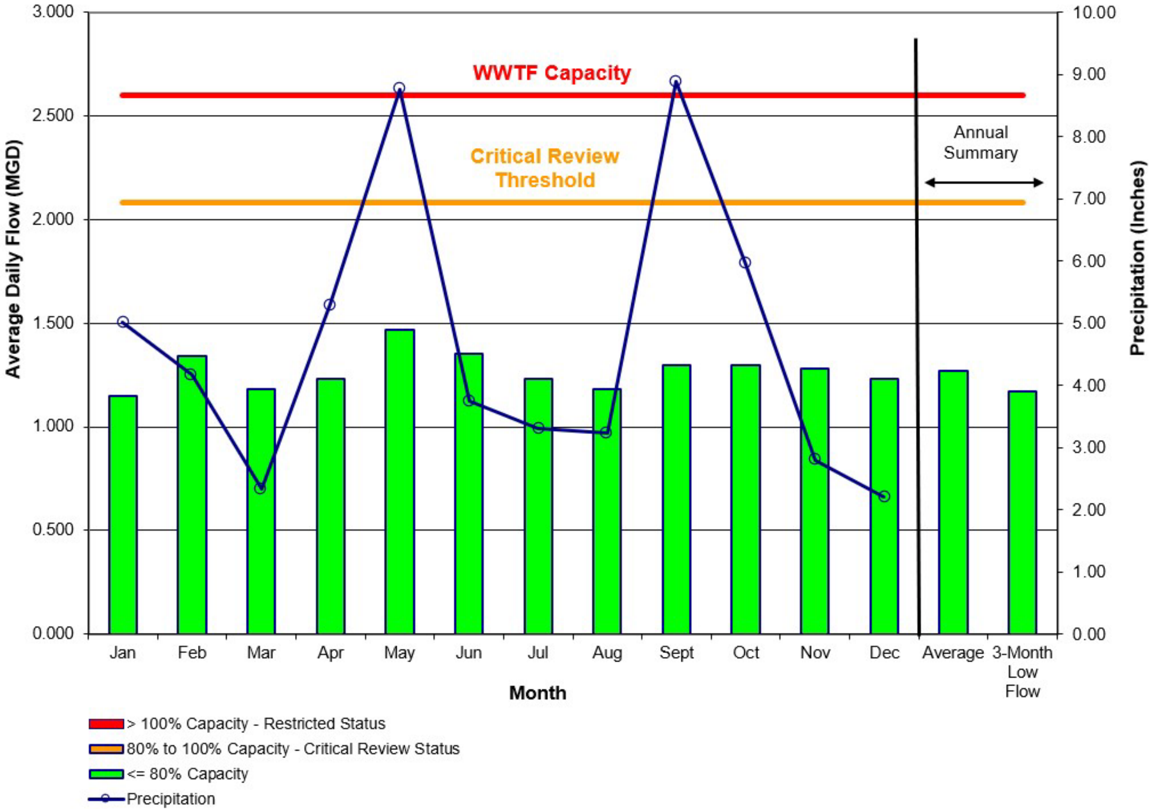


Exhibit No. 4-8: West WWTP 2020 Average Daily Flow

Village of Huntley, IL

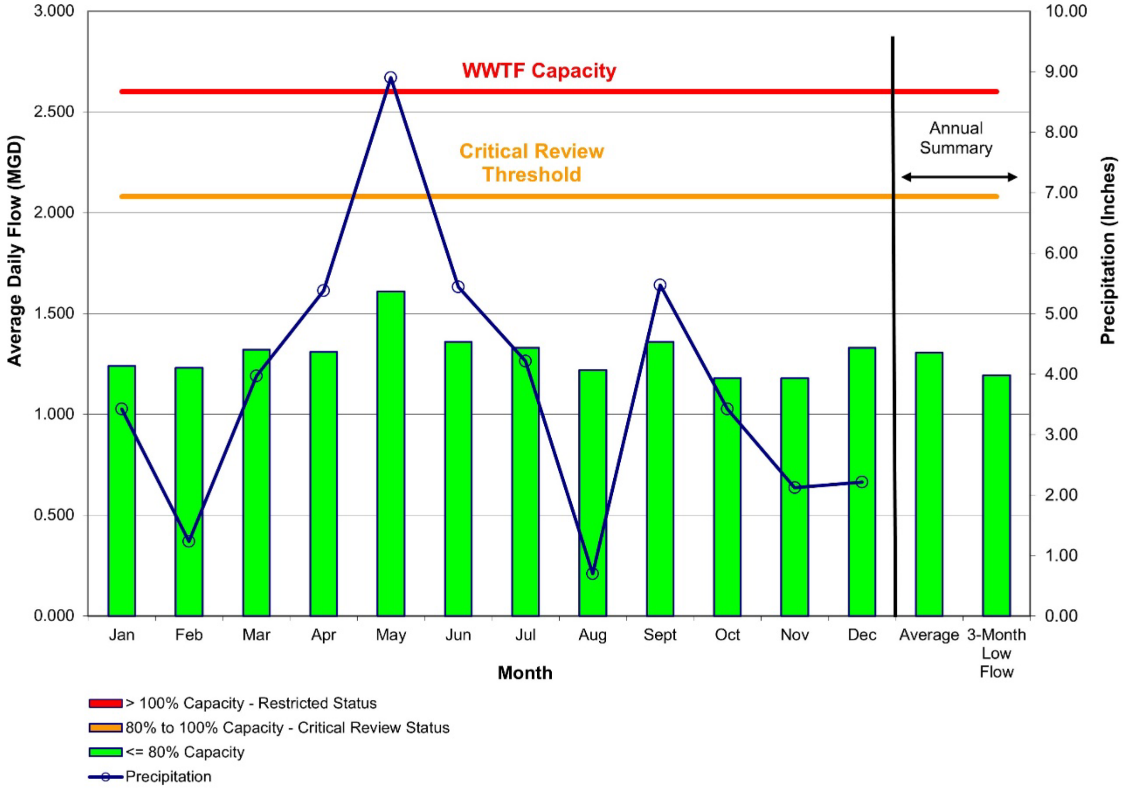
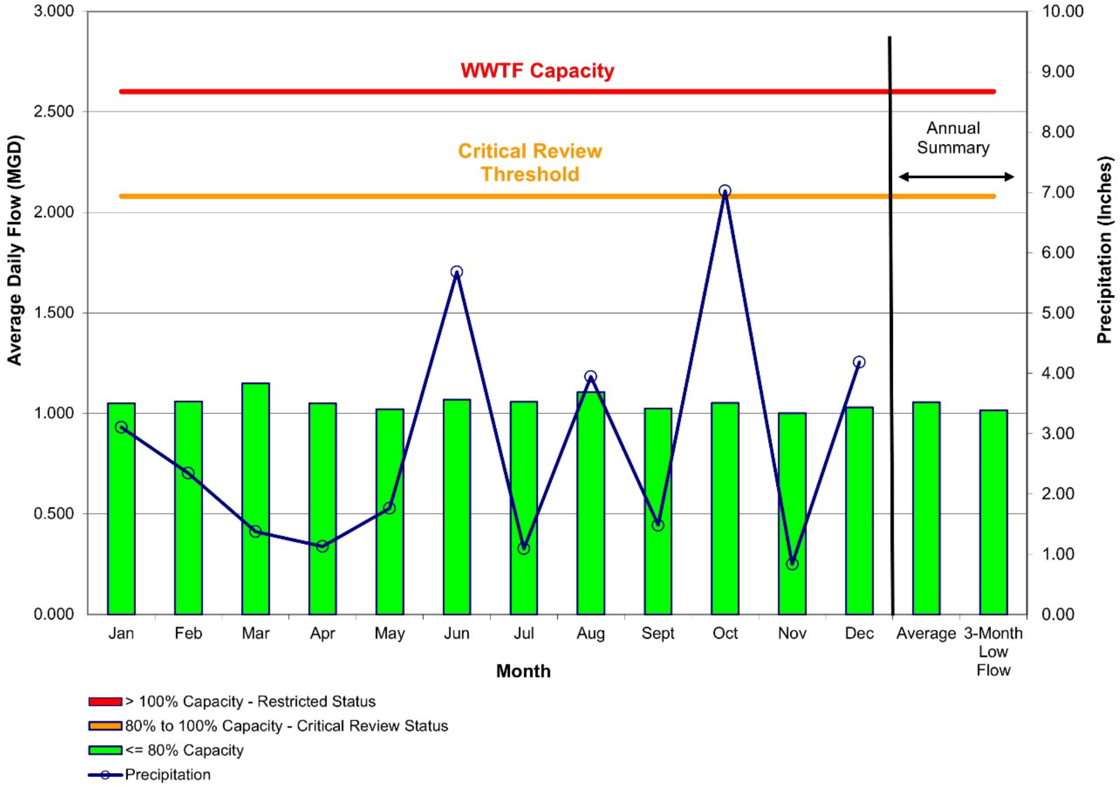


Exhibit No. 4-9: West WWTP 2021 Average Daily Flow

Village of Huntley, IL



The West WWTP Monthly Discharge Monitoring Reports (DMR) were reviewed for the period 2017 – 2021 and are summarized in the tables within Appendix D. As the tables show, based on the data provided by the Village, the plant is operating very well with regard to BOD, Total Suspended Solids (TSS), and Ammonia reduction, as well as phosphorus removal. The effluent water quality has met the permit limits all five years.

Based on the three month low flow values averaging at just above 1.1 MGD, it can be assumed the IEPA would consider that the West WWTP is currently loaded to around 43% of its DAF capacity. If we assume the sanitary sewer permits from the previous two years are minimal, and the total hydraulic loading is projected to be at 43% of the DAF, then the plant has 1.49 MGD, or 14,900 P.E., of unallocated capacity remaining at this time. This figure is slightly decreased from the 2014 Master Plan, which had 1.56 MGD of unallocated capacity.

4.2.3 Systemwide I&I Analysis

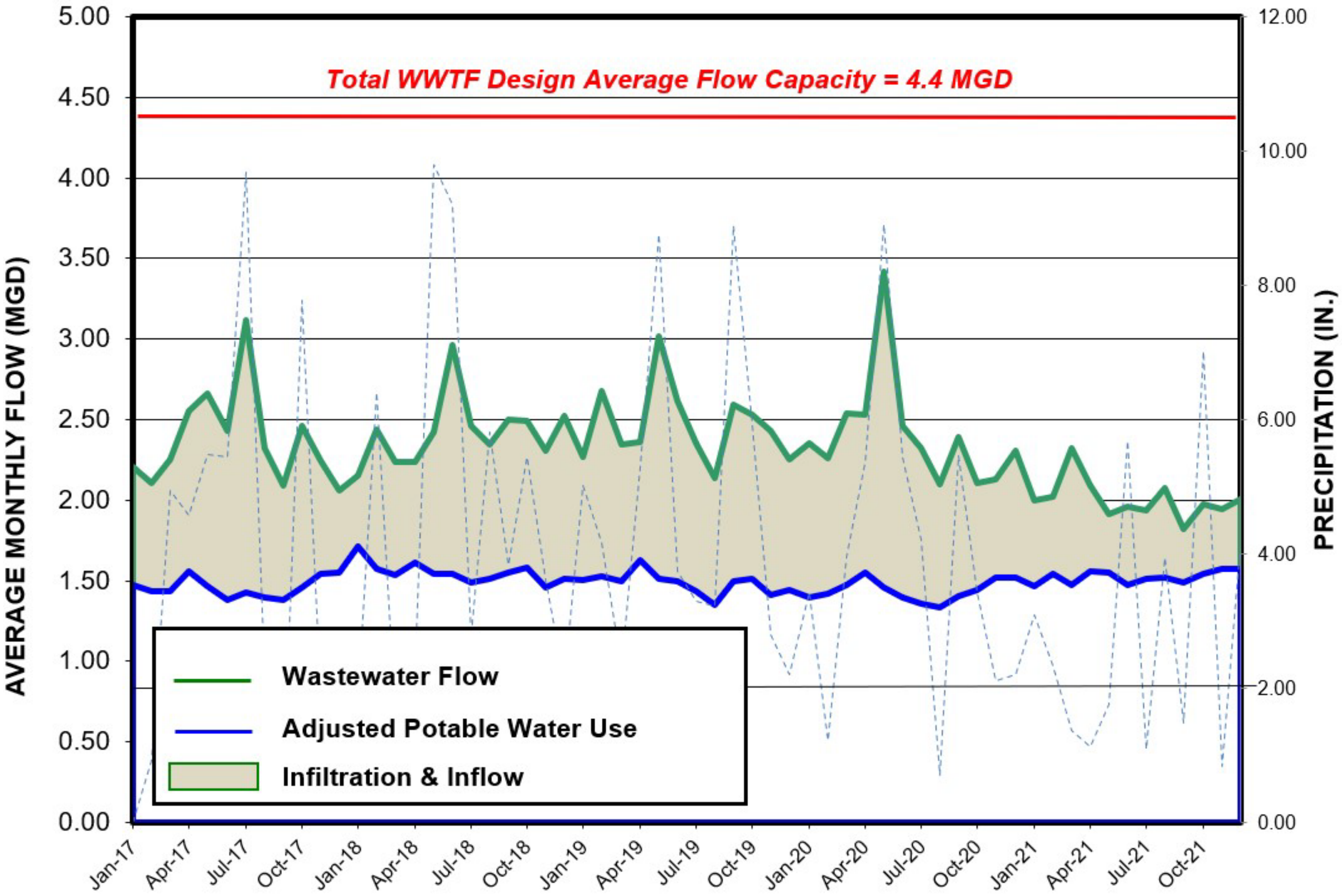
As stated in the previous section, the wastewater collection system appears to allow some I&I into the system, particularly the part of the system tributary to the East WWTP. One way to visually determine the severity of I&I within the system is to compare potable water use to the wastewater flows that arrive at the Village's WWTPs, and Exhibit No. 4-10 provides this comparison. The adjusted potable water use is developed by removing the estimated water use by the Southwind Subdivision (since wastewater from the Southwind Subdivision is sent to the Lake in the Hills Sanitary District), the estimated water loss from potable water distributed from all of the WTPs (estimated at 8%), and the estimated water use from irrigation activities during the months of May through October. More information on irrigation water use and how it was estimated is in Section 5, Projected Water Use and Wastewater Flows. Exhibit No. 4-10 also shows that the I&I contribution at the WWTPs is fairly constant with moderate increases during large rainfall events, which are shown with a dotted blue line. Lastly, it shows that the I&I percentage of flow to the WWTPs is somewhat reasonable, although it is important to note that these figures contain estimates and averages and there is some room for standard error to creep in.

It should be noted that the data for Exhibit No. 4-10 was derived in a manner that deviated slightly from the data for the 2014 Master Plan. For that report, irrigation water was not subtracted from the adjusted potable water use during the summer months, so there were huge spikes in the water use that weren't counted as wastewater flow. This resulted in negative I&I figures for most of the irrigation months, so the average I&I for the dry weather months was used as the amount of I&I for the irrigation months, which lowered the overall I&I percentage from what it should have been. Even so, the average I&I calculated for the years of 2009-2013 was 31% compared to 36% for this report.

A second way to visually determine the severity of I&I within the system and compare the I&I in the collection systems tributary to each WWTP is to compare Exhibit Nos. 4-3 through 4-5 to Exhibit Nos. 4-7 through 4-9. Although the graphs are on a slightly different scale because the West WWTP has a larger capacity, it can be easily seen how the flows to the East WWTP vary more with rainfall than those to the West WWTP, indicating that there is more I&I in the collection system tributary to the East WWTP.

Exhibit No. 4-10: Historical Sanitary Sewer Infiltration & Inflow (Adjusted Potable Water Use Versus Wastewater Flow)

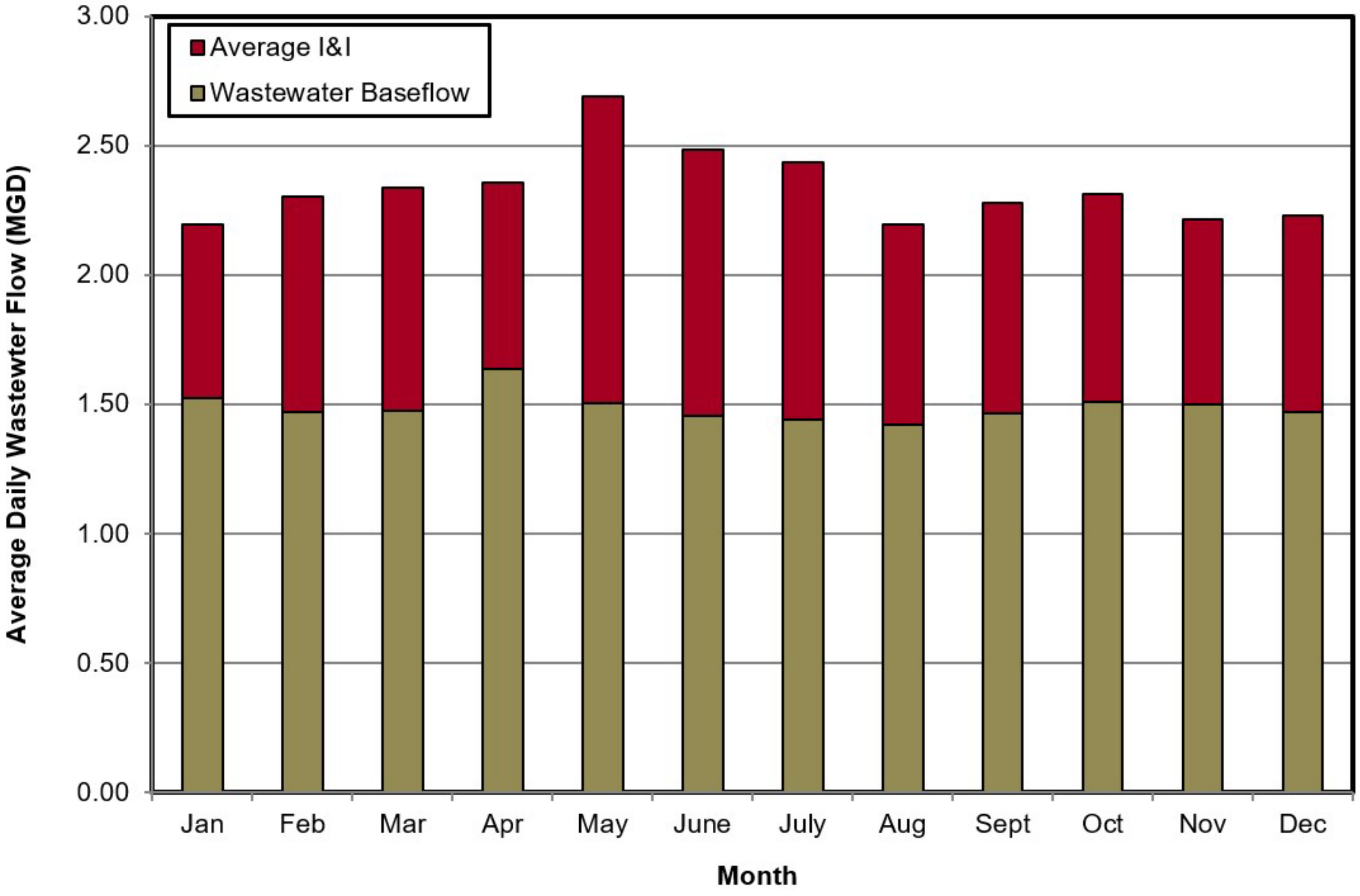
Village of Huntley, IL



The results of the total system analysis are summarized in Exhibit No. 4-11. There is some increase in I&I during Spring and then a gradual decrease into the Fall. Overall, I&I makes up approximately 35% of the influent flow to the WWTPs, although as mentioned previously, there is bound to be some standard error when working with averages and estimates. It is recommended that the Village continue its efforts to rehabilitate the older portions of the Village's sanitary sewer network, but the investment should be targeted and can most likely be implemented over time.

Exhibit No. 4-11: Monthly Average Daily Wastewater Flow (Baseline and I&I)

Village of Huntley, IL



4.3 Historical Water Use & Wastewater Flow Summary

The Village's total water consumption was relatively constant from 2017 – 2021. The average daily water use ranged from 2.1 MGD – 2.6 MGD, and the average water use per person for the five year period was approximately 83 gpcd. The maximum day water use fluctuated more with the weather. The lowest maximum day demand was in 2019 at 4.0 MGD (a wetter than average year), whereas the highest demand was 4.9 MGD in the drought year of 2021. The MDD:ADD ratio ranged from 1.84 – 2.09, and averaged 1.93 for the five year period. Compared to the last analysis from 2014, most of these values have dropped; for example, the average water use per person over the 5 years prior to 2014 was higher at 90 gpcd, and the MDD:ADD ratio was also higher at 2.16, even as the average daily water use has remained roughly the same. This indicates that any water conservation measures that the Village has put into place following the 2014 Master Plan has proven positive results.

The needs assessment calculations for the historical period, as seen in Table No. 4-2, indicate that the Village's demand is near the Village's water supply and treatment capacity; in addition, there is minimal surplus water storage capacity. Additional supply, treatment, and storage capacity will be needed if water demands increase at the current trend.

The wastewater flows to the Village's WWTPs averaged approximately 89 gpcd. While I&I is somewhat minimal in the system (more so to the West WWTP than the East), it averaged about 28 gpcd for the five year period. The total unallocated capacity remaining for the two WWTPs, based on the IEPA's criteria for calculating the hydraulic loading of a WWTP, is approximately 2.28 MGD or 22,800 P.E. Therefore, the Village's WWTPs have a fair amount of rated capacity remaining in the system. As summarized in Table No. 3-3, many of the unit processes at the West WWTP have capacity greater than the rated capacity of the plant. Therefore, not all of the unit processes would require improvements to increase the rated capacity of that plant.

Table No. 4-6 provides a summary of the Village's historical water use and wastewater flows from 2017 – 2021.

Table No. 4-6: Existing Water Use & Wastewater Flow Summary (2017 – 2021)

Village of Huntley, IL

Parameter	Definition	Value
Average Daily Water Use	Annual Daily Average Water Use	2.309 MGD
Average Daily Water Use	Annual Daily Average Water Use	82.6 gpcd
- Average Daily Indoor Water Use	Daily Average Water Use During Non-Irrigation Months (November - April)	1.876 MGD
> Annual Baseline Water Use	Average Daily Indoor Water Use For Entire Year	695.7 MG
- Average Daily Outdoor Water Use	Increase In Daily Average Water Use During Irrigation Months (May - October)	0.808 MGD
> Annual Irrigation Water Use	Increased Water Use Over Annual Baseline For May - October	145.8 MG
> Irrigation Water Use % Of Total Use	Total Annual Irrigation Water As Percentage of Total Annual Water Use	17.3 %
Average Daily Total Wastewater Flow	Annual Daily Average Wastewater Flow	2.336 MGD
Average Daily Total Wastewater Flow	Annual Daily Average Wastewater Flow	91.9 gpcd
- Average Daily East WWTF Flow	Annual Daily Average Wastewater Flow To East WWTF	1.128 MGD
- Average Daily West WWTF Flow	Annual Daily Average Wastewater Flow To West WWTF	1.208 MGD
- Average Daily Wastewater Baseflow	Annual Daily Average Domestic/Commercial/Industrical Wastewater Flow To WWTFs Excluding I&I	1.492 MGD
- Average Daily Wastewater Baseflow	Annual Daily Average Domestic/Commercial/Industrical Wastewater Flow To WWTFs Excluding I&I	58.6 gpcd
- Average Daily Total I&I	Annual Daily Average I&I Within Sanitary Sewer Network	0.844 MGD
- Average Daily Total I&I	Annual Daily Average I&I Within Sanitary Sewer Network	33.3 gpcd

Notes:

Wastewater gpcd based on a population of 25,544 (average of total village population from 2017-2021 minus approximately 2,400 people in Southwind Subdivision)

SECTION 5: PROJECTED WATER USE AND WASTEWATER FLOWS

As indicated in Section 1.6, this Comprehensive Master Plan is being prepared for an approximate 30 year planning period through the year 2050. The population of the Village of Huntley is anticipated to grow at an annual rate of 3.2% of the 2021 population. In addition to the residential growth, the Village also expects commercial and industrial properties to continue to develop at a steady rate thereby increasing the water demand during the next 30 years. With this growth, the water demand and the wastewater flows of the Village's Water Works and Wastewater Systems are expected to grow also.

5.1 Projected Water Use

Understanding that water resources are limited and water use trends are likely to change during the next 30 years, two different water demand scenarios were investigated as part of this Master Plan. The first scenario is based on the Current Trends (CT) of the existing Water Works System, reflecting current demand conditions and recent trends in development. The second scenario is the Less Resource Intensive (LRI) water demand projection, which is based on further intervention by the municipality to optimize water use through water conservation, as some measures have already been put into place.

5.1.1 Current Trends (CT) Water Use Projection & System Evaluation

In Section 1.6, the population projections for the planning period were summarized. The next step is to equate the population to a water use demand per capita. Table No. 5-1 summarizes the total projected CT water use for incremental P.E. increases to the year 2050 population projection of 58,997 (+29,553 P.E.).

As previously identified, the estimated average water use per person per day in the Village of Huntley for the years of 2017 – 2021 is approximately 83 gpcpd, which is lower than the value identified for the 2014 Master Plan at 90 gpcpd. Therefore, for the CT projected water use analysis, a water use per capita per day of 83 gallons was used to project the demand to 2050. This projection assumes the proportion of the residential water use to all other types of water users will remain the same into the future. The CT MDD and MHD for the planning period were established utilizing the previously discussed MDD:ADD ratio of 1.93 and an MHD:MDD ratio of 2.0.

Table No. 5-2 summarizes the CT projected water capacity analysis for the same incremental P.E. increases to the year 2050 population projection. Table No. 5-3 indicates the corresponding excess or required capacity needed to meet 100% of each of the test parameters. Tables No. 5-2 and 5-3 consider all existing active wells are online and that each water treatment plant is available to meet the Village's water demand.

Table No. 5-1: Projected Water Use – *Current Trends*

Village of Huntley, IL

YEAR **ESTIMATED POPULATION**	**2017 - 2021 Average**	**2026 (est.)** ***34,444***	**2031 (est.)** ***39,444***	**2036 (est.)** ***44,444***	**2041 (est.)** ***49,444***	**2046 (est.)** ***54,444***	**2050** ***58,997***
ADDITIONAL POPULATION EQUIVALENTS	--	*+5,000*	*+10,000*	*+15,000*	*+20,000*	*+25,000*	*+29,553*
ANNUAL PUMPAGE	842,757,200 GAL	1,043,480,980 GAL	1,194,955,980 GAL	1,346,430,980 GAL	1,497,905,980 GAL	1,649,380,980 GAL	1,787,314,115 GAL
MAXIMUM MONTHLY PUMPAGE							
MAXIMUM DRY WEATHER MONTH							
AVERAGE DAILY PUMPAGE	2,308,924 GAL	2,858,852 GAL	3,273,852 GAL	3,688,852 GAL	4,103,852 GAL	4,518,852 GAL	4,896,751 GAL
MAXIMUM AVERAGE DAILY PUMPAGE							
MAXIMUM DAILY PUMPAGE	4,466,600 GAL	5,517,584 GAL	6,318,534 GAL	7,119,484 GAL	7,920,434 GAL	8,721,384 GAL	9,450,729 GAL
COMPUTED MAXIMUM HOUR	372,217 GAL	459,799 GAL	526,545 GAL	593,290 GAL	660,036 GAL	726,782 GAL	787,561 GAL
COMPUTED MAXIMUM HOUR	6,204 GPM	7,663 GPM	8,776 GPM	9,888 GPM	11,001 GPM	12,113 GPM	13,126 GPM
AVG. GAL./PERSON/DAY	83 GPCD	83 GPCD	83 GPCD	83 GPCD	83 GPCD	83 GPCD	83 GPCD
RATIO OF MAX. DAY TO AVG. DAY	1.93	1.93	1.93	1.93	1.93	1.93	1.93

NOTES:

1. WATER CONSUMERS (POPULATION) ESTIMATED BASED ON DATA FROM ESRI AND CMAP 2050 POPULATION PROJECTION DATA
2. ASSUMED RATIO OF MAX. HOUR TO MAX. DAY DEMAND (MHD:MDD) = 2.0
3. YEARS 2026 AND ONWARD ASSUME THAT WELL AND WATER TREATMENT PLANT 13, AT 1,000 GPM, ARE OPERATIONAL.

Table No. 5-2: Water Works System Evaluation – *Current Trends*

Village of Huntley, IL

TEST PARAMETERS	YEAR / POPULATION EQUIVALENT INCREASE						
	2017-2021	2026 / +5,000	2031 / +10,000	2036 / +15,000	2041 / +20,000	2046 / +25,000	2050 / +29,553
1.0 Ultimate Source Capacity	501,400 GAL	1,106,416 GAL	305,466 GAL	**-495,484 GAL**	**-1,296,434 GAL**	**-2,097,384 GAL**	**-2,826,729 GAL**
2.0 Reliable Source Capacity	**-146,600 GAL**	**-93,584 GAL**	**-894,534 GAL**	**-1,695,484 GAL**	**-2,496,434 GAL**	**-3,297,384 GAL**	**-4,026,729 GAL**
3.0 Peak Hour Storage	170,133 GAL	**-149,695 GAL**	**-416,678 GAL**	**-683,661 GAL**	**-950,645 GAL**	**-1,217,628 GAL**	**-1,460,743 GAL**
4.0 Fire Flow	2,177,075 GAL	2,301,502 GAL	2,201,383 GAL	2,101,264 GAL	2,001,146 GAL	1,901,027 GAL	1,809,859 GAL
5.0 Emergency Supply	5,414,276 GAL	5,129,148 GAL	4,714,148 GAL	4,299,148 GAL	3,884,148 GAL	3,469,148 GAL	3,091,249 GAL

Table No. 5-3: Water Works System Evaluation – *Current Trends*
Corresponding Available or Required Capacity

Village of Huntley, IL

TEST PARAMETERS	YEAR / POPULATION EQUIVALENT INCREASE						
	2017-2021	2026 / +5,000	2031 / +10,000	2036 / +15,000	2041 / +20,000	2046 / +25,000	2050 / +29,553
1.0 Ultimate Source Capacity	348 GPM	768 GPM	212 GPM	**-344 GPM**	**-900 GPM**	**-1,457 GPM**	**-1,963 GPM**
2.0 Reliable Source Capacity	**-153 GPM**	**-97 GPM**	**-932 GPM**	**-1,766 GPM**	**-2,600 GPM**	**-3,435 GPM**	**-4,195 GPM**
3.0 Peak Hour Storage	170,133 GAL	**-299,390 GAL**	**-833,356 GAL**	**-1,367,323 GAL**	**-1,901,290 GAL**	**-2,435,256 GAL**	**-2,921,486 GAL**
4.0 Fire Flow	2,177,075 GAL	2,301,502 GAL	2,201,383 GAL	2,101,264 GAL	2,001,146 GAL	1,901,027 GAL	1,809,859 GAL
5.0 Emergency Supply	5,414,276 GAL	5,129,148 GAL	4,714,148 GAL	4,299,148 GAL	3,884,148 GAL	3,469,148 GAL	3,091,249 GAL

Notes:
1. Assumes wells are operating 16 hours/day for Reliable Source Capacity.
2. Years 2026 and onward assume that Well and Water Treatment Plant 13, at 1,000 GPM, are operational.

Inspection of Table Nos. 5-2 and 5-3 indicates that additional P.E. exacerbates the deficit for the water supply parameters *Ultimate Source Capacity and Reliable Source Capacity,* even with Well and WTP No. 13 online by 2026, as well as the water storage parameter *Peak Hour Storage.* By 2050 the *Reliable Source Capacity* water supply deficit is estimated at approximately 4,200 GPM whereas the *Peak Hour Storage* deficit is estimated at approximately 3.0 million gallons. The system continues to be adequate for the *Fire Flow* and *Emergency Supply* analysis for the planning period.

5.1.2 Water Conservation Goals and Strategies

As part of the Master Plan, the Village is interested in understanding the potential reduction in future water system capital improvements resulting from a Less Resource Intensive (LRI) demand scenario for the Village. The LRI demand scenario is calculated based on water conservation practices that are judged to be suitable for the Village based on a variety of factors including regional climate, and political and social appropriateness.

To define a reasonable LRI demand scenario, a systematic process was used to efficiently review available information, select relevant water conservation strategies, and calculate estimated savings. The resulting water demand savings are applied to the baseline water use projections developed for the Master Plan and the LRI demand scenario can be established. As compared to the 2014 Master Plan where the entire LRI reduction was applied for every population increment in the planning period, here the LRI reduction is applied in a more realistic stepwise manner, as any conservation improvements would be applied over time rather than all at once, immediately.

5.1.2.1 Water Use Review – In the first step, baseline water use was reviewed and further analyzed to better understand the allocation of water across the Village's customer base and categories relevant to water conservation planning.

The first water use breakdown focused on defining the Village's water use in the categories of indoor use, outdoor use, and non-revenue water. These categories are important because they represent the most common three areas where water conservation strategies can be applied to reduce water use in any community.

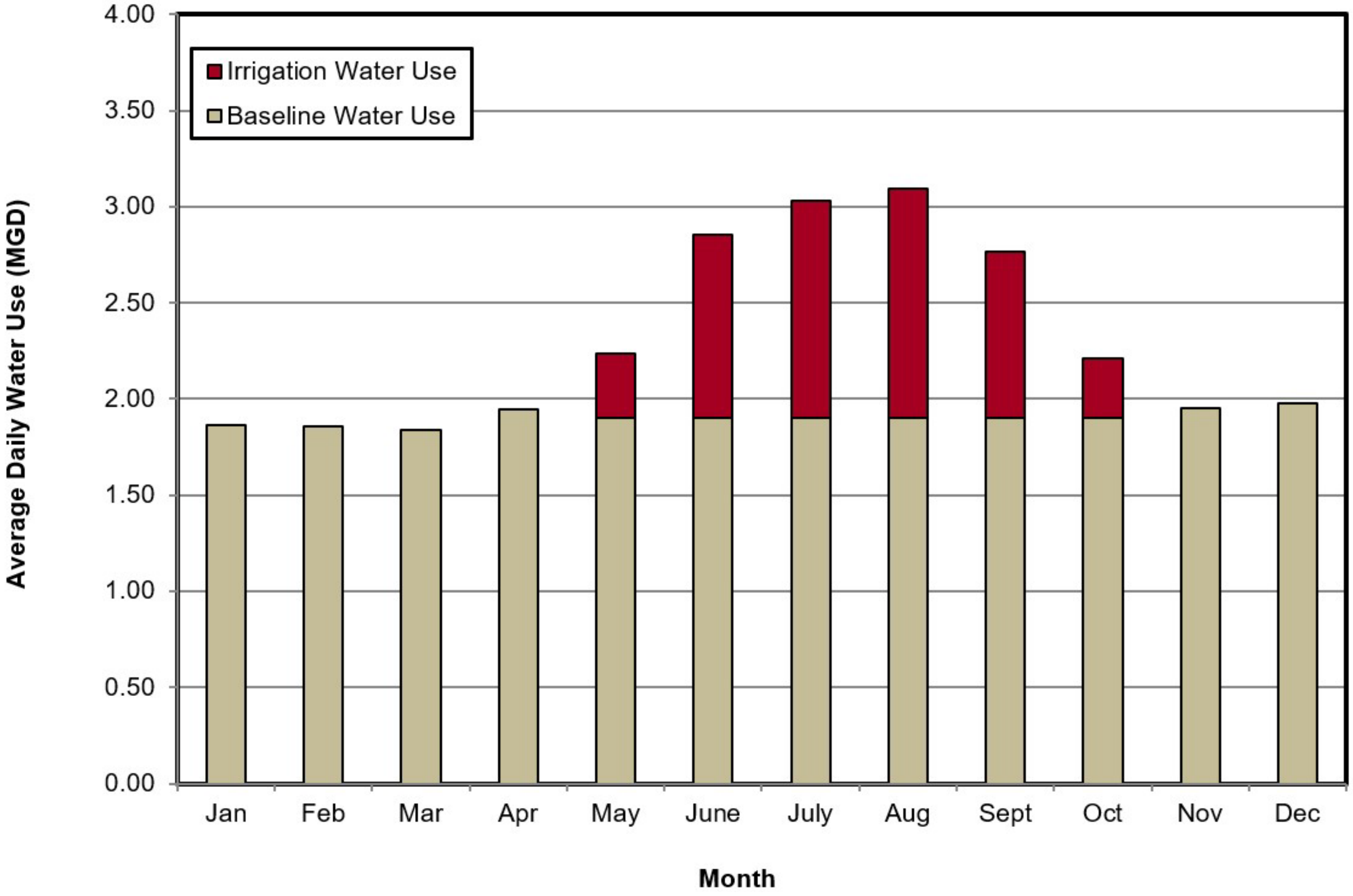
Outdoor water use as a percentage of annual water use is calculated by first estimating the average water use during the cool weather months of November through April. This average water use can be considered the baseline indoor use because air temperature and precipitation in the Midwestern United States during the November to April timeframe limits the need for outdoor water use. This calculation was performed for the period of 2017 through 2021 and an average baseline demand for each calendar year was established. To calculate the estimated irrigation use during the months of May through October, the baseline daily demand was subtracted from the average daily demand for each irrigation month in 2017 through 2021, averaged for every month, and added together for an average annual irrigation water use representative of the years 2017-

2021. The average annual irrigation use was then divided by average total water use; based on this calculation, the average amount of outdoor water use from 2017 – 2021 was approximately 17.3% of the total water use, around 22% lower than the 22.2% from 2014, which is yet another indicator that implemented water conservation measures since the 2014 Master Plan have had a positive effect.

Exhibit No. 5-1 summarizes the monthly analysis for the time period. Not only has the average irrigation use decreased from the 2014 Master Plan, but the peak values have decreased as well, from almost 3.5 MGD for the month of July in the 2014 report to just over 3.0 MGD here.

Exhibit No. 5-1: Average Daily Water Use – Baseline & Irrigation (2017 – 2021)

Village of Huntley, IL



In any water utility, there is a difference between the amount of source water obtained and the total amount of water that the utility can reasonably account for in terms of customer billing and estimates. This water is often referred to as non-revenue water. As previously discussed in Section 4.1.3, an analysis of the Village's annual water production was performed and it was estimated that the real losses associated with the distribution system is approximately 11% of the annual water pumpage, using the year 2020 as a basis – even though the pandemic may have altered water use slightly. In terms of water conservation, this number reflects the baseline amount of water loss that the Village can work to decrease through utility best management practices. As the average value from 2014 was 14%, it would appear that the Village has effected positive change with its water losses, although the value for this report is a snapshot of a single year, and not an average of the five years prior.

The second analysis focused on a review of the Village's water use by customer class. As shown previously in the Village's 2021 Water Consumption by Customer Class in Section 4.1.2, single- and multi-family residential customers account for approximately 83.5% of the total annual billed water. Industrial and commercial users account for 15.5%. The remaining 1.0% of the total annual water usage is divided between schools, manufacturing, church, and government. This has changed slightly since 2014, where 5% of residential use switched to industrial/commercial in the interim years.

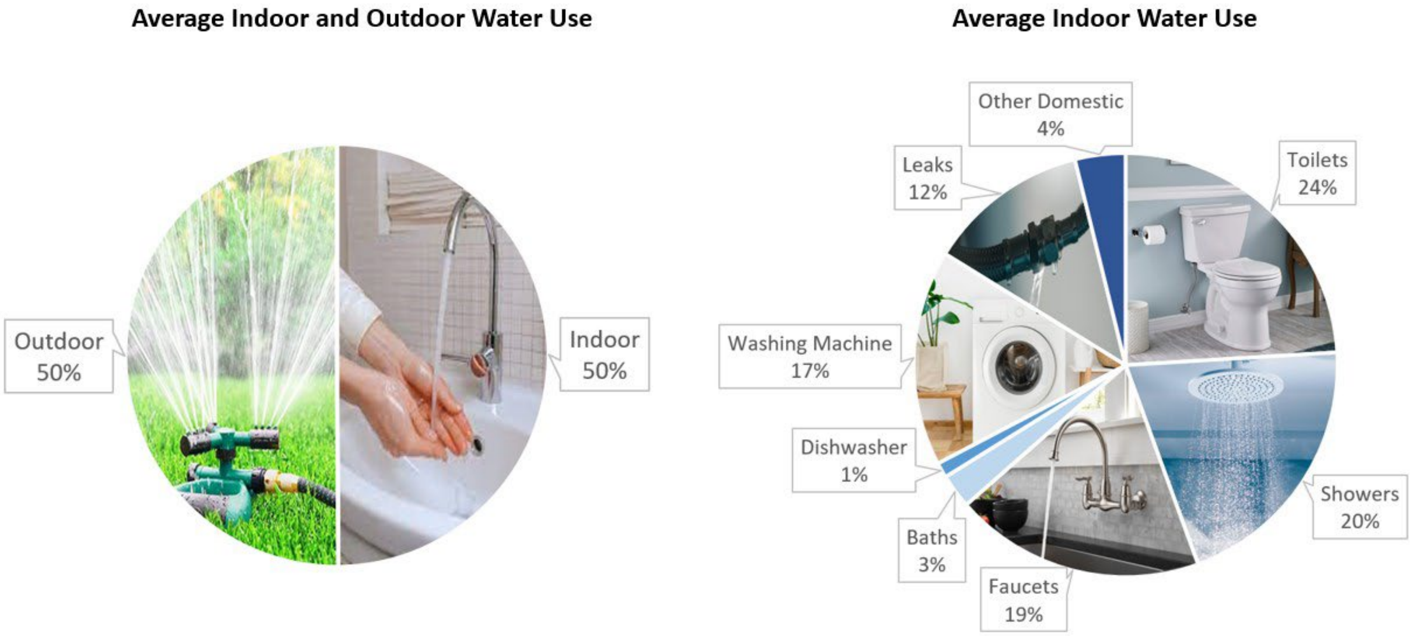
Because the Village's water is used predominately by residential customers, significant water savings can be realized from conservation programs that specifically address residential water use. To better understand potential areas for water savings inside residential properties, a review was performed of typical indoor water uses in a single-family home. Exhibit 5-2 illustrates how the average residential household in the United States uses water, with an approximate 50% of their water use for outdoor use and 50% for indoor use, which is a rise in outdoor usage from past years. While an annual average outdoor water use is approximately 50% for the United States, which includes many arid states, outdoor water use in the Midwest likely is much lower than that value. Average water use as a whole in Illinois is 30% lower than the national average of 276 gpd, standing at 194 gpd. It is unknown whether a study has evaluated the Midwest or Illinois outdoor water use specifically, but past master plans completed by EEI have determined that average outdoor water use in the City of South Elgin and Village of Algonquin are 10% and 6%, respectively. At 17%, the Village of Huntley's outdoor water use is well below the national average but still above its regional neighbors. Given the high amount of outdoor water use, there is certainly an opportunity to further conserve water by reducing a portion of the outdoor water use that is wasted.

In addition to water savings on the outdoor water use side, there also are some opportunities where additional water conservation approaches on indoor water use can make an impact on overall water use. For instance, Exhibit No. 5-2 shows the estimated indoor water use breakdown, which indicates toilets and showers are the top two indoor water users with approximately 24% and 20% of indoor water use, respectively.

Several conclusions relevant to potential water use reductions from water conservation were made from this analysis. First, because the Village's customer base is mainly residential, significant water savings can be realized from conservation programs that specifically address residential water use, and in fact, have already been realized to some degree. In addition, outdoor water use on average is approximately 17% of total annual water use. Since it is likely that a portion of the outdoor water use is wasted and the fact that outdoor water use drives the maximum day demands on the Water Works System, it would seem reductions in outdoor water use could make a big effect on the total water use within the community and create a considerable cost savings. Finally, real losses for the Village are estimated at 10.6% and the Village could realize water savings in this category by further implementing utility best management practices.

Exhibit No. 5-2: Average Indoor and Outdoor Water Use in a Residential Single-Family Home

National Average



Average Indoor and Outdoor Water Use

Average Indoor Water Use

- 80 – 90% of the outdoor component of residential water use goes to watering lawns, plants, and gardens
- Nonresidential outdoor water use is largely devoted to turf irrigation

- Source: Water Research Foundation. “Residential End Uses of Water, Version 2”, 2016
- Indoor use data based on average use in a single-family home – 137.8 gallons per capita per day

5.1.2.2 BMP Overview – In the second step, drivers, goals, and criteria for evaluating potential water conservation programs are evaluated and an inventory is made of all potential water saving measures or strategies. These have remained mainly unchanged since the 2014 Master Plan.

The current drivers for implementing water conservation in the Village of Huntley are a combination of stewardship and cost savings. In recent years, the Village has taken a proactive approach to increasing its focus on sustainability across all parts of the Village’s operation. Water is a finite and precious resource and water conservation is an area that the Village has a significant opportunity to influence leadership provided by the Water Department. Therefore, as part of this Master Plan, a goal was established to calculate further potential water savings that could be achieved with conservation strategies relevant to Huntley.
The Village also wanted to understand the potential reduction in future water system capital requirements that would result from a Less Resource Intensive (LRI) demand scenario for the Village in the planning year of

2050. Water conservation has been demonstrated as a cost effective strategy to reduce capital expenditures by deferring system improvements associated with expanding infrastructure to meet increasing water demands. The water conservation measures already implemented by the Village have yielded positive results, which have been discussed in a comparison of historical water use and will be discussed later in this section with projected water demands.

The Village's current philosophy regarding water conservation is that education is a key first step in creating awareness around the Village's finite water supply and has been involved with student and adult outreach in this area. The next step in promoting water conservation is further implementation of water conservation programs that have already resulted in measurable water savings.

Potential water savings estimated for the LRI scenario should be determined by selecting water conservation best practices that would result in further measurable water savings, are relevant to the Village of Huntley, and would be reasonably accepted by the local community.

A review of best management practices in water conservation was performed with the goal of creating a consolidated list of the potential options to use as a basis for the estimated water savings for the Village's LRI demand scenario. In the context of water conservation, a Best Management Practice (BMP) consists of generally accepted conservation measures or incentives that directly or indirectly result in proven, beneficial, and cost-effective water savings. BMPs vary depending on local or regional water-use characteristics and demand reduction needs.

While water conservation has become more relevant in the Midwestern United States, other parts of the country including California have experienced decades of drought and have applied water conservation to help address serious water supply challenges. The most popular set of water conservation BMPs were developed as part of The California Memorandum of Understanding (MOU) Regarding Urban Water Conservation in California. The document has been signed by more than 260 water utilities, public advocacy organizations, and other interested groups who are members of the California Urban Water Conservation Council and are committed to ensuring adequate water supply to residents of California. A set of 14 BMPs are outlined in the MOU and provide guidelines on the expected water savings and requirements for program implementation.

The BMPs developed for the California MOU were selected because they have proven significant conservation benefits, are technically and economically feasible, are environmentally and socially acceptable, and are not otherwise unreasonable for most water suppliers to carry out. These BMPs have been adopted by water utilities across the United States and recently were evaluated and adopted by the Chicago Metropolitan Agency for Planning (CMAP) document titled *Water 2050: Northeastern Illinois Regional Water Supply/Demand Plan* (CMAP Plan). CMAP, the official regional planning agency for northeastern Illinois, released their Water Supply and Demand Plan in March of 2010, which includes a set of 13 water conservation measures and recommendations for demand management. These recommendations are based on the BMPs developed for the California MOU.

Table No. 5-4 provides a summary of the 13 recommendations from the CMAP Plan which were determined to be relevant for the Northeastern Illinois region. These BMPs address each of the main categories of water use within the Village including indoor, outdoor, and non-revenue water as well as a variety of customer classes such as residential and non-residential customers.

The BMPs presented in the CMAP Plan represent demonstrated, successful water conservation programs each with specific water conservation measures and incentives that contribute to the program's success. A *water conservation measure* is a device or practice that results in a more efficient use of water and reduces water demand. A *water conservation incentive* increases customer awareness about the value of reducing water use and motivates water users to implement conservation or efficiency measures. Successful water conservation programs appropriately match measures with incentives to drive reduction in water use.

5.1.2.3 BMP Selection – During the third step, the BMPs and other conservation measures are evaluated for their relevance to the Village of Huntley and potential water savings are estimated.

Table No. 5-5 presents a summary of the evaluation of CMAP Plan BMPs with respect to their relevance for the Village of Huntley. All of these BMPs were determined to be relevant for the Village in 2014 and continue to be relied on for measurable water savings. The BMPs address all the areas that were previously identified as high potential water savings for the Village including residential water use, outdoor water use and non-revenue water. Potential water savings for each BMP were calculated and are discussed in more detail in this section. Because the CMAP Plan recommended BMPs are comprehensive and include programs that address each of the areas of water savings within the Village, no additional water conservation measures were selected for incorporation into the LRI water demand scenario.

As indicated in Table No. 5-5, all of the CMAP Plan recommended BMPs are relevant for the Village of Huntley. The Village is already metering all of their customers based on the volume of water that each customer uses, and in 2017 put a separate meter on irrigation lines with an alternate monthly rate. This practice is fundamental to water conservation program success because volumetric metering allows customers to see the impacts of their behaviors and changes in hardware. It is recommended that the Village continue to follow this practice. Another key output of the BMP evaluation is that baseline education and public outreach activities are essential elements to support all other water conservation programs. The Village has already taken steps to implement education and public outreach programs and should continue to do so to increase these activities as the Village moves forward with other conservation programming.

Table No. 5-4, Part 1: Evaluation of Best Management Practices (BMPs) for Water Conservation

Village of Huntley, IL

Conservation Program Description	RWSP Number	California MOU Number	Utility	All Customers	Residential	Non-Residential	Purpose/Description	Description of Basis for Water Savings	Low Estimate from RWSP (mgd)	High Estimate from RWSP (mgd)	Program Cost	Implementation Obstacles
System Water Audits, Leak Detection and Repair	6	1	x				To perform a water audit by the water utility which consists of compiling the consumptive uses and losses of water managed in a single system; losses can be either apparent (paper losses due to metering and billing errors) and real losses (physical losses including leakage from distribution mains, customer service lines and overflows from distribution system tanks to storage facilities).	A leak-free water system is not a technically feasible or an economic objective, but a good rule of thumb is that losses should not constitute more than 10% of the total volume of water entering the system	5.9	29.7	Varies for each utility based on the amount of water loss and reduction goal	Utility staff capacity
Metering with commodity rates for all new connections and retrofit of existing connections	7	2	x				To bill customers for the volume of water they use which is measured by meters for each customer; require that each new connection is metered and provide meters to all existing connections without a meter; maintain a record of all meters including testing, repair and replacement schedule and status.	Assume meter retrofits and volumetric rates combined will result in a 20% reduction in demand for retrofitted accounts.	30.3	31.5	Utility: meter purchase, meter installation	Utility investment cost
Retail Conservation Pricing	11	3		x			To provide economic incentives (a price signal) to customers to use water efficiently. Because conservation pricing requires a volumetric rate, metered water service is a necessary condition of conservation pricing; can include a uniform rate, seasonal rate, tiered rate or allocation-based rate.	Not quantified			Utility: administrative; Customer: increased water bill	Utility staff capacity, political will
Water Waste Prohibition for residential and non-residential customers	8	4		x			Standard Accounts: To enact and enforce measures prohibiting gutter flooding, single pass cooling systems in new connections, non-recirculating systems in all new conveyer car wash and commercial laundry systems, and non-recycling decorative fountains. Large-Landscape: To provide non-residential customers with support and incentives to improve their landscape water use efficiency; should include landscape water use analysis/surveys, voluntary water use budgets, and when cost effective, include the following: installation of dedicated landscape meters, training in landscape maintenance and irrigation design, and financial incentives such as loans, rebates, or grants for the purchase and/or installation of water efficient irrigation systems. Regular-Landscape: To provide residential customers with clear information and guidelines on when to water outdoor landscapes and provide a financial incentive (fine or additional fee) when water schedules are broken.	Not quantified Assume landscape surveys and assistance will result in a 15% reduction in demand for landscape water use by accounts that participate in survey/assistance programs.	12.1	60.3	Political will (i.e. ordinance creation); Utility: enforcement Utility: survey/budget calculation; Customer: hardware investment	Political will (i.e. ordinance creation); Utility staff capacity for enforcement Investment cost, social mindset
Conservation Coordinator	1	5		x			To designate a water conservation coordinator (and support staff if necessary) whose duties would include the following: coordination and oversight of conservation programs and BMP implementation; preparation and submittal of annual implementation report; communication and promotion of water conservation issues to utility management, operations and planning staff; preparation of annual conservation budget; and coordination with other regional utility conservation specialists. Agencies jointly operating regional conservation programs are not intended to have staff duplication and redundant conservation coordinator positions.	Not quantified	na	na	Utility: variable	Utility staff capacity
School Education Programs	13	6		x			To educate students in the service area about water conservation and efficient water use; program examples include: working with school districts and private schools to provide instructional assistance, education materials, and classroom presentations that identify urban, agricultural, and environmental issues and conditions in the local watershed. Education materials shall meet the state education framework requirements, and grade appropriate materials shall be distributed to grade levels K-3, 4-6, 7-8, and high school.	Not quantified	na	na	Variable depending on the scale, frequency and type of public programs; school district: administrative; government advocates: programmatic	Already full classroom curriculum

Table No. 5-4, Part 2: Evaluation of Best Management Practices (BMPs) for Water Conservation

Village of Huntley, IL

Conservation Program Description	RWSP Number	California MOU Number	Utility	All Customers	Residential	Non-Residential	Purpose/Description	Description of Basis for Water Savings	Low Estimate from RWSP (mgd)	High Estimate from RWSP (mgd)	Program Cost	Implementation Obstacles
Public Information Programs	12	7		x			To promote and educate customers about water conservation and water conservation benefits; program examples include: providing speakers to employees, community groups and the media; using paid and public service advertising; using bill inserts; providing information on customers' bills showing use in gallons per day for the last billing period compared to the same period the year before; providing public information to promote water conservation practices; and coordinating with other government agencies, industry groups, public interest groups and the media.	Not quantified	na	na	Variable depending on the scale, frequency and type of public programs	Difficult to quantify cost/benefits; investment cost
Water Survey for Residential Customers	2	8			x		To conduct on-site survey and assessment of water-using hardware, fixtures, equipment, landscaping, irrigation systems and management practices to determine the efficiency of water use and to develop recommendations for improving indoor and outdoor water-use efficiency for residential customers.	Dependent on house age, device, leaks, etc. customers to see 3 - 20 gpcpd reduction in indoor water use and 10% reduction in outdoor water use if they implement the recommendations from the survey	0.1	0.7	Utility: hardware, administrative; customer: lead repair	Utility staff capacity, investment cost, customer cooperation
Residential Plumbing Retrofit	3	9			x		To provide assistance and resources to residential customers to help them change, alter, or adjust plumbing fixtures or other equipment or appliances to save water or make them operate more efficiently; typically includes the replacement of shower heads and sink faucets	Assume between 2.9 - 7.2 gpcpd water savings from low-flow showerhead retrofit and 1.3 gpcpd water savings for toilet retrofit	5.2	26.0	Utility: administrative/programmatic (rebate); Customer: cost or retrofit equipment	Utility staff capacity, investment cost of retrofit equipment, customer cooperation, rebate program funding
High-Efficiency Clothes Washing Machine Financial Incentive Replacement	5	10			x		To encourage the replacement and purchase of high-efficiency clothes washing machines by providing incentives (such as rebates, bill credits, and tax incentives) to water customers; Could include partnering with energy utilities or government organizations; applies to residential customers.	Water use by clothes washers is typically the second largest source of indoor residential water demand, representing 21.7% of indoor water use. Assume 4,200 gal/year/household of water savings for each high-efficiency clothes washing machine replacement.	3.2	16.1	Sponsor: rebate offer; Customer: purchase price minus rebate	Utility staff capacity, organization support from regional/county agency
Residential Ultra Low Flush Toilet Replacement Program	4	11			x		To encourage the replacement and purchase of Ultra Low Flush Toilets (1.6 gal or less) by providing incentives (such as rebates, bill credits, and tax incentives) to water customers; Could include partnering with energy utilities or government organizations; applies to residential customers.	Water use by toilets is typically the largest source of indoor residential water demand, representing 26% of indoor water use for the average non-conserving household. Assume 4,000 - 11,000 gal/year/household of water savings for each ultra low flow toilet replacement.	15.0	74.8	Sponsor: rebate offer; Customer: purchase price minus rebate	Utility staff capacity, organization support from regional/county agency
Conservation Programs for Commercial, Industrial, and Institutional Accounts	10	12				x	To provide assistance and incentives to commercial, industrial and institutional customers to encourage them to improve indoor and outdoor water-use efficiency; program can include replacement of existing toilets with ultra-low-flush toilets, water-use surveys, incentives and performance targets.	Savings is variable, depending on action taken	5.0	25.2	Utility: survey administration; Customer: hardware investment	Utility staff capacity; Customer cooperation, feasibility
Efficient Water Use Landscaping for Large Landscape Areas	9	13				x	To provide non-residential customers with support and incentives to improve their landscape water use efficiency; should include landscape water use analysis/surveys, voluntary water use budgets, and when cost effective, include the following: installation of dedicated landscape meters, training in landscape maintenance and irrigation design, and financial incentives such as loans, rebates, or grants for the purchase and/or installation of water efficient irrigation systems.	Assume landscape surveys and assistance will result in a 15% reduction in demand for landscape water use by accounts that participate in survey/assistance programs.	1.0	5.1	Utility: survey/budget calculation; Customer: hardware investment	Investment cost, social mindset

Adapted from the Memorandum of Understanding regarding Urban Water Conservation in California and the CMAP Plan

Table No. 5-5: Summary of BMP Evaluation for the LRI Water Demand Scenario

Village of Huntley, IL

Conservation Program Description	Sector Focus	Recommendations for Huntley
System Water Audits, Leak Detection and Repair	Utility	●
Metering with Commodity Rates for All Customers	Utility	○
Retail Conservation Pricing	All Customers	○○
Water Waste Prohibition for Residential and Non-Residential Customers	All Customers	●
Conservation Coordinator	All Customers	☐
School Education Programs	All Customers	
Public Information Programs	All Customers	
Water Survey for Residential Customers	Residential	☐
Residential Plumbing Retrofit	Residential	●
High-Efficiency Clothes Washing Machine Financial Incentive Replacement	Residential	●
Residential Ultra Low Flush Toilet Replacement Program	Residential	●
Conservation Programs for Commercial, Industrial, and Institutional Accounts	Non-residential	●
Efficient Water Use Landscaping for Large Landscape Areas	Non-residential	☐

Legend	
Symbol	**Symbol Description**
●	Recommended for the Village of Huntley - Potential water savings estimated for the LRI water demand scenario
○	Currently being completed by the Village of Huntley - No additional water savings estimated
○○	Recommended for the Village of Huntley - No additional water savings estimated due to political nature of item
☐	Recommended for the Village of Huntley - Considered to be a baseline educational component or part of another program; no water savings estimated

Potential further water savings associated with each of the BMPs listed in Table No. 5-5 were calculated for use in the LRI demand scenario, adjusting some of the estimated factors from 2014. The estimated water savings were calculated using information provided in the CMAP Plan and the California MOU. A summary of key assumptions related to potential water savings calculated for each BMP are listed in Table No. 5-6. The LRI water saving calculations are presented in Appendix E.

Potential water savings for each BMP are presented in Table No. 5-7. Based on the assumptions outlined previously, the Village could implement water conservation BMPs and realize approximately 9% of water use reduction from 2050 base demands. The two largest categories of water savings would be realized from reducing system losses and reducing outdoor water use, which make up 56% and 23% of the water reduction respectively. The remainder of the water savings is provided through indoor residential and Commercial, Industrial and Institutional focused programs.

5.1.2.4 Implementation – The final step in the process is to continue to integrate the chosen conservation programs into the Village's current operation and programs. The conservation programs that the Village has already implemented have had success, and further reduction of water use is anticipated. However, the LRI percentage of 9% is lower than the percentage of 14% from the 2014 Master Plan, mostly because the programs have been successful and the easiest reductions have already been taken. The residents of the Village of Huntley have demonstrated some resistance to the reduction of outdoor water use, so Village staff feels that there may be a limit to the eventual reduced water use per capita.

Table No. 5-6: Potential Estimated Water Savings Calculation Assumptions by BMP

Village of Huntley, IL

Best Management Practice	Key Assumptions
Water Waste Prohibition Programs	50% of outdoor water used is wasted (per EPA)
Existing Properties	Assume 25% reduction of outdoor waste
New Construction	Assume 5% reduction of outdoor waste
Correction of System Losses	10.6% water supply loss from unidentified losses
	Assume 50% reduction in unidentified losses
Indoor Residential Fixture Reduction	New retrofits since 1994 high-efficiency appliances released
High Efficiency Toilet Replacement	Assume 30% of households left to upgrade by 2050
High Efficiency Washing Machines	Assume 10% of households left to upgrade by 2050
Faucet and Showerhead Retrofits	Assume 25% of households left to upgrade by 2050
Water Conservation for Commercial, Industrial, and Institutional (CII) Accounts	13.5% reduction for all CII accounts based on no. of employees
	Employees use 16.6% of Huntley's daily demand
	Assume 50% of employee participation
Conservation Coordinator, School Education Programs, and Public Information Programs	Assumed to be a baseline component of any water conservation program; no specific water savings calculated from these programs.

Table No. 5-7: Potential Estimated Water Savings from Water Conservation and Efficiency

Village of Huntley, IL

Category		Water Saved (MGD)	% Of Total (%)
Outdoor	All Customers	0.106	2.2%
	New Landscape	0.021	0.4%
Utility Water - System Losses		0.260	5.3%
Indoor Residential	High Efficiency Toilets (HET)	0.013	0.3%
	High Efficiency Washing Machines (HEWM)	0.001	0.0%
	Fixture Retrofits	0.007	0.1%
Commercial, Industrial, and Institutional Customers		0.055	1.1%
	Total Estimated Savings =	**0.463**	**9%**

5.1.3 Less Resource Intensive (LRI) Water Use Projection & System Evaluation

As discussed in Section 5.1.2.3, successful implementation of the water conservation strategies could result in meeting an eventual 9% reduction goal in water use by the year 2050. Table No. 5-8 summarizes the total projected LRI water use for incremental P.E. increases to the year 2050 population projection of 58,997 (+29,553 P.E.).

With the LRI adjustment, the average water use per person per day in the Village of Huntley is projected to be reduced from 83 gpcpd under the CT scenario to an eventual 75.5 gpcpd under the LRI scenario, gradually reduced over the 30-ish years. The Village of Huntley's anticipated average day demand in 2050 is reduced from 4.90 MGD under the CT scenario (down from 5.31 in 2014) to 4.31 MGD under the LRI scenario (down from 4.51 in 2014). As stated previously, outdoor water use makes up a large portion of the Village's total water use, and it has a large effect on the maximum day water use within the community. With enforcement of existing water conservation programs focused on wiser outdoor water use along with spreading out the water demand (i.e. odd/even lawn sprinkling requirements), the MDD:ADD ratio should come down somewhat, although Village consumers have shown slight reluctance to reduce its outdoor water usage. Therefore, the eventual LRI MDD:ADD ratio was established at 1.76 (the CT MDD:ADD average ratio was 1.93) and an MHD:MDD ratio of 2.0 (same as CT). Mature communities with minimal growth will often experience MDD:ADD ratios between 1.3 – 1.5. Given the Village of Huntley's growth potential and percentage of outdoor usage, a ratio higher than 1.5 was deemed appropriate.

Table No. 5-9 summarizes the LRI projected water capacity analysis for incremental P.E. increases to the year 2050 population projection. Table No. 5-10 indicates the corresponding excess or required capacity needed to meet 100% of each of the test parameters. Table Nos. 5-9 and 5-10 consider that all existing active wells are online and that each water treatment plant is available to meet the Village's water demand.

Inspection of Table Nos. 5-9 and 5-10 indicates that while the *Ultimate Source Capacity, Reliable Source Capacity and Peak Hour Storage* continue to fail with additional P.E. increases, the water supply and storage deficits are generally cut by half to two-thirds under the LRI scenario when compared to the CT scenario by the end of the planning period.

Table No. 5-8: Projected Water Use – *Less Resource Intensive*

Village of Huntley, IL

YEAR	**2017 - 2021 Average**	**2026 (est.)**	**2031 (est.)**	**2036 (est.)**	**2041 (est.)**	**2046 (est.)**	**2050**
ESTIMATED POPULATION		***34,444***	***39,444***	***44,444***	***49,444***	***54,444***	***58,997***
ADDITIONAL POPULATION EQUIVALENTS	--	*+5,000*	*+10,000*	*+15,000*	*+20,000*	*+25,000*	*+29,553*
ANNUAL PUMPAGE	842,757,200 GAL	1,027,765,905 GAL	1,158,963,330 GAL	1,289,120,442 GAL	1,407,670,680 GAL	1,525,180,605 GAL	1,626,455,845 GAL
MAXIMUM MONTHLY PUMPAGE							
MAXIMUM DRY WEATHER MONTH							
AVERAGE DAILY PUMPAGE	2,308,924 GAL	2,815,797 GAL	3,175,242 GAL	3,531,837 GAL	3,856,632 GAL	4,178,577 GAL	4,456,043 GAL
MAXIMUM AVERAGE DAILY PUMPAGE							
MAXIMUM DAILY PUMPAGE	4,466,600 GAL	5,352,971 GAL	5,944,371 GAL	6,509,705 GAL	6,996,702 GAL	7,459,805 GAL	7,826,149 GAL
COMPUTED MAXIMUM HOUR	372,217 GAL	446,081 GAL	495,364 GAL	542,475 GAL	583,058 GAL	621,650 GAL	652,179 GAL
COMPUTED MAXIMUM HOUR	6,204 GPM	7,435 GPM	8,256 GPM	9,041 GPM	9,718 GPM	10,361 GPM	10,870 GPM
AVG. GAL./PERSON/DAY	83 GPCD	81.8 GPCD	80.5 GPCD	79.3 GPCD	78.0 GPCD	76.8 GPCD	75.5 GPCD
RATIO OF MAX. DAY TO AVG. DAY	1.93	1.90	1.87	1.84	1.81	1.79	1.76

NOTES:

1. WATER CONSUMERS (POPULATION) ESTIMATED BASED ON DATA FROM ESRI AND CMAP 2050 POPULATION PROJECTION DATA
2. ASSUMED RATIO OF MAX. HOUR TO MAX. DAY DEMAND (MHD:MDD) = 2.0
3. YEARS 2026 AND ONWARD ASSUME THAT WELL AND WATER TREATMENT PLANT 13, AT 1,000 GPM, ARE OPERATIONAL.

Table No. 5-9: Water Works System Evaluation – *Less Resource Intensive*

Village of Huntley, IL

TEST PARAMETERS	YEAR / POPULATION EQUIVALENT INCREASE						
	2017-2021	2026 / +5,000	2031 / +10,000	2036 / +15,000	2041 / +20,000	2046 / +25,000	2050 / +29,553
1.0 Ultimate Source Capacity	501,400 GAL	1,271,029 GAL	679,629 GAL	114,295 GAL	**-372,702 GAL**	**-835,805 GAL**	**-1,202,149 GAL**
2.0 Reliable Source Capacity	**-146,600 GAL**	71,029 GAL	**-520,371 GAL**	**-1,085,705 GAL**	**-1,572,702 GAL**	**-2,035,805 GAL**	**-2,402,149 GAL**
3.0 Peak Hour Storage	170,133 GAL	**-94,824 GAL**	**-291,957 GAL**	**-480,402 GAL**	**-642,734 GAL**	**-797,102 GAL**	**-919,216 GAL**
4.0 Fire Flow	2,177,075 GAL	2,322,079 GAL	2,248,154 GAL	2,177,487 GAL	2,116,612 GAL	2,058,724 GAL	2,012,931 GAL
5.0 Emergency Supply	5,414,276 GAL	5,172,203 GAL	4,812,758 GAL	4,456,163 GAL	4,131,368 GAL	3,809,423 GAL	3,531,957 GAL

Table No. 5-10: Water Works System Evaluation – *Less Resource Intensive* Corresponding Available or Required Capacity

Village of Huntley, IL

TEST PARAMETERS	YEAR / POPULATION EQUIVALENT INCREASE						
	2017-2021	2026 / +5,000	2031 / +10,000	2036 / +15,000	2041 / +20,000	2046 / +25,000	2050 / +29,553
1.0 Ultimate Source Capacity	348 GPM	883 GPM	472 GPM	79 GPM	**-259 GPM**	**-580 GPM**	**-835 GPM**
2.0 Reliable Source Capacity	**-153 GPM**	74 GPM	**-542 GPM**	**-1,131 GPM**	**-1,638 GPM**	**-2,121 GPM**	**-2,502 GPM**
3.0 Peak Hour Storage	170,133 GAL	**-189,647 GAL**	**-583,914 GAL**	**-960,803 GAL**	**-1,285,468 GAL**	**-1,594,203 GAL**	**-1,838,433 GAL**
4.0 Fire Flow	2,177,075 GAL	2,322,079 GAL	2,248,154 GAL	2,177,487 GAL	2,116,612 GAL	2,058,724 GAL	2,012,931 GAL
5.0 Emergency Supply	5,414,276 GAL	5,172,203 GAL	4,812,758 GAL	4,456,163 GAL	4,131,368 GAL	3,809,423 GAL	3,531,957 GAL

Notes:

* Assumes wells are operating 16 hours/day for Reliable Source Capacity.

* Well and WTP 13 (currently in design) have been added to capacities from 2026 onwards.

5.1.4 Projected Water Use Summary

Table No. 5-11 summarizes the comparison between the CT and LRI scenarios demonstrating an eventual 9% water use reduction between the CT scenario to LRI scenario by the year 2050, which will occur incrementally over the next 30 years. Exhibit No. 5-3 further illustrates the significance that water conservation can have based on the LRI scenario. By reducing water use, capacity improvements in the Water Works System can be delayed or deferred. This concept will be discussed in detail in Section 7.

Table No. 5-11: Water Use Projection Summary

Village of Huntley, IL

Year / Increment	Population Projection	ADD[a] Water Use Projection		MDD[b] Water Use Projection		MHD[c] Water Use Projection	
		CT (MGD)	LRI (MGD)	CT (MGD)	LRI (MGD)	CT (MGD)	LRI (MGD)
2021	29,444	2.31	2.31	4.47	4.47	8.93	8.93
2026 / +5,000	34,444	2.73	2.69	5.28	5.12	10.55	10.24
2031 / +10,000	39,444	3.15	3.05	6.08	5.72	12.16	11.44
2036 / +15,000	44,444	3.56	3.41	6.88	6.29	13.76	12.58
2041 / +20,000	49,444	3.98	3.74	7.68	6.78	15.36	13.57
2046 / +25,000	54,444	4.39	4.06	8.48	7.25	16.96	14.51
2050 / +29,553	58,997	4.90	4.34	9.45	7.63	18.90	15.25

Notes

ADD = Average Day Demand; MDD = Maximum Day Demand; MHD = Maximum Hour Demand

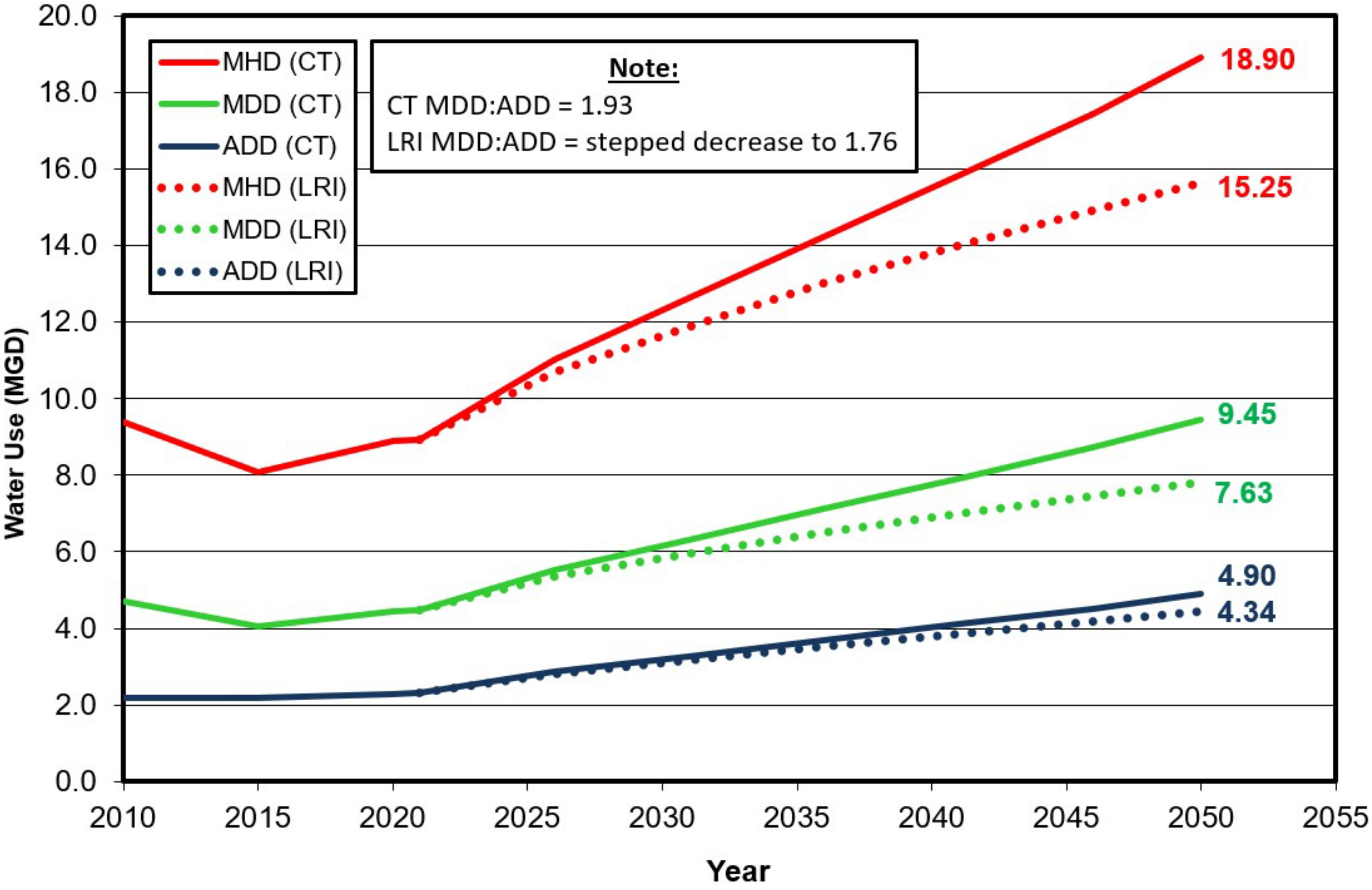
[a] CT ADD based on 83 gpcd; LRI ADD based on stepped decrease to 75.5 gpcd

[b] CT MDD:ADD = 1.93; LRI MDD:ADD = stepped decrease to 1.76

[c] MHD:MDD = 2.00

Exhibit No. 5-3: Historical and Projected Water Use Summary

Village of Huntley, IL



5.2 Projected Wastewater Flows

As summarized within Section 4.3 and specifically Table No. 4-6, the current Village of Huntley wastewater flows average 91.9 gpcd, slightly higher than the 89 gpcd from 2014. Assuming that the Village will grow in similar fashion to the current mix of land use, then the CT wastewater flow increases are simply the increase in population times the 91.9 gpcd. Due to the fact that the industry standard for wastewater flow projections is 100 gpcd, and the fact that the Village has some I&I within the sanitary sewer network, the use of 91.9 gpcd to project CT wastewater flows seems appropriate. Based on a total population of 58,997 in 2050 and a total existing average daily flow at the two WWTPs of 2.34 MGD, the 2050 CT total average daily flow (ADF) wastewater projection is 5.06 MGD. If we assume the maximum daily flow (MDF) is 2.5 times the ADF, then the 2050 CT MDF can be projected to be 12.64 MGD. Both values are somewhat higher to what they were for the 2014 report (4.69 and 11.72 MGD).

As described in the previous section, water use can be reduced significantly through water conservation efforts. The two main areas of water use reduction for the Village of Huntley to achieve a LRI water use were determined to be outdoor water conservation and utility system water loss reduction. The two remaining water conservation/efficiency categories that were evaluated – indoor residential water conservation and commercial, industrial and institutional customer water use reduction – also contributed to the LRI reduction, although to a much smaller extent. Therefore, the eventual 9% reduction in water use would also translate to an eventual 9% reduction in wastewater flows by 2050.

Based on the total population of 58,997 in 2050, a starting average daily flow of the two WWTPs at 2.34 MGD, and a 9% reduction in wastewater flow by 2050, the ADF LRI projection would be 4.81 MGD by 2050. At an MDF:ADF ratio of 2.5, the MDF LRI projection would be 12.03 MGD. Both values are higher than they were in the 2014 report as well (4.57 MGD and 11.42 MGD). A summary of the CT and LRI projections for the full planning period is included in Table No. 5-12.

Table No. 5-12: Wastewater Flow Projection Summary

Village of Huntley, IL

Year / Increment	Population Projection	ADF[a] Wastewater Projection		MDF[b] Wastewater Use Projection	
		CT (MGD)	LRI (MGD)	CT (MGD)	LRI (MGD)
2021	29,444	2.34	2.34	5.85	5.85
2026 / +5,000	34,444	2.80	2.79	7.00	6.98
2031 / +10,000	39,444	3.26	3.23	8.15	8.08
2036 / +15,000	44,444	3.72	3.66	9.30	9.14
2041 / +20,000	49,444	4.18	4.07	10.45	10.17
2046 / +25,000	54,444	4.64	4.47	11.59	11.16
2050 / +29,553	58,997	5.06	4.81	12.64	12.03

Notes

ADF = Average Daily Flow; MDF = Maximum Daily Flow

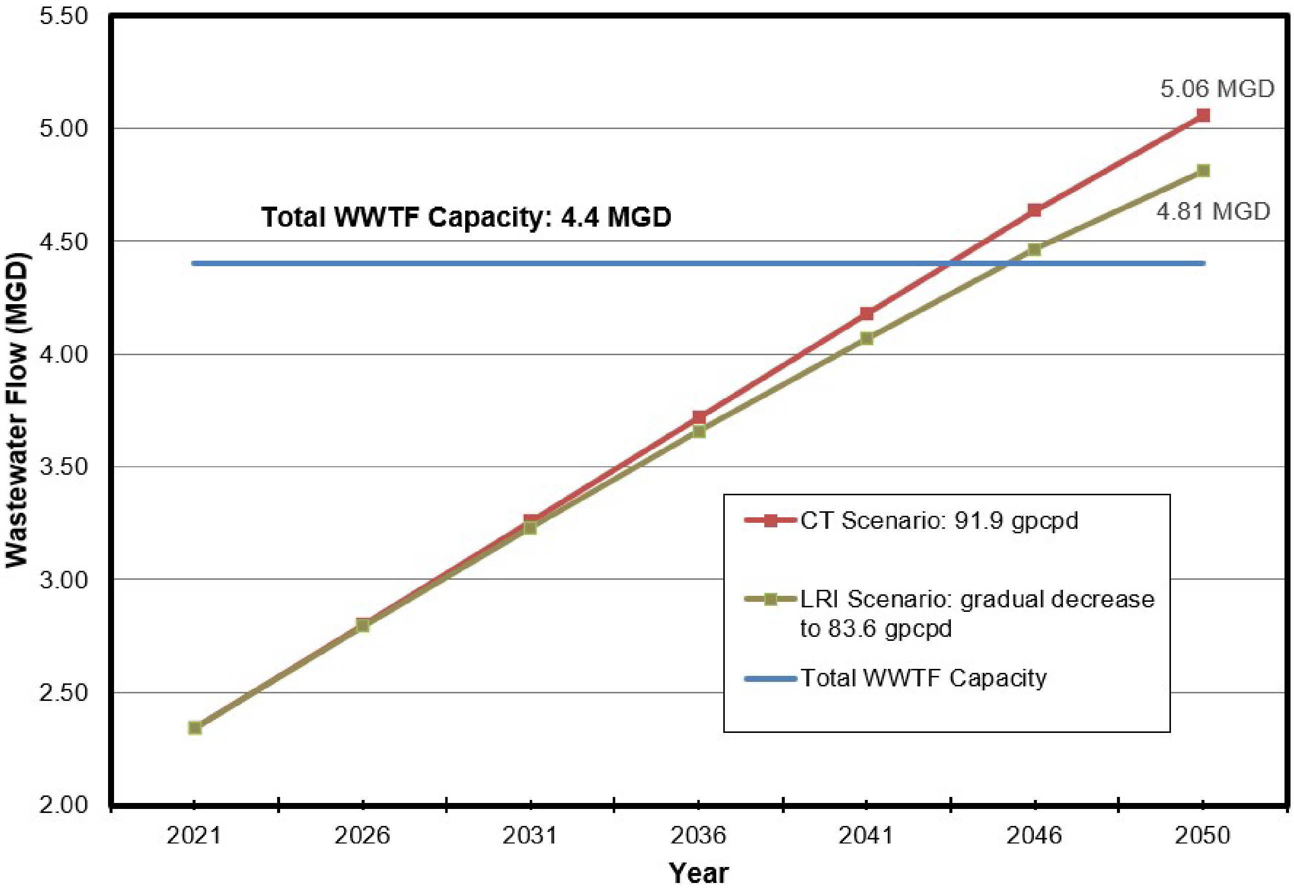
[a] CT DAF based on 91.9 gpcd; LRI DAF based on stepped decrease to 83.6 gpcd

[b] CT DMF:DAF = 2.5; LRI DMF:DAF = 2.5

As was discussed in Section 3, the two WWTPs have a combined rated capacity of 4.4 MGD. It is assumed no further buildout of the East WWTP will take place. Therefore, the West WWTP would need a nominal 0.66 MGD capacity to meet the projected CT wastewater demands. Due to the fact that the LRI ADF wastewater projection of 4.81 MGD is greater than the combined capacity of the Village's two WWTPs, the capacity of portions of the West WWTP would need to be expanded under the LRI scenario, as well. A graph depicting the Wastewater Flow Projection against the combined rated capacity of the two WWTPs is shown in Exhibit No. 5-4, which indicates that expansion of the West WWTP would likely be needed around or before approximately 2043.

Exhibit No. 5-4: Projected ADF Wastewater Flows vs. Total Rated WWTP Capacity

Village of Huntley, IL



SECTION 6: REGULATORY REVIEW

Under the Safe Drinking Water Act (SDWA), the United States Environmental Protection Agency (USEPA) sets legal limits on the levels of certain contaminants in drinking water. The legal limits reflect both the level that protects human health, and the level that water systems can achieve using the best available technology. Besides prescribing these legal limits, USEPA rules set water testing schedules and methods that water systems must follow. The rules also list acceptable techniques for treating drinking water. The SDWA gives individual states the opportunity to set and enforce their own drinking water standards if the standards are at least as strong as EPA's national standards. The Illinois Environmental Protection Agency (IEPA) directly oversees the water systems within Illinois. The USEPA also administers federal water quality initiatives, such as compliance with the Clean Water Act, and more specifically the National Pollutant Discharge Elimination System (NPDES) permit process. For NPDES permits issued in the State of Illinois, the USEPA delegates NPDES permit review authority to the IEPA. The purpose of this section of the report is to evaluate the Village’s current compliance with existing, near future, and potential future regulations relative to Water Works and Wastewater Systems.

6.1 Existing Drinking Water Regulations

The USEPA has drinking water regulations for more than 90 chemical and microbiological contaminants. Table 6-1 presents the existing and near future drinking water regulations that apply to the Village of Huntley’s water treatment systems. Table 6-1 also presents the Village’s status with regard to compliance with the regulations. A brief description of the regulations is presented below.

6.1.1 Safe Drinking Water Act (1974)

The Safe Drinking Water Act (SWDA) sets the standards for drinking water quality and monitors states, local authorities, and water suppliers who enforce those standards. As part of the SWDA, the USEPA has set maximum contaminant levels (MCLs) and maximum contaminant level goals (MCLGs), as well as treatment requirements, for over 90 different contaminants in public drinking water. This act has been significantly amended twice, in 1986 and 1996. The 1986 amendments included restrictions on lead in solder and plumbing, disinfection requirements for groundwater systems, and added enforcement powers. The 1996 amendments included such provisions as the requirement for Consumer Confidence Reports, the establishment of Drinking Water State Revolving Funds, and requirements for Operator certification. Many of the following rules are part of amendments to the SWDA.

6.1.2 Chemical Contaminant Rule (1987)

The Chemical Contaminant Rule establishes national primary drinking water regulations for certain synthetic volatile organic compounds (VOCs), synthetic organic contaminants (SOCs), and inorganic contaminants (IOCs). It was promulgated in four phases: Phase I in 1987, which added such VOCs as benzene and carbon tetrachloride; Phase II in January 1991, which added VOCs, SOCs, and IOCs such as toluene, PCBs, fluoride, and nitrate; Phase IIB in July 1991, which added SOCs and IOCs such as aldicarb and barium; and Phase V in 1992, which added VOCs, SOCs, and IOCs such as dichloromethane, diquat, and cyanide.

6.1.3 Surface Water Treatment Rule (1989)

The Surface Water Treatment Rule seeks to prevent waterborne diseases caused by viruses, *Legionella*, and *Giardia lamblia*. These disease-causing microbes are present at varying concentrations in most surface waters. The rule requires that water systems filter and disinfect water from surface water sources and groundwater under direct influence of surface water (GWUDI) to reduce the occurrence of unsafe levels of these microbes. This rule does not apply to the Village of Huntley as it does not use surface water or GWUDI as a water source for treatment.

6.1.4 Total Coliform Rule (1989)

The current Total Coliform Rule (TCR) continues to be the only microbial drinking water regulation that applies to all public water systems. Systems are required to meet legal limits (i.e. Maximum Contaminant Levels (MCL)) for total coliforms, including fecal coliforms, as determined by monthly monitoring. The TCR specifies the frequency and timing of the monthly microbial testing by water systems based on population served. The rule also requires public notification as indicated by monitoring results.

6.1.5 Lead and Copper Rule (1991)

The Lead and Copper Rule (LCR) requires systems to monitor drinking water at customer taps. If lead concentrations exceed an action level of 15 ppb or copper concentrations exceed an action level of 1.3 parts per million (ppm) or milligrams per liter (mg/L) in more than 10% of customer taps sampled, the system must undertake a number of additional actions to control corrosion. If the action level for lead is exceeded, the system must also inform the public about steps they should take to protect their health and may have to replace lead service lines under their control.

6.1.6 Unregulated Contaminant Monitoring Rule (1998)

EPA uses the Unregulated Contaminant Monitoring Rule (UCMR) program to collect data for contaminants suspected to be present in drinking water, but that do not have health-based standards set under the Safe Drinking Water Act. Every five years EPA reviews the list of contaminants, largely based on the Contaminant Candidate List.

6.1.7 Interim Enhanced Surface Water Treatment Rule (1998)

The Interim Enhanced Surface Water Treatment Rule (IESWTR) amends the existing Surface Water Treatment Rule to strengthen microbial protection, including provisions specifically to address *Cryptosporidium,* and to address risk trade-offs with disinfection byproducts. The final rule includes treatment requirements for waterborne pathogens, e.g., *Cryptosporidium*. In addition, systems must continue to meet existing requirements for *Giardia lamblia* and viruses. This rule does not apply to the Village of Huntley.

Table No. 6-1: Drinking Water Regulation Compliance Summary

Village of Huntley, IL

Regulation	Year Enacted	In Compliance?		Compliance Status
		Yes	No	
Safe Drinking Water Act (and Amendments in 1986 and 1996)	1974	💧		System is routinely monitored as required
Chemical Contaminant Rule, Phase I	1987	💧		System is routinely monitored as required
Total Coliform Rule (TCR)	1989	💧		System is routinely monitored as required
Lead and Copper Rule	1991	💧		System is routinely monitored as required
Chemical Contaminant Rule, Phase II & IIB	1991	💧		System is routinely monitored as required
Chemical Contaminant Rule, Phase V	1992	💧		System is routinely monitored as required
Unregulated Contaminant Monitoring Rule (Updated Every 5 Years)	1998	💧		System is routinely monitored as required
Stage 1 Disinfectant / Disinfection Byproducts Rule	1998	💧		System is routinely monitored as required
Radionuclides Rule	2000	💧		System is routinely monitored as required
Arsenic Rule	2001	💧		System is routinely monitored as required
Stage 2 Disinfectant / Disinfection Byproducts Rule	2005	💧		System is routinely monitored as required
Groundwater Rule	2006	💧		System is routinely monitored as required
IL Radium Treatment Residuals Rule	2011	💧		System is routinely monitored and reported as required
Revised Total Coliform Rule (RTCR)	2014	💧		System is routinely monitored as required
America's Water Infrastructure Act (AWIA)	2018	💧		System is in compliance
Revised Lead and Copper Rule	2021	💧		System is routinely monitored as required
Radon Rule	Proposed			Proposed rule would set MCL at 4,000 pCi/L - or at 300 pCi/L without a Multimedia Mitigation Program to address radon in indoor air
PFAS Rule	Under Development			EPA is engaging stakeholders for input on regulations; Final regulations possible in Fall 2023

Regulations that only apply to Surface Water and Groundwater Under Direct Influence [of surface water] (GWUDI) Systems: Surface Water Treatment Rule (1989), Interim Enhanced Surface Water Treatment Rule (1998), Filter Backwash Recycling Rule (2001), Long Term 1 Enhanced Surface Water Treatment Rule (2002), and Long Term 2 Enhanced Surface Water Treatment Rule (2005)

6.1.8 Stage 1 Disinfectant/Disinfection Byproducts Rule (1998)

The Stage 1 Disinfectant/Disinfection Byproducts Rule (Stage 1 DBPR) establishes maximum residual disinfectant level goals (MRDLGs) and maximum residual disinfectant levels (MRDLs) for three chemical disinfectants – chlorine, chloramines, and chlorine dioxide. It also establishes maximum contaminant level goals (MCLGs) and maximum contaminant levels (MCLs) for total trihalomethanes, haloacetic acids, chlorite and bromate.

6.1.9 Radionuclides Rule (2000)

The Radionuclides Rule retains the existing MCLs for combined radium-226 and radium-228, gross alpha particle radioactivity, and beta particle and photon activity, but regulates uranium for the first time. The current combined radium MCL is 5 pCi/L.

6.1.10 Arsenic Rule (2001)

The Arsenic Rule reduces the MCL for drinking water from 50 parts per billion (ppb) or micrograms per liter (µg/L) to 10 ppb. Water systems had to comply with this standard by January 23, 2006.

6.1.11 Filter Backwash Recycling Rule (2001)

The Filter Backwash Recycling Rule (FBRR) requires systems that recycle to return specific recycle flows through all processes of the system's existing conventional or direct filtration system or at an alternate location approved by the state. This rule does not apply to the Village of Huntley due to the fact that it does not utilize conventional or direct filtration.

6.1.12 Long Term 1 Surface Water Treatment Rule (2002)

The Long Term 1 Surface Water Treatment Rule does not apply to the Village of Huntley, as it is only for systems with less than 10,000 customers, nor does the Village use surface water as a water source.

6.1.13 Long Term 2 Surface Water Treatment Rule (2005)

The Long Term 2 Surface Water Treatment Rule (LT2SWTR) requires systems to monitor their source water, calculate and average Cryptosporidium concentration, and use those results to determine if their source is vulnerable to contamination and may require additional treatment. This rule also does not apply to the Village of Huntley.

6.1.14 Stage 2 Disinfectant/Disinfection Byproducts Rule (2005)

The Stage 2 Disinfectant/Disinfection Byproducts Rule (Stage 2 DBPR) requires some systems to complete an initial distribution system evaluation (IDSE) to characterize DBP levels in their distribution systems and identify locations to monitor DBPs for Stage 2 DBPR compliance. The Stage 2 DBPR bases TTHM and HAA5 compliance on a locational running annual average (LRAA) calculated at each monitoring location. A Compliance Monitoring Plan was due April 1, 2012. The plan includes the compliance monitoring locations, dates, and compliance calculation procedures.

6.1.15 Ground Water Rule (2006)

The Ground Water Rule (GWR) establishes a risk-targeted approach to identify groundwater systems (GWSs) susceptible to fecal contamination and requires corrective action to correct significant deficiencies and source water fecal contamination in all public GWSs.

6.1.16 Radium Treatment Residuals Rule (2011)

In 2011, the Illinois Emergency Management Agency (IEMA) provided the leadership for the revisions to Title 32 of the Illinois Administrative Code, Section 330.40(d). With these revisions, entities handling water and wastewater treatment residuals containing radium must register with IEMA and meet the disposal standards specified in the rule. The rule only applies to Water Treatment Plants and Wastewater Treatment Plants which are part of a 'system' where deep sandstone aquifers known to contain radium are used as a water supply source.

6.1.17 Revised Total Coliform Rule (2014)

The revisions to the TCR requires public water systems that are vulnerable to microbial contamination to identify and fix problems, and establish criteria for systems to qualify for and stay on reduced monitoring.

6.1.18 America's Water Infrastructure Act of 2018 (2018)

The America's Water Infrastructure Act (AWIA) of 2018 instituted over 30 mandated programs, among which are: requiring community water systems serving over 3,000 people to develop or update risk and resilience assessments and emergency response plans; authorizing the Drinking Water State Revolving Fund to allow extended loan terms and requires the provision of additional subsidies to state-defined disadvantaged communities; and providing funding to assist public water systems and homeowners in small and disadvantaged communities with reducing lead in drinking water systems through the Water Infrastructure Improvements for the Nation (WIIN) Act Grant Programs.

6.2 Near Future Regulations

The SDWA includes a process that USEPA follows to identify and list unregulated contaminants which may require a national drinking water regulation in the future. USEPA must periodically publish this list of contaminants (called the Contaminant Candidate List or CCL) and decide whether to regulate at least five or more contaminants on the list (called Regulatory Determinations). EPA uses this list of unregulated contaminants to prioritize research and data collection efforts to help determine whether a specific contaminant should be regulated. Based on the current discussion relative to these proposed rules, it is anticipated the Village of Huntley will have no compliance concerns with meeting them.

6.2.1 Lead and Copper Rule Revisions (LCRR)

The USEPA is currently reviewing revisions to the LCR to ensure that it protects families and communities, particularly those that have been disproportionately impacted by lead in drinking water. Proposed improvements include: establishing a trigger level to jumpstart mitigation earlier and in more communities; requiring testing in schools and childcare facilities; requiring water systems to identify and make public the locations of lead service lines; and using science-based protocols to find more sources of lead in drinking water. The EPA anticipates finalizing the forthcoming Lead and Copper Rule Improvements (LCRI) prior to October 2024, the initial compliance date in the LCRR.

6.2.2 Radon Rule

The USEPA proposed new regulations for radon in drinking water in 1999. The proposed regulations provide flexibility in how to limit exposure to radon by focusing efforts on the greatest public health risks from radon - those in indoor air - while also reducing the highest risks from radon in drinking water. The proposed rule provides for a multimedia approach to address risks from radon in drinking water and radon in indoor air from soil. The Safe Drinking Water Act directs the EPA to propose and finalize a maximum contaminant level (MCL) for radon in drinking water, but also to make available an alternative approach: a higher alternative maximum contaminant level (AMCL) accompanied by a multimedia mitigation (MMM) program to address radon risks in indoor air. The proposed rule would set the MCL at 300 pCi/L or 4,000 pCi/L for a system with a MMM program. It is unclear as to whether this rule will ever be promulgated.

6.3 Potential Future Regulations

The USEPA has identified three additional chemical contaminants through the CCL and UCMR process that are currently being considered for regulation. These are: MTBE, Sulfate, and PFAS. No schedule for regulatory action has been presented by USEPA as yet. Based on the current discussion relative to these potential rules, it is anticipated the Village of Huntley will have no compliance concerns with meeting them.

6.3.1 MTBE

MTBE is a member of a group of chemicals commonly known as fuel oxygenates. Oxygenates are added to fuel to increase its oxygen content. MTBE is used in gasoline throughout the United States to reduce carbon monoxide and ozone levels caused by auto emissions. MTBE has replaced the use of lead as an octane enhancer since 1979. Releases of MTBE to ground and surface water can occur through leaking underground storage tanks and pipelines, spills, emissions from marine engines into lakes and reservoirs, and to some extent from air deposition.

6.3.2 Sulfate

Sulfate is a substance that occurs naturally in drinking water. Health concerns regarding sulfate in drinking water have been raised because of reports that diarrhea may be associated with the ingestion of water containing high levels of sulfate. Of particular concern are groups within the general population that may be at greater risk from the laxative effects of sulfate when they experience an abrupt change from drinking water with low sulfate concentrations to drinking water with high sulfate concentrations.

Sulfate in drinking water currently has a secondary maximum contaminant level (SMCL) of 250 milligrams per liter (mg/L), based on aesthetic effects (i.e., taste and odor). This regulation is not a federally enforceable standard, but is provided as a guideline for States and public water systems. USEPA estimates that about 3% of the public drinking water systems in the country may have sulfate levels of 250 mg/L or greater.

6.3.3 Per- and Polyfluoroalkyl Substances (PFAS)

PFAS are a family of widely used, long-lasting chemicals, components of which break down very slowly over time; because of their persistence, many PFAS are found in the blood of people all over the world and are present in low levels in a variety of food products and in the environment. Scientific studies have shown that exposure to some PFAS may be linked to harmful health effects such as reproductive challenges, developmental delays in children, and increased risk of some cancers.

There are no federal drinking water standards for PFAS in public water supplies yet, but the IEPA has developed health-based guidance levels for seven PFAS compounds ranging from 2 ppt for PFOA to 560,000 ppt for PFHxA. Effective methods of removal of PFAS from drinking water for public water suppliers is still being researched but homeowners can utilize carbon filtration or reverse osmosis to treat their water service.

6.4 Capacity, Management, Operation & Maintenance (CMOM) Plan

The Village's separate sanitary sewer system collects and conveys wastewater generated by the residential, commercial, industrial, and institutional land uses connected to the system. Proper operation and maintenance of the system allows for continued collection and conveyance without service interruption to the users. A properly maintained sanitary sewer system minimizes the amount of extraneous flows (I&I) entering the system, so that its capacity to convey domestic wastewater remains intact. Conversely, poorly operated and maintained sanitary sewer networks can cause service interruptions and sewer system overflows (SSOs) that negatively affect the users and the environment.

In 2001, the USEPA first published the proposed CMOM rules. According to the O&M in CMOM: "Operation & Maintenance", A Reference Guide For Utility Operators, as published by the WEF Collection Systems Committee, USEPA's CMOM standard permit condition for municipal sanitary sewer collection systems contains five general performance standards. The permittee would need to:

1. Properly manage, operate and maintain, at all times, the parts of the collection system that the permittee owns or over which it has operational control.
2. Provide adequate capacity to convey base flows and peak flows.
3. Take all feasible steps to stop, and mitigate the impact of, sanitary sewer overflows.
4. Provide notification to parties with a reasonable potential for exposure to pollutants associated with the overflow event.

5. Develop a written summary of their CMOM program and make it, and required program audits, available to the public upon request.

After many years of discussion relative to the proposed federal rule, the federal rulemaking process has stalled, primarily due to challenges from interested stakeholders. While the regulation has not been promulgated, many guidance documents have been created to describe the CMOM process. One such document is the *Guide for Evaluating Capacity Management, Operation, and Maintenance (CMOM) Programs at Sanitary Sewer Collection Systems*, as published by the USEPA in January 2005. Some utilities have utilized the available guidance documents to develop a CMOM plan on their own.

The IEPA requires CMOM plans from communities that have a high amount of sanitary sewer overflow (SSO) incidents. Often the SSOs are caused by poor operation and maintenance procedures and/or a high amount of I&I within the collection system. The IEPA then instituted a policy to require CMOM plans from all major WWTPs (WWTPs with a DAF capacity of 1.0 MGD or greater), regardless of the amount of I&I in the system or SSOs reported, and the Village has had a CMOM plan requirement in its NPDES permits since 2015.

6.5 Wastewater Treatment Plant Receiving Stream Review

The Village of Huntley's East WWTP discharges into the Huntley Branch to the South Branch of the Kishwaukee River (known as the Huntley Ditch), and the Village's West WWTP discharges into the East Fork of the South Branch of the Kishwaukee River. The Huntley Ditch starts near the East WWTP, flows south and then west where it drains into the South Branch of the Kishwaukee River approximately ½ mile east of Route 47. The South Branch of the Kishwaukee River (South Branch) starts southeast of the Village and flows in a northwesterly direction. It crosses Kreutzer Road east of Route 47 near Kruetzer Road's intersection with the railroad tracks. After combining with the Huntley Ditch, the South Branch flows west and crosses Route 47 just north of the Kreutzer Road/Route 47 intersection. In the northeastern portion of the Del Web Sun City Development, Eakin Creek discharges into the South Branch about 3,500 feet south of the West WWTP. The South Branch crosses under Main Street just east of the Harmony Road and Main Street intersection. It then continues to flow to the northwest where it eventually discharges into the Kishwaukee River.

The Village of Huntley WWTPs are permitted to discharge into their respective receiving streams under their respective NPDES permits. The effluent standards established in the two NPDES permits are based on the defined use and then corresponding water quality standards applied to each of the receiving streams. The state of the receiving stream bears heavily on the standards established in the permit. Therefore, as a starting point to predict future regulatory compliance, the receiving systems' existing conditions must first be defined.

6.5.1 Huntley Ditch

At the point of discharge of the East WWTP, the Huntley Ditch has a 7Q10 (lowest seven day flow received in a ten year period) of 0 cfs, thus considered a low flow stream. The IEPA has established its designated use is to support aquatic life. The stream is channelized and has minimal areas of high quality habitat, and accepts surface drainage from portions of the east and central parts of the Village.

The IEPA currently lists the Huntley Ditch as an impaired waterway. The causes for impairment, as summarized in Illinois' 2020/2022 303(d) List, are barium, chloride, copper, hexachlorobenzene, total phosphorus, sedimentation/siltation and zinc. Due to the fact that the Huntley Ditch is impaired, the Clean Water Act generally states that the IEPA must work to reduce the causes of impairment such that the stream will return to its designated use. Of the seven causes of impairment, four could potentially be attributed to the Village's East WWTP, namely: 1) barium, 2) copper, 3) total phosphorus and 4) zinc. The East WWTP NPDES permit used to contain a barium effluent standard, but no longer does as of 2021, and its 2015 NPDES permit added a total phosphorus (Total P) standard. The East WWTP NPDES permit does not include a copper or zinc standard, and the IEPA has given no indication that one will be applied. Therefore, it is reasonable to assume that the IEPA has determined that the East WWTP is not the source of the elevated copper and zinc levels in the stream.

6.5.2 South Branch Kishwaukee River (East Fork)

At the point of discharge of the West WWTP, the South Branch of the Kishwaukee River has a 7Q10 of 0.9 cfs. While it does have some baseflow, it is considered a low flow stream, as well. The portions of the stream southeast of the Village primarily drain agriculture fields. The portion of the stream within the Village's corporate boundaries accepts surface water drainage from developed areas in the central and eastern parts of the Village. Its designated use is to support aquatic life as well.

The IEPA currently lists many segments of the South Branch of the Kishwaukee River as impaired. The stream segment the Village's West WWTP discharges to is listed as impaired, and the cause for impairment is total phosphorus; the West WWTP NPDES permit currently contains a total phosphorus standard.

It is important to note that since the South Branch of the Kishwaukee River is listed as an impaired stream, antidegradation requirements state that no additional loads can be applied for the potential cause of the impairment. While an expansion of the Village's West WWTP is not expected for as many as two decades, if the stream remains impaired for constituents within the Village's West WWTP, stricter discharge requirements could be applied on those constituents. In addition, if the impairment persists, the IEPA could apply lower effluent standards at an NPDES permit renewal (NPDES permits are renewed every five years) if they deem the reduced loading on the stream is needed to remove the impairment.

6.6 Wastewater Treatment Plant Regulations Summary

As stated previously, the Village's WWTPs are permitted to discharge into the adjacent receiving streams through their respective NPDES permits. Both of the plants have no issues meeting the standards established in the permits. In this section of the report, a brief explanation of the Village's ability to meet the existing regulations established in its NPDES permits will be provided, then a review of the state of nutrient standards will be provided. Lastly, a discussion of standards relative to the Village's biosolids disposal program will be summarized.

6.6.1 Existing Regulations

As previously stated, both of the Village's WWTPs contain 10 mg/L BOD and 12 mg/L TSS monthly average effluent limitations. Both plants have seasonal ammonia-nitrogen monthly average effluent limitations ranging from 1.1 – 1.5 mg/L, and a total phosphorus monthly average effluent limitation of 1.0 mg/L. Both permits also contain typical effluent limitations for CBOD, suspended solids, pH, fecal coliform, and dissolved oxygen, and standard special conditions for major WWTPs.

As was presented in Section 3 and documented in Appendices C and D, both WWTPs have no issues meeting the existing effluent limitations contained within their respective NPDES permits. It is assumed that the continued focus on operation and maintenance procedures at the plants will keep them in permit compliance into the future.

6.6.2 Nutrients

Federal and statewide nutrient regulations have been discussed for many years, even decades. In the last decade they have generally only been applied to WWTP discharge permits undergoing a plant expansion in Illinois. However, in recent years there has been heightened focus on developing statewide nutrient standards from the national and state level. The statewide efforts, along with recent results from Total Maximum Daily Load (TMDL) studies, have provided the momentum for the IEPA to add nutrient standards to WWTP NPDES permit renewals.

Under the direction of the Clean Water Act, the USEPA has been charged with evaluating the deleterious effects of nutrients, amongst other constituents, on waters of the United States. USEPA efforts to develop nutrient regulations to reduce impairments caused by nutrients within inland and coastal waters have been ongoing for decades. Within the Midwest, the USEPA's primary motivation for nutrient reduction is to reduce and control hypoxia in the Gulf of Mexico. Gulf Hypoxia is an area within the Gulf of Mexico, on average over the past five years to be 5,380 square miles, or around the size of the state of Connecticut, where dissolved oxygen levels are so low that the waterbody cannot sustain most marine life. It is believed that nutrient loads within the Mississippi Watershed contribute to the Gulf Hypoxia problem, along with temperature and salinity stratification of Gulf waters. The Gulf Hypoxia Task Force Action Plan of 2008 established a goal of 45% reduction in nutrient loads from the Mississippi River Watershed.

In 2015, a working group formed by the IEPA, Illinois Department of Agriculture (IDOA), and Illinois Water Resource Center released the Illinois Nutrient Loss Reduction Strategy. It lays out a comprehensive suite of best management practices for reducing loads from wastewater treatment plants and urban and agricultural runoff to achieve the 45% nutrient load reduction goal, with interim goals of 25% reduction in phosphorus loads and 15% reduction in nitrate-nitrogen loads by 2025. A report describing actions taken to achieve the goals since the strategy release is released every two years; the most recent report was in 2021.

The strategy also identifies priority watersheds for nutrient loss reduction efforts, establishes a Nutrient Science Advisory Committee to develop numeric criteria for Illinois waters, and identifies strategies for improving collaboration among government, nonprofits, and industry, including the formation of an Agriculture Water Quality Partnership Forum to steer outreach and education efforts to help farmers address nutrient loss and an Urban Stormwater Working Group to coordinate and improve stormwater programs and education.

Due to the fact that the Village's WWTPs already contained a Total P effluent limitation of 1.0 mg/L as of 2015, the statewide nutrients standards did not cause any change in subsequent NPDES permits. The Village also received a special condition in its NPDES permits to develop a Nutrient Assessment Reduction Plan (NARP) by 2024 to identify phosphorus input reductions and other measures needed to help ensure that dissolved oxygen criteria, among others, are met throughout a watershed. The NARP substitutes for a Total Maximum Daily Load (TMDL) study to meet the aforementioned criteria but allows groups to evaluate the appropriate water quality targets, adjust them if shown to be appropriate and necessary, and to implement the NARP through adaptive management. Given the fact that both of the WWTP receiving streams have nutrients as a cause for impairment, the IEPA could further restrict nutrient loads to the receiving streams by ultimately lowering the Total P effluent limitations in the Village's WWTP NPDES permits.

6.6.3 Biosolids Disposal

Following stabilization and dewatering, the Village of Huntley contracts for the land application of the biosolids generated at both of the WWTPs. The Village works with the sludge applicator to find fields that will accept the Class B biosolids and then the applicator applies the biosolids in accordance with the applicable federal and state land application regulations. At present, the Village does not appear to have compliance or cost issues with disposing of its sludge via land application such that a move to a higher quality sludge such as Class A is warranted. However, methods to reduce sludge disposal volume and thus costs are recommended in Sections 3 and 8.

While Village is required to meet the federal 503 land application regulations and Illinois Part 391, *Design Criteria For Sludge Application On Land*, the Village also is required to meet the applicable radium standards for land application of sludge as administered by Illinois Emergency Management Agency (IEMA). In February of 2011, 32 Illinois Administrative Code 330.40(d) was modified to essentially apply a radium land application limit of 1.0 pCi/g increase in the soil concentration or a maximum radium soil concentration of 3.0 pCi/g. From that point forward, all land application sites needed to be sampled to determine the existing background radium content of the soil. The radium loading provided through the land application of biosolids on the site then needs to be monitored such that the radium content in the soil does not exceed the 1.0 pCi/g increase, or the 3.0 pCi/g concentration ceiling is breached.

Since the Village's water supply contains radium, and water containing radium is discharged into the sanitary sewer network, the biosolids at the WWTPs contain moderate levels of radium. The radium content of the biosolids does not change much, but both plants report lower levels in recent years than in the past. A random sampling of quarterly biosolids reports from the East WWTP revealed radium concentrations from 14 to 27 pCi/g with an average of 21.7 pCi/g compared to a range of 20 to 37 pCi/g in the 2014 Master Plan, and a random sampling of quarterly biosolids reports from the West WWTP reveal radium concentrations in a range of 24 to 40 pCi/g with an average of 31.1 pCi/g as compared to 40 to 60 pCi/g in 2014.

The radium content of both plants is well below the radioactive licensing threshold of 200 pCi/g and IEMA's 100 pCi/l threshold which would require a closer review of the land application approach. Given the moderate radium content of the Village's biosolids and the fact that there appear to be sufficient land application sites in the area, there is no reason to believe that alternative biosolids disposal techniques will need to be considered.

SECTION 7: WATER WORKS SYSTEM EVALUATION AND RECOMMENDATIONS

Previous sections of this report summarize the Water Works System components and provide a needs assessment analysis. This section will determine the required improvements to expand the system to meet the 2050 CT and LRI water demand projections for the Village of Huntley, including the results of water modeling scenarios for the Southern Service Area (SSA). Following a review of the cost of the improvements, a phasing and implementation program will be summarized for both the CT and LRI water demand scenarios. Finally, a cost comparison of the CT and LRI recommendations will be presented to demonstrate the anticipated financial benefit to the Village if the LRI goals outlined in Section 5.1.2 are reached.

7.1 Water Modeling Analysis – Potential Future Development South of Tollway

The Village's planning area includes undeveloped land south of the I-90 tollway, for which there is an existing 12" water main stub that extends across the tollway just east of Route 47. Although there currently are no specific developments proposed at this time, the Village anticipates future growth in that area. As part of this Master Plan, the Village desired to evaluate different alternatives to provide water service to future development in that area. The Village provided a copy of the existing steady state water model of the Village's Water System in WaterCAD, previously updated by Ruekert & Mielke, Inc., to EEI for use in the analysis. The model was evaluated using a steady state analysis.

EEI developed several water model scenarios evaluating alternatives for water mains to serve future development south of the tollway. For each scenario, the future development water main was represented by the large diameter water main network previously identified as part of the last Master Plan Update, focusing on the area between Route 47 to the east and Sandwald Road to the west. For the purposes of this analysis, except for the existing 12" stub, all of the future water main was assumed to be 16". The existing WaterCAD model of the Village's Water Works System (WWS) was utilized for modeling the future main. Except for updating the existing demands, no changes were made to the existing model components including water main location and pipe size, C factors, and tank and pump setpoints. The system demands were updated based on the current Master Plan needs assessment, and the updated current trends analysis. Only the current trends demands were utilized in the model to be conservative with respect to anticipated future demands.

Separate scenarios were developed in the model which include additional storage south of the tollway and an additional tollway crossing to loop the new water main. The scenarios were run under various system conditions to evaluate the system hydraulics and available fire flows (AFF) and eventually determine the breakpoint P.E. at which the next improvement would be required. Appendix F includes exhibits with various screenshots from the water model depicting different data (e.g. alternative scenarios water main overview with pipe sizes, pressures, AFF, pipe velocities) under the different scenarios modeled, which are summarized in the next section.

7.1.1 Future Scenarios Overview

The future water main south of the tollway is proposed to connect to the existing 12" water main stub located along Route 47 at the tollway crossing. At this time, the Village is not interested in considering additional supply/treatment in this area. Appendix F-A depicts the three scenarios which are summarized as follows:

Scenario 0: Existing System Conditions and Demands

Scenario 1: Future Development 16" Water Main Loop (no additional I-90 crossing or EWST)

Scenario 2: Additional EWST (no additional I-90 crossing)

Scenario 3: Additional West I-90 Crossing (16" – at Sandwald Road)

The following conditions and assumptions were utilized for the water modeling:

- Village tanks were 50% full for all scenarios, Well and WTP 7 is running, and one HSP at Well 9 WTP is running.
- Future tank and water main locations south of the tollway from the previous Master Plan (2014) were used.
- For the purpose of planning the future development area, the water use was assumed as 100 gallons per capita per day (gpcpd).
- The maximum day demand to average day demand ratio (MDD:ADD) has averaged 1.93 for the past five years and was utilized to calculate the MDD for the future development south of I-90.
- Well and WTP No. 13 are currently under design, and were added in the model for future scenarios.

7.1.2 Description of Modeling Analysis, Conditions, and Metrics

The water system and proposed development were evaluated on the basis of system pressures, AFF, and pipe velocities. Consistent with the AWWA Manual M32 Computer Modeling of Water Distribution Systems, pressures and pipe velocities are typically reviewed under the following three critical scenarios:

1. Average Day Demand (ADD) Conditions
2. Maximum Day Demand (MDD) Conditions
3. MDD + Fire Flow Conditions

In distribution systems of comparable size to Huntley, the MDD + Fire Flow Conditions scenario typically governs. The water system was evaluated under all three conditions and at multiple future additional P.E. south of the tollway. However, only screenshots from select scenarios and conditions are included in Appendix F.

The proposed water main must provide sufficient capacity to maintain minimum pressure of 20 psi during periods of fire flow and emergency conditions. The ideal range of normal operating pressures in the water distribution is typically specified as 40 – 80 psi. However, in general the operating pressure at any given point in the system will tend to remain fairly consistent, and is dependent on a variety of factors including elevation, tank levels, proximity to tanks or treatment plants/pump stations, and the current system demands, to name a few. Certain customers may be more susceptible to and/or cognizant of changes in system pressure, such as in an emergency. System pressures were evaluated under the different scenarios and different conditions to compare the change in system pressures due to higher flows and demands, e.g. as a result of additional development and increasing demands/corresponding P.E. south of the tollway. Ultimately, it is up to the Village to determine what the preferred system pressures are and how much variation in system pressure is acceptable.

Because no specific improvements or developments south of the tollway are currently planned, and future water demands and fire flow requirements are unknown, the Village requested that default AFF requirements be utilized for this analysis. Typically, a fire flow requirement of 1,500 gpm is utilized for residential nodes in hydraulic modeling, and 3,500 gpm is assumed for commercial/industrial/other non-residential nodes. Given the nature of the proposed development (industrial), the higher 3,500 gpm requirement was assumed for fire flow at all points south of the tollway.

Additionally, pipe velocities were evaluated in the existing and proposed water mains under ADD, MDD, and PHD conditions and in a fire flow demand scenario. General recommendations are for average pipe velocities to be under 2 feet per second (fps) under normal conditions, with 5 fps as a target upper boundary for higher (e.g. max/peak) demands, and 10 fps being the recommended maximum for a short duration (e.g. a few hours) such as in a fire emergency, though pipe velocities less than 10 fps should be targeted when possible. The piping systems should be designed to prevent velocities from exceeding 10 fps, under any conditions where possible.

Well & WTP No. 7 is the closest point of supply to the area south of the tollway and would therefore generally be considered the most critical with regards to servicing that area. Therefore, Well & WTP No. 7 was assumed to be running in addition to the HSP at WTP 9 and assuming tanks are at 50% capacity. Using the above assumptions and established guidelines, an analysis was performed to determine the maximum P.E. that could be serviced south of the tollway under each of the three future scenarios and set of future improvements.

Demands corresponding to the equivalent additional P.E. were added in the model to the future development area south of the tollway through multiple iterations, until the breakpoint at which the system could no longer service the area was identified. The criteria for determining the P.E. at which the next scenario and corresponding WWS improvement is needed were established as follows:

1. Pipe velocities over 5 fps under MDD conditions
2. Pipe velocities over 10 fps under MDD + FF conditions
3. Pressures under 40 psi anywhere in the system
4. Pressure drop over 10 psi from existing conditions anywhere in the system

The estimated maximum additional demands and corresponding added P.E. south of the tollway was determined at which each of the above criteria or tests were observed, or ‘failed’, in the model. In some cases, as reflected in the screenshots in Appendix F, the additional P.E. that could meet one criteria varied greatly from that of another criteria. All four criteria were compared, and the lowest P.E. was selected as the breakpoint for the next scenario since it would be the limiting factor. The following sections discuss each scenario and summarizes observations with regard to the above criteria and corresponding additional demands/P.E. In Appendix F, the various screenshots are labeled according to the corresponding scenario in the model. The existing system and conditions are labeled ‘0’, and Scenarios 1-3 summarized above are labeled with ‘1’, ‘2’, or ‘3’ as appropriate in each instance. Appendix F is subdivided into the following sections:

- Appendix F-A: Future Development Scenarios Overview
- Appendix F-B: Water System Pressure Maps – Max Day Demand (MDD)
- Appendix F-C: Water System Pressure Maps – MDD + Fire Flow
- Appendix F-D: Available Fire Flow (AFF) at Select Junctions at Different Additional P.E.
- Appendix F-E: Pipe Velocities with MDD and MDD + 3,500 gpm Fire Flow in Future Development South of the Tollway
- Appendix F-F: Pipe Velocities – Filling Future EWST South of the Tollway (1,000 gpm)

7.1.3 Scenarios Nos. 1 – 3 Analysis

7.1.3.1 Scenario 1: Existing System and 12” Stub Across I-90 - Scenario 1 includes the future 16” water main loop south of the tollway with just the existing 12” water main supply connection stub across I-90 (no wells/WTP/EWST). Appendix F-A-1 depicts the overview of the future Scenario 1.

Under Scenario 1 with no additional I-90 crossing, and no additional storage, all of the supply must pass through the existing 12” crossing. Therefore, it would be challenging to provide the assumed required AFF of 3,500 gpm at all points south of I-90 with the existing infrastructure while also meeting demands of other customers in that area. Under this scenario, the future water main south of the tollway would effectively function as a dead end main. More frequent flushing or auto flushing may be required to maintain consistently good water quality in this scenario.

Because all of the flow must pass through the existing 12” crossing in Scenario 1, at 3,500 gpm this equates to 10 fps, which is the recommended maximum pipe velocity. With additional regular demands, the velocity would exceed 10 fps. Appendix F-E-1 depicts the pipe velocities under different demand scenarios.

7.1.3.2 Scenario 2: Additional EWST (No Additional I-90 Crossing) - Scenario 2 includes the same 16” future water main loop and an additional EWST south of the tollway, with no additional I-90 crossing water main. The future EWST was assumed to be a 1.0 MG tank, though for the purposes of modeling and in terms of hydraulics, the water model analysis would be the same regardless of the tank volume. Appendix F-A-2 depicts the overview of the Future Scenario 2.

Overall, with the additional EWST south of the tollway, the system is much more resilient and better equipped to maintain adequate system pressures and provide ample fire flow due to the presence and proximity of the future tank. From a hydraulic standpoint and without regards to other factors such as available land and the intended land use, when considering the above four criteria, the model projects that the system would be able to support a large equivalent P.E. south of the tollway. One additional scenario was modeled to evaluate whether the new EWST would be able to be filled at a rate of 1,000 gpm, which is typical for anticipated or desired rates at which to be able to fill a tank (see Appendix F-F). Assuming there is no fire flow emergency, the model projects increased pipe velocities exceeding 5 fps in the 12” crossing once a demand equivalent of 12,000 P.E. is established, which is the recommended maximum pipe velocity under normal, non-emergency conditions.

Adding a storage tank south of I-90 would still require all of the supply to come across the existing 12” crossing which would remain the only source of supply to the area south of the tollway. As growth occurs and water use increases, there will be additional demand and head loss placed on the 12” water main crossing, which may eventually present challenges hydraulically to conveying water to that area and the ability to fill the new tank. Adding the EWST would help alleviate the stress on the system by providing an additional storage source of water in an emergency and during periods of higher demand on the south side of the tollway. It is assumed that the EWST would have the same characteristics (operating levels, etc.) as proposed in 2014 Huntley Master Plan. Another alternative could be a GST or Standpipe with BPS, which would have a lower capital cost compared to the EWST. However, this may present additional operational challenges having a mix of a Standpipe with the other EWSTs in the system. Depending on water demands and how quickly development occurs, tank turnover is also a potential concern. It ultimately becomes a question of the Village’s comfort in having one supply connection across the tollway to service the future developments south of the tollway, for which Future Scenario 3 was evaluated as summarized in the next section.

7.1.3.3 Scenario 3: Additional West I-90 Crossing (16”) and EWST - Scenario 3 includes the same 16” future water main loop, and both the additional EWST and additional I-90 water main crossing at the north end of Sandwald Road. Appendix F-A-3 depicts the overview of Future Scenario 3.

As shown in Appendix F, under Future Scenario 3, under normal, non-emergency conditions the system would be projected to satisfy the demands of a large equivalent P.E. south of the tollway, assuming all system components including the various mains are in operation and available to supply and convey water. The limiting factor in this scenario becomes the MDD + Fire Flow condition. Under these demands, even with both the existing 12” and additional 16” water main to provide supply across the tollway, plus the new elevated tank, eventually with enough additional demand the pipe velocities would approach and eventually exceed 10 fps under the 3,500 gpm fire demand condition (see Appendix F-E-3). The maximum equivalent P.E. south of the tollway that the existing system can serve with the noted improvements is projected to be 30,000 P.E. Scenario 3 provides the highest benefit to the Village with regard to providing sufficient supply, good water quality, and maintaining ideal system hydraulics with additional redundancy in providing water to the area south of the tollway, although it would also have the highest construction cost of all of the future scenarios.

Additional modeling was also completed for an alternative future tollway crossing located instead at George Bush Court. While not included in Appendix F, hydraulically this scenario is very similar to the base Scenario

3 with the future crossing at Sandwald Road. There is an existing 12” water main on George Bush Court, with a 12” water main extension south of the Court to the tollway right-of-way that is planned to be constructed this year. One option for an additional connection south of the tollway would be to install a water main under the tollway to connect to the George Bush Court extension currently planned, which would be less costly than the Sandwald connection due to the shorter run of water main required and a portion of the extension already having been installed.

The alternative George Bush Court crossing is also similar to Scenario 3 with regards to water quality. The emergency available fire flows would be lower due to connecting onto the current/planned 12” water main on George Bush Court compared to connecting to continuous 16” as depicted for Sandwald Road. However, the initial capital cost of looping the water main would be less costly for the Village to do at George Bush Court. The future water main crossing under the tollway is again proposed to be 16”, though this would connect onto the 12” on George Bush Court which would represent a ‘disconnect’ in the 16” water main network between Jim Dhamer Drive and across the tollway. While not a significant concern, long-term the Village may want to consider upsizing the 12” water main on George Bush Court to 16” for the entire run across the tollway if they wish to consider this option for an additional redundant supply line to the south area.

7.1.4 Future Development South of Tollway – Water Modeling Analysis Summary

The corresponding maximum equivalent additional P.E. that can be serviced under each Future Scenario is summarized as follows:

- Scenario 1 – Future Development Water Main (16” loop) South of the Tollway: < 1,000 total P.E.
- Scenario 2 – Future EWST Constructed South of the Tollway: approximately 12,000 total P.E.
- Scenario 3 – Future EWST plus Additional 16” Tollway Crossing at Sandwald Road: approximately 30,000 total P.E.

As noted, under Future Scenario 1, the criteria for maximum pipe velocity through the 12” tollway crossing is exceeded with any additional demands on top of the assumed 3,500 gpm fire flow requirement. Therefore, the P.E. breakpoint is technically hit as soon as any kind of large commercial or industrial development is connected. Under Scenario 2, with the additional EWST, the typical water main pipe velocity through the 12” Tollway crossing exceeds the recommended maximum under normal daily operations, when filling the tank at a rate of 1,000 gpm, once 12,000 P.E. are added. Lastly, under Scenario 3 with the added EWST and additional tollway crossing, the system would have added redundancy and realize hydraulic benefits that would potentially allow up to an estimated 30,000 P.E. to be serviced, without exceeding the maximum pipe velocity under an MDD plus Fire Flow scenario which was the limiting condition in that scenario.

The following additional concluding comments are made regarding the water modeling and future south of tollway analysis:

- Exact system hydraulics will vary depending on a number of factors. While generally the system is operating within a range of tank levels and system pumps turning on and off to maintain typical desired system pressures, the precise system operating conditions could yield varying hydraulic conditions in terms of differences in pressures, available fire flows, etc. The performance of the system can also vary if certain components such as Wells, WTPs, and/or EWSTs are offline for maintenance, or if there is an emergency such as a water main break. The demand and P.E. breakpoints for each scenario, therefore, can vary and are subject to how much flow the system can supply at a given time under a set of conditions. Ultimately, any future improvements and the phasing plan come down to a risk tolerance and benefit/cost comparison for the Village.

- The additional crossing under Future Scenario 3 would provide additional redundancy and be beneficial from a water quality standpoint as well as providing resiliency against water main break incidents; however, the construction cost would be higher.
- More frequent operation of Well & WTP No. 7 and more frequent turnover of EWST No. 2 (nearest supply and storage points) are anticipated since these are closest to the area south of the tollway, at least until such time if/when a future EWST is constructed south of the tollway.
- Water turnover may be a concern with an additional EWST, as well as water quality in the future development area. Therefore, additional flushing in this area may need to be considered initially and as development progresses, either manually or with an autoflusher until the system can be fully looped.
- Phasing of improvements will need to be considered as development occurs.

7.2 Water Supply Treatment Evaluation & Recommendations

The sustainable source water assessment from 2014 (included in this report as Section 9 but not updated) concluded that the continued use of the deep sandstone aquifer to meet existing demands and then expansion of the withdrawals to meet future water demands, is the most sustainable, cost-conscious approach for the planning period. All future wells should be drilled with the Ironton-Galesville sandstone formation as the target aquifer. Wells constructed in the southern portion of the planning area should be constructed in a manner that deepening to the Mt. Simon formation can be accomplished.

Due to the fact that it can be reasonably assumed that the Ironton-Galesville formation will have barium and radium concentrations above their respective MCLs, it is assumed that the Village will utilize cation exchange treatment for all new wells, consistent with the five existing Ironton-Galesville wells and WTPs. As was discussed in Section 2, Well No. 9 contains hydrogen sulfide levels such that treatment is needed to reduce those levels. It is assumed that the same type of treatment – aeration and detention – would be utilized for future wells with excessive amounts of hydrogen sulfide. Since it is not preferred to add this extra step of treatment when it is not needed (recall four of five Village wells do not need it), it is recommended that the Village drill and test pump all future wells prior to finalizing the water treatment plant design. If hydrogen sulfide levels are of sufficient concentration to require aeration and detention treatment, then it can be added to the treatment train. However, if the hydrogen sulfide levels are below the level requiring the additional treatment, the water treatment plant can be set up the same as the Wells No. 7, 8 and 10 WTPs. Utilizing this overall supply and treatment approach, a summary of the needed well and water treatment plants to meet the CT and LRI water use scenarios is as follows.

7.2.1 CT Water Supply and Treatment Evaluation & Recommendations

In Section 5, the needs assessment calculations projected a 2050 CT water use scenario deficit of 4,200 under the *Reliable Source Capacity* test parameter, which is lower than the anticipated deficit of 7,300 gpm from the 2014 report due to water use reductions. This figure already includes the 1,000 gpm from currently-planned Well and WTP No. 13; it would be 5,200 gpm otherwise. It also should be noted the needs assessment calculations presented in Section 4 show water supply deficits of 399, 189, and 625 gpm in 2017, 2020, and 2021, respectively, of the same test parameter. Therefore, the Village's existing water supply is currently at capacity, and supply and treatment expansion has been considered and initiated. As the typical target production rate for an Ironton-Galesville well is 1,000 gpm, six Ironton-Galesville wells will need to be drilled and connected to appropriately sized water treatment plants to comfortably make up that deficit. The first well of those six, Well No. 13, has had permit approval but is pending on land acquisition, and the associated water treatment plant is under design.

When water wells are pumped, the water levels in the aquifer decline in a radial direction. While the deep sandstone formations are not purely homogenous, the characteristics of the aquifer are fairly consistent. In an effort to reduce hydraulic interference between deep sandstone wells, a typical minimum well spacing is one mile. By separating the wells by at least one mile, the drawdown in one deep sandstone well will be minimal at the edge of the drawdown from another one.

Up to this point, all of the Village's Ironton-Galesville wells pump to their own individual WTP. This practice could certainly be continued, but there is an opportunity to save capital and O&M costs by combining water treatment for two or more wells in one facility in the future. In essence, the one mile of raw water main needed to pump a well to a multi-well WTP is more cost-effective than constructing an individual water treatment plant. In addition, the operation and maintenance cost of a 2,000 gpm WTP would be lower than two 1,000 gpm water treatment plants. With this in mind, along with considerations for the hydraulic input and distribution of the water throughout the Village's future Water Works System, six new wells and five water treatment plants were located throughout the Village's Planning Area under the CT water use scenario. A summary of the well and water treatment plant combinations is as follows:

- Well No. 13 and Well No. 13 WTP: The 1,000 gpm Ironton-Galesville Well No. 13 and its corresponding WTP are proposed to be located south of the western intersection of Smith Drive and Kreutzer Road, just behind the Walmart. At one time, the Village explored the potential of locating a shallow sand and gravel well at this location, but it was determined the sand and gravel deposits were not of sufficient aerial extent in this area to site a new shallow sand and gravel well. However, it is a good location to site a new deep sandstone well and water treatment plant. This well and treatment plant are currently under design and are anticipated to be online by 2024.
- Well No. 14 and Well No. 14 WTP: The 1,000 gpm Ironton-Galesville Well No. 14 and its corresponding WTP are proposed to be located at the end of Industrial Court, and should be completed by 2031 to meet demands. It is recommended this well be a 26X22 well for expansion into the Mt. Simon aquifer, if

needed. The Village has acquired a small piece of property at the end of the Industrial Court cul-de-sac, and has indicated it would like to site a well there. An initial review of the dimensions of the Village's property at this location indicates the Village may need to acquire more property or obtain easements for this facility. A more detailed review of the property should be completed before detailed design is initiated.

- Well No. 15 and 18 and Wells No. 15 and 18 WTP: The 1,000 gpm Ironton-Galesville Well No. 15 would be constructed adjacent the Village's existing EWST No. 4 on the Village of Huntley's property along west Main Street, and should be completed before 2036 to meet demands. The building would be sized such that the future Well No. 18 connection, along with expansion of the water treatment equipment inside of the building, would expand the plant to a 2,000 gpm WTP. It is assumed that Well No. 18 would be sited north of the WTP with the appropriate one mile spacing from each other, and that both wells can be 24X18 wells. Well No. 18 would require completion by 2050 to meet future demands.
- Well No. 16 and Well No. 16 WTP: The 1,000 gpm Ironton-Galesville Well No. 16 and its corresponding WTP is proposed to be installed just north of the East WWTF, and should be completed by 2041 to meet demands. There is a triangular parcel north of the East WWTF that may have development challenges due to the parcel's geometry. The installation of Well No. 16 next to another Village facility and in close proximity to Public Works would be a good location for Village Staff to monitor. A well in this location also keeps the minimum one mile separation from the Village's existing and other potential future wells. Given its central location, it assumed Well No. 16 could be a 24X18 well.
- Well No. 17 and Well No. 17 WTP: The 1,000 gpm Ironton-Galesville Well No. 17 and its corresponding WTP is proposed to be located south of I-90 and west of Route 47, and should be completed by 2046 to meet demands. It is recommended the Village secure property from the development of property in this area, and that it be constructed when extensive development south of I-90 occurs. Given its southern location, it is suggested that this well could be a 26X22 well, as well. The Well No. 17 WTP could be constructed with extra floor space such that additional cation exchange water treatment equipment could be added to eventually treat a future well.

7.2.2 LRI Water Supply and Treatment Evaluation & Recommendations

In Section 5, the needs assessment calculations projected a 2050 LRI water use scenario, under the *Reliable Source Capacity* test parameter, deficit of 2,295 gpm. This figure already includes Well and WTP No. 13, online before 2026; the deficit would be 3,295 otherwise. This is a slight reduction from 2014, where the LRI scenario predicted a deficit of 3,567 gpm but did not include any impending additional supply. Therefore, four Ironton-Galesville wells would need to be connected to appropriately size water treatment plants to make up that deficit. The proposed locations for Wells No. 13, 14, 15, and 16 are the same locations as described in the previous section. While the treatment plants for Wells No. 13, 14 and 16 should be designed to treat the water from just their associated wells, it is recommended that the design for the Well No. 15 WTP is made for future expansion as under the CT scenario. As the demand grows towards the need for Well No. 16, the Village could consider installing Well No. 16 at the site of Well No. 18 from the CT scenario and construct a one-mile pipeline to the WTP No. 15 location in lieu of constructing another water treatment plant. However, this decision would depend on water demands and where in the distribution system another water source would be most beneficial.

7.3 Water Storage Evaluation & Recommendations

As water demands rise, the Village will need to expand the amount of water storage within the Water Works System, so peak hour demands can be met. The storage expansion could be accomplished with the construction of Elevated Water Storage Tanks, Ground Storage Tank (GST) or a combination, thereof. The main benefit of EWSTs is the fact once the water is pumped into the tank, it can flow out to the customers via gravity. On the other hand, ground storage tanks would require a pump to convey the water across the system. Given the constantly changing demands in the Water Works System, the seamless release of water from an EWST far exceeds the need to modify the pumping rate to meet the changed demand. In the end, the cost to construct and operate a 2.0 MG EWST or smaller typically is comparable to the cost of a similar size GST and pumping station. Therefore, due to the comparable costs and ease of operations, it is recommended water storage expansion be accomplished with the construction of EWSTs.

While the distribution of multiple EWSTs throughout the community will help system hydraulics, there is a point where the capital and operation and maintenance costs are optimal. Certainly the cost per gallon goes down as the size of the EWST increases, but funding constraints for a particular tank should be considered. For those reasons, and based on the Village's current and projected size, it is recommended the Village construct tanks at a minimum capacity of 1.0 MG.

A description of the recommended water storage additions to meet future CT and LRI water demand scenarios is as follows.

7.3.1 CT Water Storage Evaluation & Recommendations

In Section 5, the needs assessment calculations for the projected CT water use scenario identified a *Peak Hour Storage Capacity* deficit of approximately 2.9 million gallons by the end of the planning period, compared to a deficit of 4.5 million gallons from the 2014 Master Plan. Additional storage will need to be integrated into the Water Works System to close the future conditions deficit. A description of the recommended water storage improvements is as follows:

- EWST No. 6: It is recommended that EWST No. 6 is constructed at the Well No. 11 and Well No. 11 WTP site with a capacity of 1.5 MG. The Village has additional space at this property, so no new property would be needed to construct an EWST there. In addition, its location in the north/northwest portion of the Village will help with the distribution of water in that area. According to the needs assessment calculations, this tank will be needed within the addition of 5,000 P.E.
- EWST No. 7: It is recommended that EWST No. 7 have a capacity of 1.0 MG, and be located at the future Well No. 17 and Well No. 17 WTP site. As the only proposed tank in the Village's southern

planning area, the central location will optimize distribution across the area. This tank will be necessary before the addition of 20,000 P.E., but if development in the southern area is slower than anticipated, it could be pushed back to before the addition of 30,000 P.E., and EWST No. 8 could be constructed before EWST No. 7 instead. However, if development in the southern area proceeds quickly, then this EWST could be constructed before EWST No. 6 above.

- EWST No. 8: It is recommended that EWST No. 8 have a capacity of 1.0 MG, and be located at the WTP No. 14 site, which would likely require land acquisition to accommodate the tank. This tank will be required before the addition of 30,000 P.E., and should be constructed at approximately the same time as the recommendation below.
- EWST No. 1 Demolition – EWST No. 1, which was originally constructed in 1970, could be at the end of its useful life at some point within the planning period. In addition, with a capacity of 0.3 MG, the cost per gallon of storage to maintain EWST No. 1 would be higher than the same amount of storage in the newly constructed EWSTs. Therefore, the next time EWST No. 1 is to be repainted, the Village should consider demolishing it rather than investing the money to recoat it. EWST No. 6 has been upsized by 0.5 MG to compensate for the eventual loss of storage, although any of the proposed tanks could be sized at 1.5 MG rather than the 1.0 MG required.

7.3.2 LRI Water Storage Evaluation & Recommendations

In Section 5, the needs assessment calculations for the projected LRI water use scenario identified a *Peak Hour Storage Capacity* deficit of approximately 1.8 million gallons by the end of the planning period. To close the deficit, additional storage will need to be integrated into the Water Works System. Building on the same concepts as described in the CT water use scenario, EWST No. 6 would be constructed at a 1.5 MG capacity at the existing Well No. 11 and WTP site. EWST No. 7 would be constructed in the southern planning area at a site for a potential future Well and WTP, sized for 1.0 MG. It is also assumed that the Village would abandon EWST No. 1, for the reasons described in the previous section under the CT scenario, and the size of EWST No. 6 has been similarly increased by 0.5 MG to compensate for the eventual loss of storage.

7.4 Water Distribution and Pressure Zone Evaluation & Recommendations

The water distribution system was summarized within Section 2. Based on a review of the hydraulic grade line of the Water Works System and the topography within the Village's planning area, it would appear that the Village can continue to operate on one pressure zone. The Village's existing large diameter pipe network appears to provide sufficient conveyance across the system, because there are no known hydraulic limitations. Past modeling of the system has also verified good conveyance across the system. As the system expands, it will be important to maintain a large diameter water main backbone of 12-inch and 16-inch water mains.

7.5 Recommended Improvements Summary

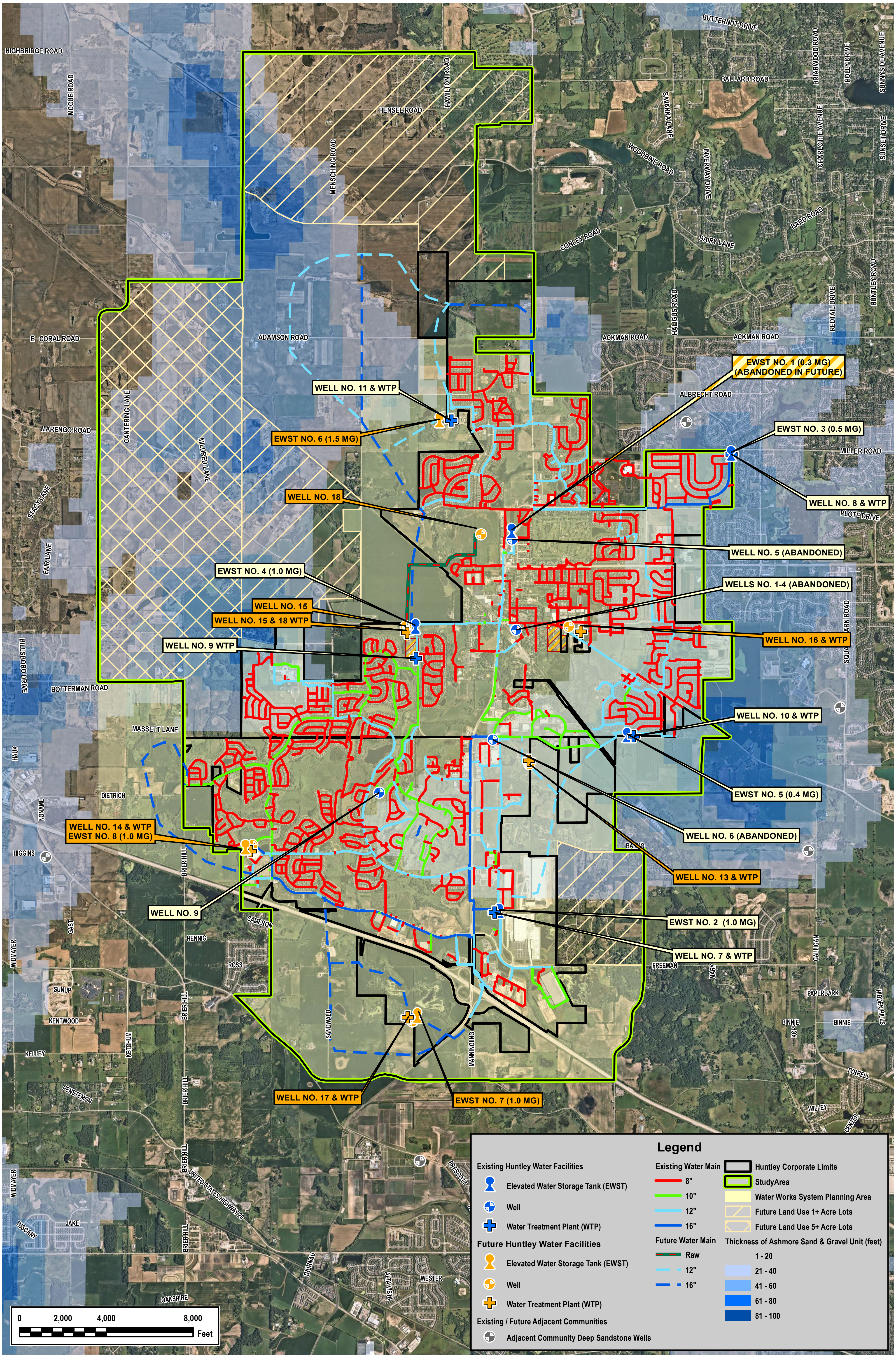
The improvements presented in this report will allow for water transfer with minimal headloss, appropriate water storage volume, and the required water supply and treatment to continue to provide safe and adequate water to the Village of Huntley given both CT and LRI demand scenarios. The recommended improvements for the SSA will also be presented here, separately. The recommendations are broken down into Supply, Treatment, Storage, and Distribution. The recommended improvements will be presented in this Section, but the actual phasing and implementation of these improvements will be further discussed in Section 7.6. Detailed cost estimates for the proposed improvements described in Sections 7.1, 7.2, and 7.3 and shown below are provided in Appendix G.

7.5.1 CT Water Works System Master Plan

Under the CT demand scenario, the following improvements are recommended:

Supply & Treatment:	
○ Well No. 13 and Well No. 13 WTP (Under Design)	$8,523,000
○ Well No. 14 and Well No. 14 WTP	$9,192,000
○ Well No. 15 and Well No. 15 WTP (Building Sized for Future Well Connection)	$9,206,000
○ Well No. 16 and Well No. 16 WTP	$8,523,000
○ Well No. 17 and Well No. 17 WTP	$9,192,000
○ Well No. 18 and Wells No. 15 & 18 WTP Expansion	$7,883,000
Storage:	
○ EWST No. 6 (1.50 MG)	$8,973,000
○ EWST No. 7 (1.00 MG)	$7,355,000
○ EWST No. 8 (1.00 MG)	$7,355,000
Distribution:	
○ 18,000 ft of Looped 16” Water Main in the SSA	$6,327,000
○ 3,100 ft of 16” Water Main Extension in the SSA	$1,536,000

The location of all recommended improvements for the CT demand scenario, including the large diameter water main extension in the SSA, are depicted on Exhibit No. 7-1.



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DATE:	SEPTMEBER 2022
PROJECT NO.:	HU2102
BY:	MJT
PATH:	H:\GIS\PUBLIC\HUNTLEY\HU2102\
FILE:	HU2102_EXH_7-1.MXD

COMPREHENSIVE WATER AND WASTEWATER SYTEMS MASTER PLAN

EXHIBIT 7-1
WATER WORKS SYSTEM MASTER PLAN
CURRENT TRENDS - CT

NORTH

7.5.2 LRI Water Works System Master Plan

Under the LRI demand scenario, the following improvements are recommended (note LRI cost estimates are provided in Appendix G, as well):

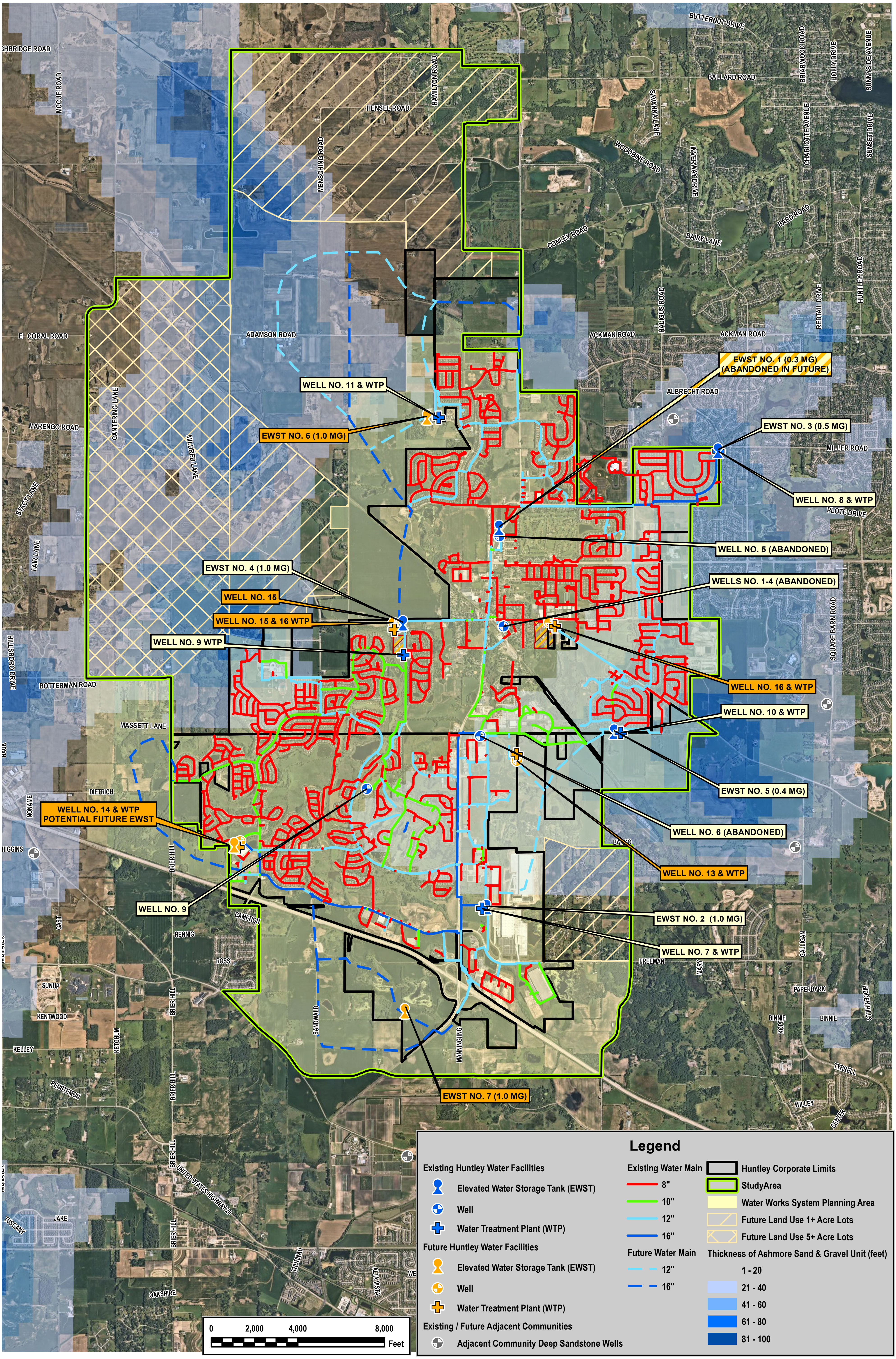
Supply & Treatment:	
○ Well No. 13 and Well No. 13 WTP (Under Design)	$8,523,000
○ Well No. 14 and Well No. 14 WTP	$9,192,000
○ Well No. 15 and Well No. 15 WTP (Building Sized for Future Well Connection)	$9,206,000
○ Well No. 16 and Well No. 16 WTP	$8,523,000
Storage:	
○ EWST No. 6 (1.50 MG)	$8,973,000
○ EWST No. 7 (1.00 MG)	$7,355,000
Distribution:	
○ 18,000 ft of Looped 16” Water Main in the SSA	$6,327,000
○ 3,100 ft of 16” Water Main Extension in the SSA	$1,536,000

The locations of all recommended improvements for the LRI demand scenario, including the large diameter water main extension in the SSA, are depicted on Exhibit No. 7-2.

7.5.3 Southern Service Area Water Works Master Plan

The following improvements are recommended for the SSA alone, assuming complete build-out of the area:

Storage:	
○ EWST No. 7 (1.00 MG) [Phase 2]	$7,355,000
Distribution:	
○ 18,000 ft of Looped 16” Water Main [Phase 1]	$6,327,000
○ 3,100 ft of 16” Water Main Extension [Phase 3]	$1,536,000



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DATE: MAY 2022
PROJECT NO.: HU2102
BY: MJT
PATH: H:\GIS\PUBLIC\HUNTLYEY\HU2102\
FILE: HU2102_EXH_7-2.MXD

COMPREHENSIVE WATER AND WASTEWATER SYTEMS MASTER PLAN

EXHIBIT 7-2
WATER WORKS SYSTEM MASTER PLAN
LESS RESOURCE INTENSIVE - LRI

7.6 Water Works System Phasing and Implementation Plan

In order to provide an organized logical phasing and implementation plan that also recognizes that population projections for a 25 year period are less than exact, the recommendations have been prioritized and grouped into three categories: 1) Immediate Improvements, 2) Near Future Improvements, and 3) Long Term Improvements. The Immediate Improvements are the minimum improvements necessary to correct the deficiencies in the existing Water Works System and meet the demands that an additional 5,000 people and commensurate commercial and industrial growth would add to the system. Based on the population projection provided in Section 1.6, it is estimated this level of population increase could occur over the next five years. The Near Future Improvements are the necessary improvements necessary to accommodate 5,001 to 16,000 people along with the additional commercial and industrial growth. This total population growth is projected to occur in six to fifteen years. The Long Term Improvements are the optimal improvements to accommodate the 2050 population projection of 58,997 people, approximately 29,500 additional people from 2021, and the associated commercial and industrial growth that will be encountered with the growth. The recommendations summarized in Section 7.5 were placed into the three water demand projection timeframes, and a phasing and implementation plan has been prepared for both the CT and LRI scenarios. In addition, costs related to the Southern Service Area alone are shown in a separate table.

7.6.1 CT Implementation Plan

Table No. 7-1 presents the recommended Phasing and Implementation Plan for the proposed improvements under the CT demand scenario along with the summary of costs for each of the three categories.

As shown on the Phasing and Implementation Plan - CT, the total cost of recommended Immediate, Near Future, and Long Term Water Works System improvements is approximately $84.07 million, which includes $23.82 million for the Village's Immediate Needs, $25.75 million for Near Future Improvements and $34.49 million for Long Term Improvements. These improvements include new wells and water treatment plants, water treatment plant and distribution system expansions, and additional water storage.

7.6.2 LRI Implementation Plan

Table No. 7-2 presents the recommended Phasing and Implementation Plan for the proposed improvements under the LRI demand scenario along with the summary of costs for each of the three categories.

As shown on the Phasing and Implementation Plan - LRI, the total cost of recommended Immediate, Near Future, and Long Term water Works System improvements is approximately $59.64 million, which includes $23.82 million for the Village's Immediate Needs, $18.40 million for Near Future Improvements, and $17.41 million for Long Term Improvements. These improvements include new wells and water treatment plants, distribution system expansion, and additional water storage.

Table No. 7-1: Water Works System Phasing and Implementation Plan – CT

Village of Huntley, IL

Water Works System Component	Immediate 0 - 5,000 Population Equivalents Addition 0 - 5 Years		Near Future 5,001 - 16,000 Population Equivalents Addition 6 - 15 Years		Long Term 16,001 - 29,553 Population Equivalents Addition 16 - 26 Years		Total
	Description	Cost[1]	Description	Cost[1]	Description	Cost[1]	
Supply & Treatment	Well No. 13 & Well No. 13 WTP	$ 8,523,000	Well No. 14 & Well No. 14 WTP	$ 9,192,000	Well No. 16 & Well No. 16 WTP	$ 8,523,000	
			Well No. 15 & Well No. 15 WTP	$ 9,206,000	Well No. 17 & Well No. 17 WTP	$ 9,192,000	
					Well No. 18 & Well No. 15 & 18 WTP Expansion	$ 7,883,000	
Supply & Treatment Subtotal:		**$ 8,523,000**		**$ 18,398,000**		**$ 25,598,000**	**$ 52,519,000**
Distribution in Southern Service Area	18,000 LF 16" Water Main Loop from 12" Stub	**$ 6,327,000**			3,100 LF 16" Water Main Extension from Sandwald Rd. (which includes tollway crossing)	$ 1,536,000	
Distribution Subtotal:		**$ 6,327,000**		**$ -**		**$ 1,536,000**	**$ 7,863,000**
Storage	EWST No. 6 (1.5 MG)	$ 8,973,000	EWST No. 7 (1.0 MG)	$ 7,355,000	EWST No. 8 (1.0 MG)	$ 7,355,000	
Storage Subtotal:		**$ 8,973,000**		**$ 7,355,000**		**$ 7,355,000**	**$ 23,683,000**
TOTAL:		**$ 23,823,000**		**$ 25,753,000**		**$ 34,489,000**	**$ 84,065,000**

Notes

[1] Based on 2022 dollars and 2022 construction costs; includes engineering and contingency costs.

Table No. 7-2: Water Works System Phasing and Implementation Plan – LRI

Village of Huntley, IL

Water Works System Component	Immediate 0 - 5,000 Population Equivalents Addition 0 - 5 Years		Near Future 5,001 - 16,000 Population Equivalents Addition 6 - 15 Years		Long Term 16,001 - 29,553 Population Equivalents Addition 16 - 26 Years		Total
	Description	Cost[1]	Description	Cost[1]	Description	Cost[1]	
Supply & Treatment	Well No. 13 & Well No. 13 WTP	$ 8,523,000	Well No. 14 & Well No. 14 WTP	$ 9,192,000	Well No. 16 & Well No. 16 WTP	$ 8,523,000	
			Well No. 15 & Well No. 15 WTP	$ 9,206,000			
Supply & Treatment Subtotal:		**$ 8,523,000**		**$ 18,398,000**		**$ 8,523,000**	**$ 35,444,000**
Distribution in Southern Service Area	18,000 LF 16" Water Main Loop from 12" Stub	**$ 6,327,000**			3,100 LF 16" Water Main Extension from Sandwald Rd. (which includes tollway crossing)	$ 1,536,000	
Distribution Subtotal:		**$ 6,327,000**		**$ -**		**$ 1,536,000**	**$ 7,863,000**
Storage	EWST No. 6 (1.5 MG)	$ 8,973,000			EWST No. 7 (1.0 MG)	$ 7,355,000	
Storage Subtotal:		**$ 8,973,000**		**$ -**		**$ 7,355,000**	**$ 16,328,000**
TOTAL:		**$ 23,823,000**		**$ 18,398,000**		**$ 17,414,000**	**$ 59,635,000**

Notes

[1] Based on 2022 dollars and 2022 construction costs; includes engineering and contingency costs.

7.6.3 Capital Cost Savings With LRI Water Use Commitment

The major differences in the recommended improvements for the CT and LRI have been identified. In Sections 7.5.1 and 7.5.2, the Phasing and Implementation Plan for the recommended improvements under both the CT and LRI demand scenarios is provided along with cost estimate summaries for each phase and the total combined. Table No. 7-3 summarizes the potential financial benefit if the Village meets its water conservation goals and is able to implement improvements based on the LRI demand scenario.

Table No. 7-3: Capital Cost Savings with LRI Water Use Commitment

Village of Huntley, IL

Water Works System Component	Present Worth Capital Cost		
	Current Trends (CT)	Less Resource Intensive (LRI)	Savings
Supply & Treatment	$ 52,519,000	$ 35,444,000	($17,075,000)
Distribution	$ 7,863,000	$ 7,863,000	$0
Storage	$ 23,683,000	$ 16,328,000	($7,355,000)
TOTAL:	**$84,065,000**	**$59,635,000**	**($24,430,000)**

7.6.4 Southern Service Area Implementation Plan

Table No. 7-4 presents the recommended Phasing and Implementation Plan for the proposed improvements for the Southern Service Area alone, along with the summary of costs for each of the three categories, which estimate the trigger point of the estimated population equivalent for which the next phase of infrastructure is needed. As the SSA will be developed at a different rate than the main Water Works System north of I-90, there are no trends associated with it, resulting in a single plan that follows neither CT nor LRI projections.

As shown on Table No. 7-4, the total cost of recommended Water Works System improvements is approximately $15.22 million, which includes $6.33 million for a 16” loop of water main to support a population equivalent (P.E.) of 0 to <1,000, $7.34 million for an elevated water storage tank to support a P.E. of <1,000 to 12,000, and $1.54 million to extend the central distribution system and connect to the southern loop to support a P.E. of 12,000 to 30,000.

Table No. 7-4: Southern Service Area Water Works System Phasing & Implementation Plan

Village of Huntley, IL

Water Works System	Phase 1		Phase 2		Phase 3		
	0 - <1,000 Population Equivalents Addition		<1,000 -12,000 Population Equivalents Addition		12,000 - ~30,000 Population Equivalents Addition		
Component	Description	Cost[1]	Description	Cost[1]	Description	Cost[1]	Total
Distribution in Southern Service Area	18,000 LF 16" Water Main Loop from 12" Stub	**$ 6,327,000**			3,100 LF 16" Water Main Extension from Sandwald Rd. (which includes tollway crossing)	$ 1,536,000	
Distribution Subtotal:		**$ 6,327,000**		**$ -**		**$ 1,536,000**	**$ 7,863,000**
Storage in Southern Service Area			EWST No. 7 or 8 (1.0 MG)	$ 7,355,000			
Storage Subtotal:		**$ -**		**$ 7,355,000**		**$ -**	**$ 7,355,000**
TOTAL:		**$ 6,327,000**		**$ 7,355,000**		**$ 1,536,000**	**$ 15,218,000**

Notes

[1] Based on 2022 dollars and 2022 construction costs; includes engineering and contingency costs.

SECTION 8: WASTEWATER SYSTEM EVALUATION & RECOMMENDATIONS

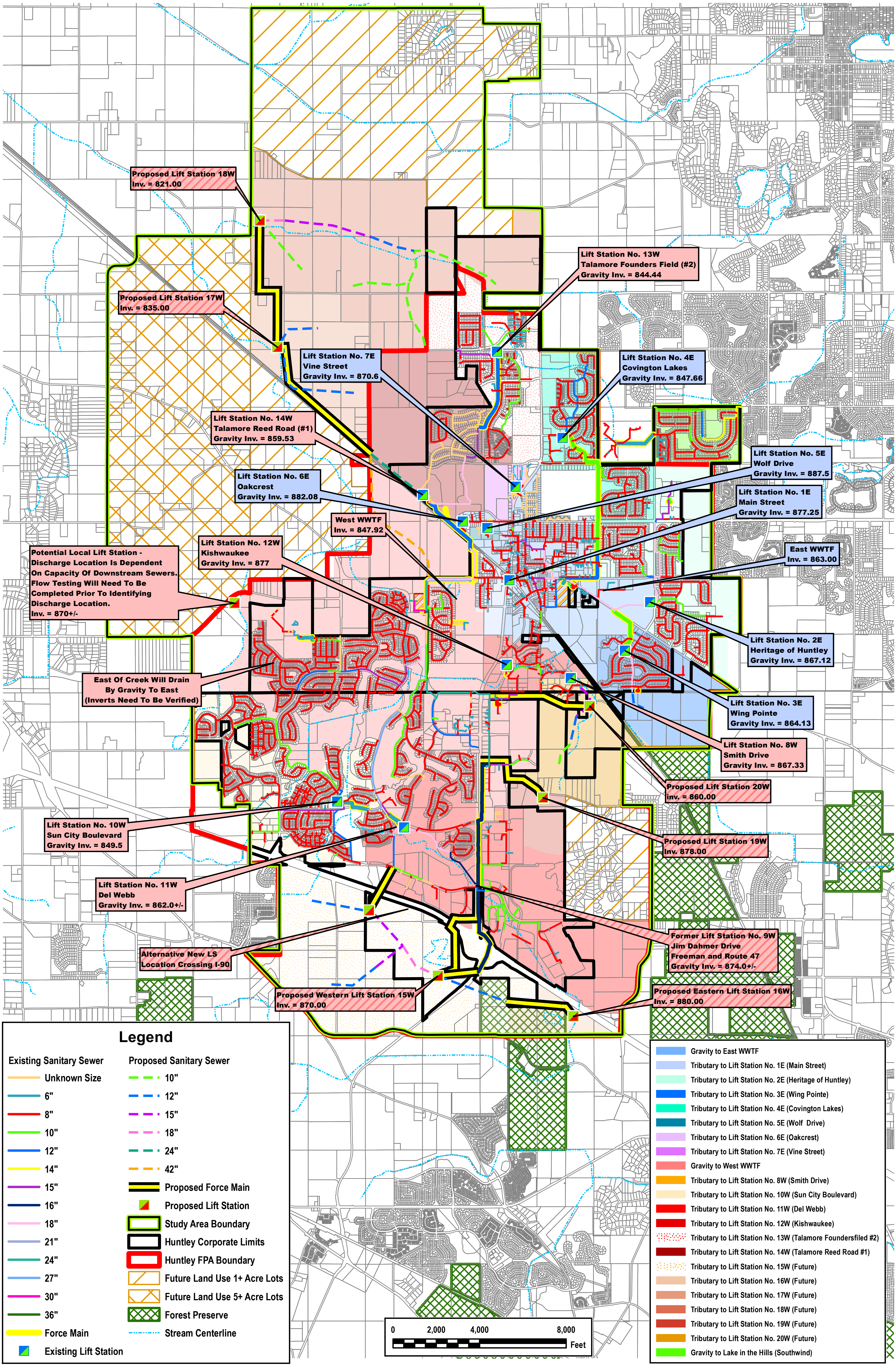
Previous sections of this report summarized the Wastewater System components, identified existing needs at each of the Village's WWTPs, and reviewed the regulatory challenges that may be presented shortly. This section will determine the required improvements needed to meet the existing operation and maintenance needs at each of the WWTPs and the improvements needed to expand portions of the West WWTP to meet the 2050 wastewater flow projections for the Village of Huntley. Following a review of the cost of the improvements, a phasing and implementation program will be summarized.

8.1 Study Area Collection and Conveyance Plan

A goal of this report is to establish a wastewater collection and conveyance plan for the Southern Service Area (SSA) located south of I-90 in the Village's Planning Area. The objective of any sanitary sewer network is to collect and convey the wastewater as efficiently as possible. Ideally, the majority of wastewater can be transferred via gravity flow. However, topographic and cost constraints can make gravity flow challenging, which would then necessitate lift stations. Furthermore, due to the uncertain nature and timeframe of the potential development in the SSA, the plan will consider private sewage disposal options as an intermediary step before the installation of traditional sewerage facilities. As stated before, the Village's collection system currently consists of 13 lift stations (not including the lift stations at each WWTP) with roughly half of that number tributary to each of the Village's WWTPs.

Wastewater flows depend on the ultimate land use of the property. Residential wastewater flow projections are fairly straightforward, but wastewater flows can vary considerably for commercial and industrial land uses. A lot of work can be put into computing land areas for the projected land uses, applying wastewater flows based on the number of units, building square footage, or overall acreage, but it ends up being a guesstimate at best. In general, wastewater flows across larger areas of multiple land uses tend to average out to around 8 to 10 population equivalents per acre (P.E./ac) After considering the options, the Village determined a wastewater flow of 8.75 P.E./ac was consistent with the existing collection system and likely would be consistent for the SSA development area. For the 1,200-acre area west of Route 47, the resultant build-out wastewater flows would be 10,500 PE or 1.5 MGD at 100 gpcd. For the 500-acre area east of Route 47, this would equate to 4,375 PE or 437,500 gpd accordingly. The total flow is estimated to be around 2.0 MGD. However, it should be noted that this maximum flow is for complete build-out and is unlikely to occur within the planning time frame. Improvements for this level of development will be planned toward the later part of the planning period as described herein.

The tools utilized to develop the future collection system plan included two-foot contour topographic maps, aerial photographs, and sewage estimation spreadsheets. Wastewater flow projections for the SSA were completed and estimates were made for potential pipe layouts and sizes or alternate methods of treatment. The resultant existing and future collection system plan is shown on Exhibit No. 8-1 with Exhibit No. 8-2 being



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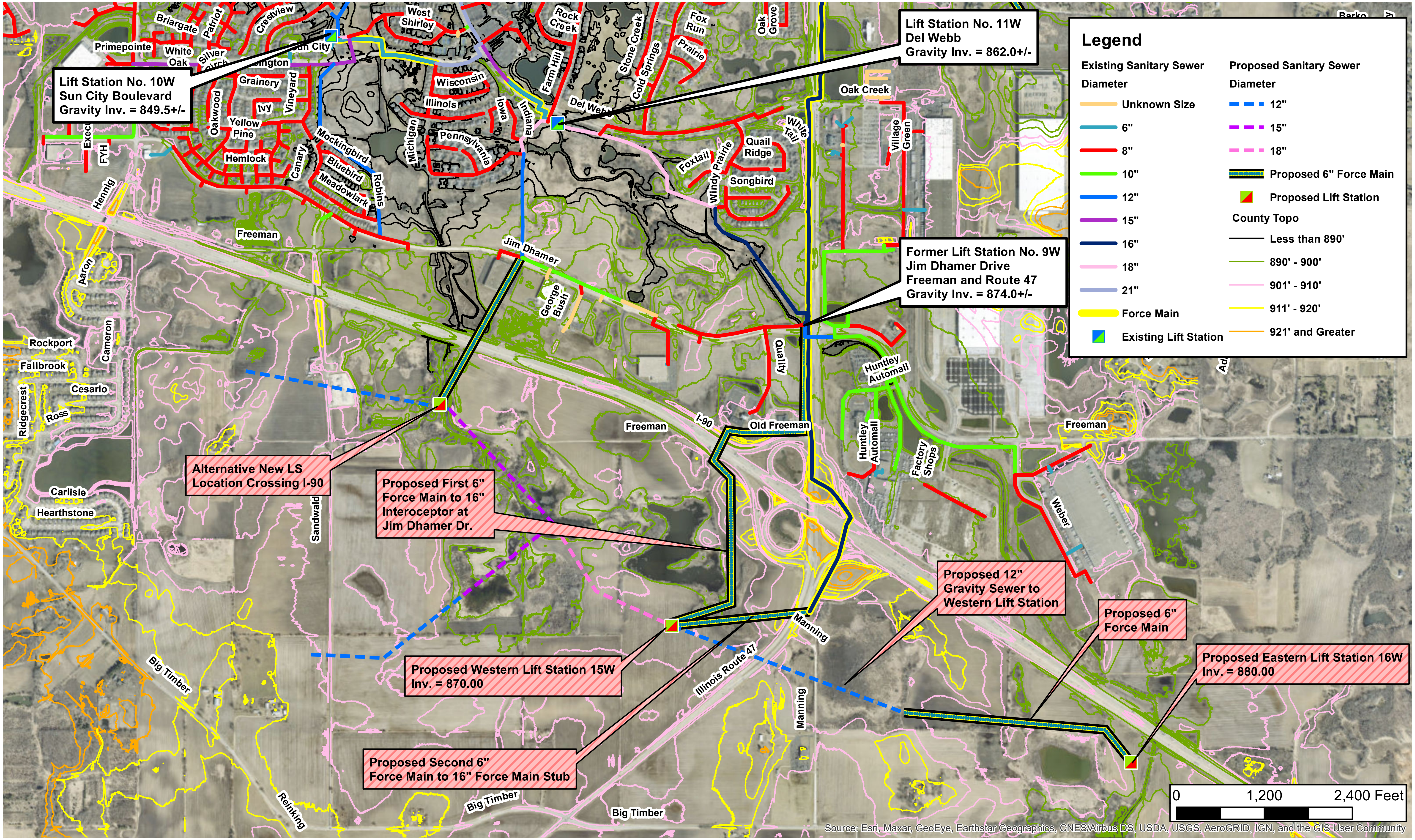
DATE: SEPTEMBER 2022
PROJECT NO.: HU2102
BY: MJT
PATH: H:\GIS\PUBLIC\HUNTLEY\HU21012\
FILE: HU2102_EXH_9-1_SANITARY COLLECTION SYSTEM.MXD

COMPREHENSIVE WATER AND WASTEWATER SYSTEMS MASTER PLAN

EXHIBIT 8-1
EXISTING AND FUTURE COLLECTION SYSTEM



Lift Station No. 10W
Sun City Boulevard
Gravity Inv. = 849.5+/-

Lift Station No. 11W
Del Webb
Gravity Inv. = 862.0+/-

Former Lift Station No. 9W
Jim Dhamer Drive
Freeman and Route 47
Gravity Inv. = 874.0+/-

Alternative New LS
Location Crossing I-90

Proposed First 6"
Force Main to 16"
Interoceptor at
Jim Dhamer Dr.

Proposed 12"
Gravity Sewer to
Western Lift Station

Proposed 6"
Force Main

Proposed Eastern Lift Station 16W
Inv. = 880.00

Proposed Western Lift Station 15W
Inv. = 870.00

Proposed Second 6"
Force Main to 16" Force Main Stub

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

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Village of Huntley
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NO.	DATE	REVISIONS

DATE: SEPTEMBER 2022
PROJECT NO.: HU2102
PATH: H:\GIS\PUBLIC\HUNTLEY\
FILE: HU2102_8-2 SOUTHERN EXPANSION AREA.MXD

COMPREHENSIVE WATER AND WASTEWATER SYSTEMS MASTER PLAN
VILLAGE OF HUNTLEY, ILLINOIS

EXHIBIT 8-2
EXISTING AND FUTURE COLLECTION SYSTEM: SOUTHERN SERVICE AREA

N

an enlarged plan focusing on the SSA. A summary of the conveyance in the southern planning area is as follows.

8.1.1 Southern Service Area Collection System Expansion

The Village's southern service area is the currently undeveloped area south of I-90. In the mid-2000s, preliminary wastewater collection and conveyance planning was completed as development proposals started to come forward. The original plan suggested installation of a new lift station on the east side of Route 47, just south of the eastbound I-90 ramp. The intent of the service area for a lift station was an approximate 1,200-acre area west of Route 47 as well as a smaller 500-acre area east of Route 47. During this timeframe, the final design phase of the I-90 and Route 47 full interchange improvements was occurring. Since the existing access ramps on the east side of Route 47 were going to be rebuilt, the Village decided it was an ideal time to install the force main that would connect to the proposed Route 47 southern lift station.

Seeing a high amount of growth within the Village and wanting to capitalize on the economic development potential in this southern service area quickly, the Village designed and installed approximately 10,600 feet of 16" force main. It was routed from the proposed lift station location, across I-90, and north along Route 47 to the point where the force main discharges into the gravity sanitary sewer network at the northeast corner of the intersection of Route 47 and Powers Road. Unfortunately, development did not occur in the area as expected, or, in fact, at all.

When the development of this area reinitiates, the conveyance of wastewater through the 16" force main will be a challenge; with minimal flows from this service area in the initial years with light development, the detention time within the force main will be months. This is obviously an undesired situation.

The original design for the Route 47 south lift station set a sanitary sewer invert at 882.4 and the bottom of the excavation would have been at an elevation of 877.6. With a ground surface elevation of 913 at the lift station site, the total depth of the lift station was going to be approximately 35.5 feet. The lift station was planned to have approximately 10,000 P.E. directly tributary to it, which would have resulted in an ultimate average day wastewater flow of approximately 1.0 MGD and a peak hour flow of nearly 3.0 MGD. Given the ultimate flows tributary to the lift station, the design included an automatically cleaned fine screen and a screenings washer compactor.

While the Route 47 lift station was designed and permitted, construction did not move forward due to the downturn in the economy and no development south of I-90 moving forward. In addition, with the large capacity of the 16" force main and the challenges it would create trying to convey the lighter wastewater flows in the early years of development, it was determined that a fresh look at the conveyance plan for this area should be completed.

8.1.1.1 New Options - Interest in development in the SSA is re-emerging but the problem of providing sewer service to the area remains. The above-mentioned existing 16” force main across I-90 is adequate to support flows that would be approaching a build-out level (~15,000 PE or 2 MGD) but that is not expected to occur for some time, if ever.

Referring to Exhibit No. 8-2, the topography within the SSA consists of a higher elevation ridge around the western and southern boundaries of the development area and a low elevation area in the middle adjacent to I-90. I-90 and Route 47 act as topographic barriers. This elevation profile allows for gravity sewers to convey flow to a central low area in the SSA but does not allow for a gravity sewer to connect any of the Village’s gravity sewers or lift stations on the northern side of I-90.

The SSA topography favors the installation of lift stations that could collect flow from a system of gravity sewers. During discussions with the Village, it was determined that the Village would prefer to avoid the installation of mini-lift stations with small diameter force mains. This kind of patchwork lift station system, with lift stations only sized for individual developments, tends to eventually create a leap-frog type conveyance system. Flows from one small lift station ends up pumping to another lift station installed earlier in the development cycle and so on. This type of system, while cost-effective from a development standpoint, often requires a significant amount of maintenance and operation activities. Additionally, this type of series pumping system has the inherent risk that failure of a downstream lift station can disrupt all dischargers upstream. The Village prefers to limit the number of potential lift stations to a minimum (no more than 2 if possible) and keep force main sizes at 6” diameter or greater to facilitate field location and cleaning.

Considering all these factors, a phased sewer service plan is recommended for the SSA that installs appropriate sewerage facilities over time based on need. This need is established as certain population equivalent thresholds of development, which then equate to respective levels of wastewater flow. The levels of flow then govern what facilities are required and when. The plan is divided into three phases as follows:

Phase 1: Initial Development up to Approximately 3,000 PE

Within the next five years, development is expected to start in the area but will be sporadic. Development is also expected to be low water usage types, such as warehouses and distribution centers, that may want to take advantage of less expensive land that has easy access to I-90. Until development achieves a sustainable level that would render a traditional sewerage system to be cost-effective, it is recommended that private sewage disposal options be utilized for the first phase of development up to around 3,000 PE or 300,000 gpd of flow (assuming 100 gpcd), although that limit is flexible.

Private sewage disposal means localized sewer collection and treatment via septic tanks and mini-treatment plants. Private sewage disposal is regulated by the Illinois Department of Public Health (IDPH) and is typically administered by the local counties which is Kane County in this case. Private sewage disposal has the advantage of being customizable to the specific development, relatively easy to permit, and less expensive than a traditional sewer collection system to install, initially.

One disadvantage to private sewage disposal is that the entirety of the parcel of land cannot be utilized for intended development functions. Septic tanks and drain fields need to have land perpetually set aside for them and in most cases, structures and parking lots cannot be built over them. There are also environmental considerations for areas close to water bodies and wetlands. Septic tanks and drainage field requirements should, as a policy, be recorded on the respective property deed for posterity. The other disadvantage is that private sewage disposal requires occasional maintenance, such as pumping out and cleaning and drain field maintenance. Unfortunately, this maintenance is critical to the operation of septic tanks and is frequently not performed, so much so that the IDPH requires property owners to submit annual reports of private disposal maintenance. From a future policy perspective, the Village should consider that any private sewage disposal installations be recorded on the respective property deed for posterity.

Holding tanks, where sewerage is collected and pumped out by a 3rd party, are not permitted by IDPH <u>except</u> for a temporary basis while awaiting the installation of a public sewer. This exception is only valid for one (1) year[1]. For Phase 1, it is anticipated that no holding tanks will be permitted until the proposed sewer improvements in Phase 2 are initiated.

Despite the disadvantages, private sewage disposal is recommended for the initial phase (Phase 1) of development in the SSA because the type and pace of development is unknown. This plan allows for development to occur apace without undue restriction or substantial amounts of investment from the Village. It is anticipated that with the type of low flow development anticipated, providing for private sewage disposal will not be an undue burden to development.

It is anticipated that once initial development starts with a few developed properties, it will attract more development. Once that starts to occur, the Village can shift gears toward planning for public sewer collection and disposal. Both the IDPH as well as the Village of Huntley Sewer Ordinance requires that a property must connect to the public sewer once said sewer is within a certain distance of the property. Per IDPH, this is 300 ft for residential properties and 1,000 ft for non-residential properties.

<u>Phase 2: Increased Development: Approx. 3,000 PE to 8,000 PE</u>

As development starts to increase to a level that makes public sewer service more economically feasible, the Village may start considering an investment in a gravity collection sewer system discharging to a new lift station.

Western SSA Area Lift Station – At this level of development, the existing 16” force main is too large to convey the associated sanitary flows. It is therefore proposed to install a new lift station, equipped with a 6”

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[1] JCOR Part 905 Private Disposal Code, Section 905.140.(a)(2)

force main, to convey flows from the SSA area west of Route 47 across I-90. This lift station is proposed to be located in the western SSA area as this seems to be the initial focus of any potential development. The new force main would discharge into the 16” Eakin Interceptor (former Jim Dhamer Drive / 9W Lift Station area). This 16” interceptor, which was installed in 2022 to eliminate the Jim Dhamer Lift Station, has excess capacity to receive flows from the SSA.

Gravity sewers would be installed from strategic points of the SSA as shown in Exhibit Nos. 8-1 and 8-2. Trunk sewers ranging from 12” diameter to 18” diameter, which can handle the build-out flows, are proposed. The installation timing of these trunk sewers will be dependent on the pace and location of development.

Reusing the existing 16” force main as a casing pipe was considered for this proposed 6” force main. However, there is little information on the profile or condition of the 16” pipe; it may or may not be viable. It is recommended to evaluate the 16” main to determine its usefulness. As such, for the Phase 2 cost estimating purposes in this study, it is recommended to plan on installing a new 6” force main from the SSA to Dhamer Drive under I-90.

The capacity of the proposed SSA Western Lift Station 6” force main will be reached at some point in the future. If a maximum velocity of 5.0 ft/sec in the 6” force main is utilized as the design constraint, then the maximum flow through the force main would be set at 0.63 MGD. A peak hydraulic flow of 0.63 MGD would equate to an approximate design average flow of 0.4 MGD or approximately 4,000 PE

Once the initial lift station capacity is reached at around 4,000 PE, there are two options for additional flows:

1) Providing for a phasing approach, the lift station would be initially designed with a sectioned-off wet well and valve vault that can be expanded in the future. An upgraded lift station with more capacity can be provided with a second 6” force main connecting to the existing 16” force main across I-90, and the previously proposed 6” force main could be used for additional flows in the future and/or a redundant/back-up main. The existing 16” force main will be oversized for the anticipated flows at this stage, and the resultant low-flow velocity will require increased force main maintenance. However, design considerations for a larger wet well and/or higher capacity pumps could be utilized for the lift station upgrade to pump sufficiently high flows to achieve adequate velocities in the 16” force main. The upgraded lift station combined force main capacity will have a hydraulic capacity of 1.13 MGD (at 5.0 ft/sec), which will be more than adequate for 8,000 PE.

2) Install a second lift station in the western SSA Area, depending on development location.

Eastern SSA Area Lift Station - The SSA area east of Route 47 is isolated by topography and Route 47. This area could be subject to development but is less desirable than the western area at present. The area cannot be serviced entirely by gravity to the west or the north due to topography. It is proposed that if flows become sufficient to require a lift station in the eastern area, a small lift station can be installed that pumps to a new 12” diameter gravity sewer installed under Route 47 to the aforementioned Western Lift Station.

Alternatively, installing a force main from this eastern lift station north under I-90 was considered. However, there is no larger diameter sewer in that vicinity. The length of force main required to reach a higher capacity sewer north of I-90 would be overly long, rendering the force main to be cost-prohibitive and undesirable.

Lift Station Designs - It should be noted that the concept design utilized for the Western Lift Station cost estimates (Table No. 8-1) is a phased construction design. The concept design is a formed, poured-in-place concrete submersible lift station with controls and generator building located at the surface, and includes a split wet well that would utilize half of the volume in the lower flow phase and then be expanded to use the full wet well when the flows are higher.

For the SSA Eastern Lift Station, the concept design utilized is more conventional, which is a formed, poured-in-place concrete submersible lift station with controls and generator building located at the surface. It does not include a split wet well nor an automatically cleaned screen and screening washing press.

Phase 3: Full Development: 8,000+ PE

This stage of development is not anticipated to occur for 15 years or more and may not occur at all. At this stage, another lift station or expansion of the existing Western Lift Station would be required. There are several alternatives for the pumping of flow across I-90:

1. Continue to pump directly into the existing 16” force main under I-90.
2. Utilize the first 6” force main under I-90.
3. Add a new force main under I-90.

If this development state should occur, further evaluation will be required at the time to ascertain the best course of action.

8.1.2 Southern Service Area Collection System Improvements

A summary of the proposed improvements to provide the Southern Service Area with sanitary service, with associated costs, is as follows:

●	Gravity Trunk Sewers	$4,800,000
●	Two-Phased Western Lift Station	$3,500,000
●	First Western Lift Station 6” Force Main under I-90	$2,000,000
●	Second Western Lift Station 6” Force Main to Existing 16” Stub	$800,000
●	Eastern Lift Station, 6” Force Main, and 12” Gravity Sewer to Western Lift Station	$4,500,000

8.2 East WWTP Improvements

The condition and capacity of the East WWTP were presented in Section 3. In addition, the current and future regulatory challenges for the East WWTP were presented in Sections 3 and 6. A summary of the proposed improvements for the rehabilitation and upgrade of the East WWTP follows.

8.2.1 Operation and Maintenance Improvements

While the overall condition of the East WWTP is good, Section 3 identified some areas of the plant that need to be improved. A summary of the proposed Operation and Maintenance Improvements and their associated costs is as follows:

Replace bearings and aerator shafts in Oxidation Ditch No. 2	$426,000
Replace Aerobic Digester Air Pipes and Valves	$111,000
Control Building No. 1 Electrical Renovation	$923,000
Refurbish Screen No. 2	$42,000
Biosolids Thickening and Dewatering Modifications	$743,000
Upgrade Non-Potable Water System and Remove Dome on Clarifier No. 1	$263,000
Replace bearings and aerator shafts in Oxidation Ditch No. 3	$60,000
Moyno Pump Replacements (2 Pumps)	$128,000

8.2.2 Regulatory/Capacity Upgrades

While it has been determined that the East WWTP cannot be expanded beyond its rated capacity of 1.8 MGD, some components within the plant need upgrades to achieve that capacity. Additionally, it seems possible the Village could receive an effluent limitation or NPDES Special Condition establishing an effluent limit for Total Nitrogen effluent within 10-20 years. If that were to occur, modifications such as internal recycle pumps and piping within the oxidation ditches would be required. Additionally, when the total phosphorus effluent limit is decreased to 0.5 mg/L in 2030 or 2035, the out-of-service sand filters may need to be converted to disk filters or other filters to consistently achieve the lower effluent limit. A summary of the Regulatory/Capacity Improvements with the associated costs is as follows:

Refurbish Raw Sewage/Excess Flow Pumps	$188,000
Modify Oxidation Ditches for Total N removal	$458,000
Convert Sand Filter Building to Tertiary Disk Filter Building/Phosphorus Removal	$1,425,000
Upgrade Effluent Parshall Flume	$50,000

8.3 West WWTP Improvements

As the first phase of the West WWTP was constructed in 1999, it is of no surprise that the condition of that plant is very good. However, there are some components of the system that require improvement. While many of the unit processes at this plant have capacity over the rated capacity of the WWTP, some do not. Specifically, several unit processes in the biosolids treatment train are undersized.

The West WWTP is meeting all of the existing regulatory requirements established within its permit. In the event a Total Nitrogen standard is applied to this plant, some process control improvements would be required. Section 5 projected the total daily average wastewater flows for the entire service area to be 5.06 MGD and 4.81 MGD for the CT and LRI wastewater flow projections, respectively. With the total WWTP capacity of 4.4 MGD between the Village's two WWTPs, an expansion of some of the unit processes within the West WWTP is projected to be needed by the end planning period. However, since long-term population and flow projections are difficult to define, no definite plans for expansion are required at this time.

8.3.1 Operation and Maintenance Improvements

A summary of the proposed Operation and Maintenance Improvements at the West WWTP and their associated costs is as follows:

Automated Aerobic Digesters Controls	$68,000
Replace/Upgrade Comminutors / Screens	$425,000
New Garage	$345,000
Upgrade Non-Potable Water System	$210,000
Replace DO/ORP Probes on Oxidation Ditch No. 3	$57,000
Digester Diffuser Replacements	$68,000
Replace Polymer Feed Systems for Belt Filter Press and Gravity Belt Thickeners	$135,000
Replace or Refurbish Raw Sewage Pumps Nos. 1 – 3	$180,000
New UV System	$593,000
Modify Oxidation Ditch Drainage System	$225,000
Replace Bearings and Aerator Shafts on Oxidation Ditches 1, 2, and 3	$192,000
New Administration / Laboratory Building	$1,485,000

8.3.2 Regulatory/Capacity Upgrades

A summary of the proposed Regulatory and Capacity upgrades is as follows:

Increase Sludge Storage Capacity	$338,000
Add Two New Digester Tanks and Blowers	$938,000
Add Third Pump to Raw Sewage Pump Station No. 2	$75,000
Add Second Filter in Sand Filter Building B	$713,000
Modify Oxidation Ditches for Total N Removal	$458,000

8.4 Wastewater System Phasing and Implementation Plan

The Village of Huntley's WWTPs phasing and implementation plan for the 30-year planning period is summarized in Table No. 8-2. They were completed with the same timeline approach as the Water Works System improvements phasing and implementation plan. Since there is minimal difference between the CT and LRI wastewater flow projections, there is no difference in the recommended WWTP improvements for the two projections.

Table No. 8-1: Southern Service Area Wastewater Service Phasing and Implementation Plan

Village of Huntley, IL

	Immediate		Near Future		Long Term		
	0 - ~3,000 Population Equivalents Addition		~3,000 - 8,000 Population Equivalents Addition		8,001+ Population Equivalents Addition		
	Description	Cost[a]	Description	Cost[a]	Description	Cost[a]	
Southern Service Area (SSA): Western Area	Private Sewage Disposal funded by development until development reaches approximate 3,000 PE level	$ -	Two-Phased Western Lift Station	$ 3,500,000	Western Lift Station Upgrade	$ 750,000	
			6,300 LF of 6" Force Main across I-90 to Eakin Interceptor	$ 2,000,000	12" and 15" Trunk Sewers (half)	$ 2,400,000	
			2,100 LF of 2nd 6" Force Main to Existing 16" Force Main Stub	$ 800,000	8" Collector Sewers (Developer)	$ -	
			12" and 15" Trunk Sewers (half)	$ 2,400,000			
			8" Collector Sewers (Developer)	$ -			
Southern Service Area (SSA): Eastern Area	Private Sewage Disposal funded by development until development reaches approximate 3,000 PE level	$ -	Eastern Area Lift Station, 6" Force Main, and 12" Gravity Sewer	$4,500,000		$ -	
			8" Collector Sewers (Developer)	$ -			
TOTAL:		$ -		$ 13,200,000		$ 3,150,000	$ 16,350,000

Notes

[a] Based on 2022 dollars and 2022 construction costs; includes engineering and contingency costs

Table No. 8-2: Wastewater Treatment Plant Phasing and Implementation Plan

Village of Huntley, IL

WWTP System Component	Immediate		Near Future		Long Term		Total
	0 - 5,000 Population Equivalents Addition 0 - 5 Years		5,001 - 16,000 Population Equivalents Addition 6 - 15 Years		16,001 - 31,193 Population Equivalents Addition 16 - 26 Years		
	Description	Cost[a]	Description	Cost[a]	Description	Cost[a]	
East WWTP - Operation and Maintenance Upgrades	Replace Bearings, Aerator Shafts, and Paddles on Oxidation Ditch No. 2 (Lakeside CLR) - Cost for All Four (4) Aerators	$ 426,000	Biosolids Thickening and Dewatering Modifications: Replace Belt Filter Press with Combined Gravity Belt Thickener/Belt Filter Press	$ 743,000			
	Replace Air Pipes and Valves for Aerobic Digesters	$ 111,000	Upgrade Non-Potable Water System: New Skid; Remove Dome on Clarifier No. 1	$ 263,000			
	Control Building No. 1 Electrical: Remove and Replace Electrical in Control Building No. 1; Remove Unused MCC Panels	$ 923,000	Replace Bearings and Aerator Shafts on Oxidation Ditch No. 3 - Cost for Each Aerator	$ 60,000			
	Refurbish Screen No. 2	$ 42,000	Moyno Pumps Replacements (2 Pumps)	$ 128,000			
Subtotal:		**$ 1,502,000**		**$ 1,194,000**		**$ -**	**$ 2,696,000**
East WWTP - Regulatory/Capacity Upgrades	Replace Raw Sewage Pump Elbows, Piping and Guide Rails for Three (3) Pumps	$ 188,000			Modify Oxidation Ditches for Additional Total Nitrogen Removal	$ 458,000	
					Convert Sand Filter Building to Tertiary Disk Filter Building for Phosphorus Removal	$ 1,425,000	
					Upgrade Effluent Parshall Flume to 18-inch Flume	$ 50,000	
Subtotal:		**$ 188,000**		**$ -**		**$ 1,933,000**	**$ 2,121,000**
East WWTP Total:		**$ 1,690,000**		**$ 1,194,000**		**$ 1,933,000**	**$ 4,817,000**
West WWTP - Operation and Maintenance Upgrades	Automated Controls for Aerobic Digesters	$ 68,000	New or Refurbished Raw Sewage Pumps Nos. 1-3	$ 180,000	New Admin/Lab Building	$ 1,485,000	
	Replace Existing Comminutor/Screen with Alternate Screening	$ 425,000	New UV System	$ 593,000			
	New Garage Building	$ 345,000	Modifications to Ox Ditch Drainage System - Route 12" to Raw Sewage Pumps	$ 225,000			
	Rehab Non-Potable Water System, Pumps, and (Bladder) Tanks	$ 210,000	Replace Bearings and Aerator Shafts on Oxidation Ditch No. 1 - Cost for Each Aerator	$ 60,000			
	Replace DO/ORP Probes on Oxidation Ditch No. 3	$ 57,000	Replace Bearings and Aerator Shafts on Oxidation Ditch No. 2 - Cost for Each Aerator	$ 60,000			
	Digester Diffusers Replacements	$ 68,000	Replace Bearings and Aerator Shafts on Oxidation Ditch No. 3 - Cost for Each Aerator	$ 72,000			
	Replace Polymer Feed Systems for Belt Filter Press (1) and Gravity Belt Thickeners (2) (3 Total)	$ 135,000					
Subtotal:		**$ 1,308,000**		**$ 1,190,000**		**$ 1,485,000**	**$ 3,983,000**
West WWTP - Regulatory/Capacity Upgrades	Increase Sludge Storage Capacity	$ 338,000	Add 2 Digester Tanks and 1 Blower for Required Capacity @ 2% Solids in Digesters	$ 938,000	Add 3rd Pump to Raw Sewage Pump Station No. 2	$ 75,000	
					Add 2nd Filter in Sand Filter Building B	$ 713,000	
					Modifications/Internal Recycle Mixers on Oxidation Ditches for Total N Removal	$ 458,000	
Subtotal:		**$ 338,000**		**$ 938,000**		**$ 1,246,000**	**$ 2,522,000**
West WWTP Total:		**$ 1,646,000**		**$ 2,128,000**		**$ 2,731,000**	**$ 6,505,000**
TOTAL:		**$3,336,000**		**$ 3,322,000**		**$4,664,000**	**$11,322,000**

Notes

[a] Based on 2022 dollars and 2022 construction costs; includes engineering and contingency costs

SECTION 9: SUSTAINABLE SOURCE WATER ASSESSMENT (FROM 2014 REPORT)

Note: This Section from the 2014 Report was not assessed for the 2022 Master Plan Update, but has been included as a source of information for future planning.

The foundation of all Water Works Systems is the source of supply. Therefore, the foundation of a sustainable Water Works System must be built on a sustainable source water assessment. The Village of Huntley generally has three potential sources of water to consider, namely: 1) local shallow groundwater, 2) deep sandstone groundwater, and 3) surface water by interconnection with a Lake Michigan Water Agency. The Village currently utilizes five deep sandstone wells for water supply sources. In this section, the sustainability of the Village's current supply source will be evaluated, and then the potential integration of other sources of water will be explored.

9.1 Existing Groundwater Resources In the Huntley Area

Since the construction of the Village's community Water Works System, the Village of Huntley has relied on groundwater resources for its source of supply. As stated in Section 2.2, the Village's first six wells were completed in the glacial drift, most likely within sand and gravel deposits. It would seem minimal exploratory efforts were part of the early well siting process, and therefore reliance on the shallow aquifer was deemed an unsustainable source of supply at the time. Given the poor water quality and lack of production of the shallow wells, the Village drilled their first well into the deep sandstone aquifer in the first part of the 1990s. The four additional wells that were drilled since then also were drilled into the deep sandstone and all of the shallow wells have since been abandoned. As the Village's planning boundary expands, and the need for additional water supply increases, the Village will need to determine if they should continue to seek water from the aquifers they currently are withdrawing from or whether alternative groundwater aquifers would be more sustainable and cost effective to utilize.

Many municipalities in Northeastern Illinois who do not receive Lake Michigan water rely on the deep sandstone aquifer as their main source of supply. Based on the current and projected regional deep sandstone withdrawal rates, the deep sandstone aquifers likely will have significant water level drawdown into the future. With this increase in drawdown, energy costs of pumping water from the deep sandstone aquifer will continue to rise, water quality within the deep sandstone aquifers could degrade and the long term sustainability of the deep sandstone aquifer for the region will continue to be a question.

On the other hand, shallow groundwater, if available in sustainable capacity, can reduce demand on the deep aquifers, reduce radium levels in the water supply, and add water supply at an affordable cost. Like deep groundwater sources, shallow groundwater sources typically have few organic constituents, so the cost to treat shallow groundwater is typically considerably less costly to treat than surface water supplies. Shallow well water can be obtained from sand and gravel aquifers in the glacial drift and/or the fractured dolomite bedrock in the Maquoketa or Galena-Platteville systems. Diversifying water resources when possible is always encouraged to minimize a community's susceptibility to drawing down the water supply in a specific groundwater aquifer.

In recent years, several regional water studies have focused on water supply availability within Northeastern Illinois. Three of the studies, which include the *Groundwater Simulation Modeling and Potentiometric Surface Mapping, McHenry County, Illinois (ISWS, 2013)*, the *Kane County Water Resources Investigations: Simulation of Groundwater Flow in Kane County and Northeastern Illinois* (ISGS/ISWS, 2009) and the *Northeastern Illinois Regional Water Supply/Demand Plan* (CMAP/RWSPG, 2010), have evaluated the sustainability of the shallow aquifers, deep sandstone aquifers and the Fox River within the Northeastern Illinois region. As part of these studies, the Illinois State Geologic Survey (ISGS) and Illinois State Water Survey (ISWS) staffs have developed a three dimensional geologic model of a good portion of Northeastern Illinois and deep sandstone macroscale geologic and groundwater flow models that cover a good portion of the Midwest. In this section of the report, a summary of the work completed by the ISGS & ISWS will be reviewed to identify the groundwater resource availability for the Village.

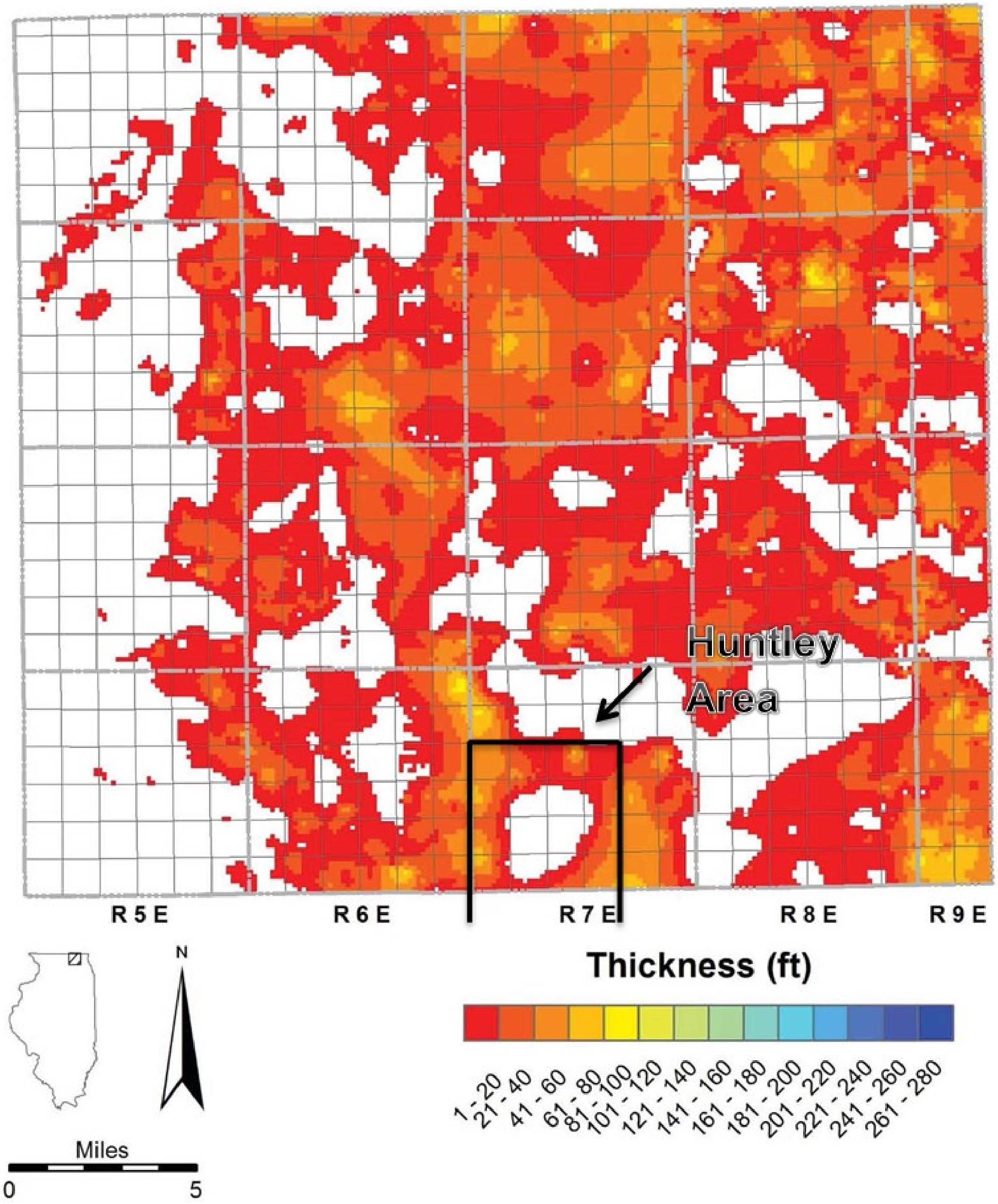
9.1.1 Shallow Sand & Gravel Aquifer

In Northeastern Illinois, the availability of shallow well water sufficiently productive for a municipal well varies and shallow well construction and development often requires extensive studies, exploration, drilling, and testing. In the Huntley area, there are several known Quaternary period (2.588 million years ago to present) aquifers. These sand and gravel aquifers are remnants of the last major episode of glaciation in the Midwest (approximately 110,000 to 10,000 years ago). These glacial sand and gravel deposits rest on a surface of eroded Silurian aged bedrock (443.7 to 416 million years ago). These aquifers have been studied extensively by the ISGS and ISWS and mapped with a relative degree of certainty.

As summarized in the *Groundwater Simulation Modeling and Potentiometric Surface Mapping, McHenry County, Illinois* report (ISWS, 2013) and in consultation with ISWS staff, the most viable sand and gravel aquifer within the Huntley area is the Ashmore formation. Per the McHenry County report, the Ashmore Formation "consists of sand gravel of the Ashmore Tongue of the Henry Formation… The Ashmore Tongue is a lateral extension of the Henry Formation that occurs beneath the Tiskilwa Formation (Wedron Group), a thick and widespread layer of diamicton….The Ashmore Unit is laterally extensive in McHenry County, with thicknesses up to about 100 ft. It is widely used for domestic water supplies and for some public, industrial, and commercial supplies." Exhibit No. 9-1 presents the Ashmore sand and gravel formation thickness within McHenry County.

Exhibit No. 9-1: Ashmore Sand and Gravel Formation Thickness In McHenry Co.

Village of Huntley, IL

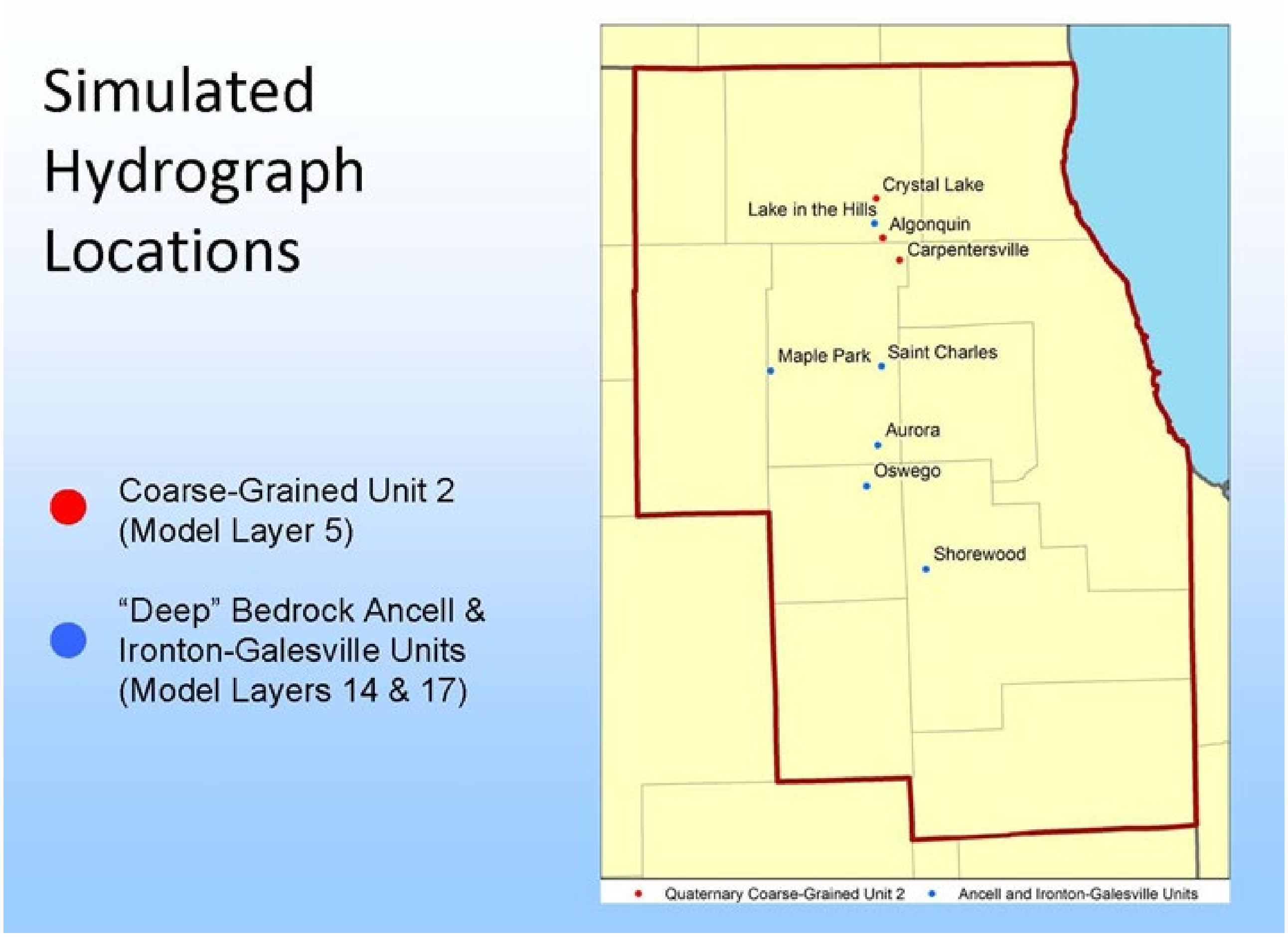


(Source: Groundwater Simulation Modeling and Potentiometric Surface Mapping, McHenry County, Illinois, ISWS, November 2013)

Based on a review of well logs within and adjacent to the Village's planning boundary, which will be summarized in a map later in this section, it would appear that both the Villages of Algonquin and Lake in the Hills tap into the Ashmore formation with some of their municipal wells. While the formation has been productive for the two Villages, its long term sustainability could be an issue if they continue to pump the aquifer at the same rates. The ISWS completed regional groundwater modeling of the Quaternary coarse-grained aquifers, as well as the deep bedrock Ancell and Ironton-Galesville Aquifers. Simulated hydrograph locations are identified on Exhibit No. 9-2.

Exhibit No. 9-2: Simulated Hydrograph Locations

Village of Huntley, IL



Simulated Hydrograph Locations

● Coarse-Grained Unit 2 (Model Layer 5)

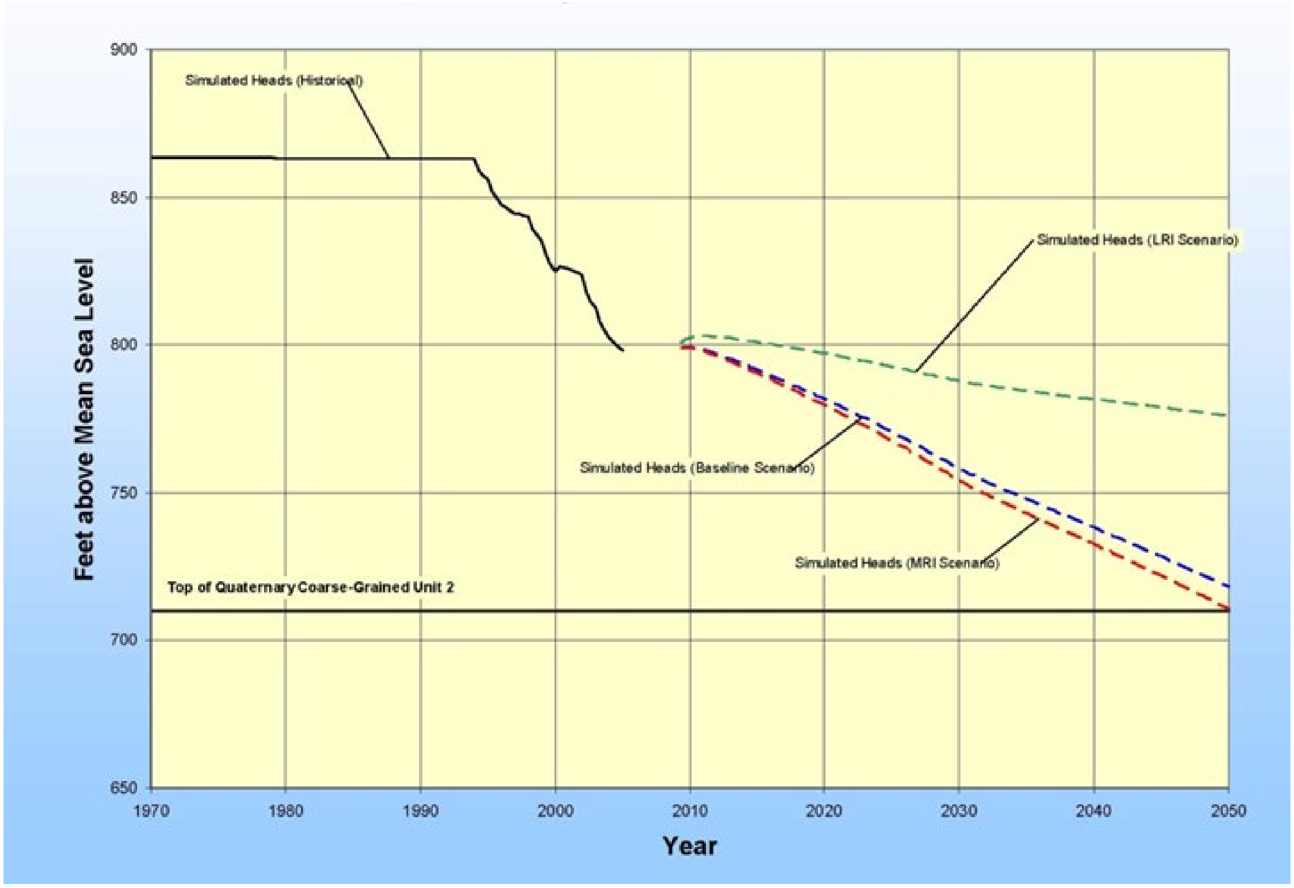
● "Deep" Bedrock Ancell & Ironton-Galesville Units (Model Layers 14 & 17)

Source: Regional Groundwater Modeling Results for Water Supply Planning in Northeast Illinois -- Presented by Allen Wehrmann, Illinois State Water Survey, on December 16, 2008 at a meeting of the NE Illinois Regional Water Supply Planning Group in Chicago, Illinois. (http://www.isws.illinois.edu/iswsdocs/wsp/ppt/NEIL_RWSPG_Dec2008.pdf)

A simulated hydrograph of the Quaternary coarse-grained aquifer, which would be predominately the Ashmore Formation in the Algonquin area, with a cone center at Algonquin was modeled. The results of the simulated water levels, or heads, for various projected water use scenarios are shown in Exhibit No. 9-3. Under the More Resource Intensive (MRI) and Baseline (CT) Scenarios, the simulated head declines over 75 feet to at or near the top of the quaternary unit. Under the LRI scenario, the model projects a gradual and much less overall simulated head decline of about 25 feet.

Exhibit No. 9-3: Simulated Hydrograph of Quaternary Coarse Grained Unit at Algonquin Cone Center

Village of Huntley, IL



Source: Regional Groundwater Modeling Results for Water Supply Planning in Northeast Illinois -- Presented by Allen Wehrmann, Illinois State Water Survey, on December 16, 2008 at a meeting of the NE Illinois Regional Water Supply Planning Group in Chicago, Illinois. (http://www.isws.illinois.edu/iswsdocs/wsp/ppt/NEIL_RWSPG_Dec2008.pdf)

Based on the ISWS modeling results, it would seem that any shallow sand and gravel deposits on the east side of the Village could have long term sustainability concerns. However, sand and gravel deposits on the west side of the Village could have some potential, primarily due to the fact that there would be significantly less wells in the formation in that area. The map depicting the Ashmore formation within Huntley's planning area will be provided in Section 9.1.4.

9.1.2 Shallow Bedrock Aquifer

In the Huntley planning area, the upper most bedrock unit is the Maquoketa Unit. The uppermost 25 – 125 feet of bedrock forms the shallow bedrock aquifer. Per the McHenry County Groundwater Study, "This aquifer, also called the dolomite aquifer or shallow dolomite aquifer, is defined by secondary porosity and permeability that formed through weathering and dissolution of the carbonate rock, principally along fractures and bedding planes, with subsequent burial by Quaternary materials and saturation by groundwater. The Shallow Bedrock Aquifer is a common target of domestic supply wells in McHenry County, but well yields are variable, a product of the size, number, and degree of connection of fractures and bedding planes intersected by the well bore."

As is the case in most of Northeastern Illinois, the shallow bedrock formation likely can sustain a domestic well in the Huntley area, but the likelihood of intersecting sufficient fractures to sustain a municipal water well are very unlikely. Therefore, it is assumed the shallow bedrock aquifer is not a viable option for the Village of Huntley.

9.1.3 Deep Sandstone Aquifer

Within the Village's Planning Area, deep well water can be obtained from formations in the Ordovician and/or the Cambrian aquifer systems. In general, the Ordovician aquifer system consists of (in descending order) the Galena-Platteville dolomite, the Glenwood-St. Peter sandstone (hereinafter referred to as the St. Peter or Ancell Unit), and the Prairie du Chien dolomite/sandstone formations. Furthermore, the Cambrian aquifer system generally consists of (in descending order) the Eminence–Franconia dolomite/sandstone, the Ironton-Galesville sandstone, the Eau Claire sandstone, and the Elmhurst-Mt. Simon sandstone formations. The major deep water bearing formations in order from the ground surface to the deepest are the St. Peter sandstone, the Ironton-Galesville sandstone, and the Mt. Simon sandstone formations. With observed water production capacities in the maximum range of 400 gpm to 500 gpm, the St. Peter formation is generally the greatest water producer of the Ordovician aquifer system. Based on capacities of other wells in this formation within northeastern Illinois, the water production from the Ironton-Galesville formation of the Cambrian aquifer system can be projected at a rate of 1,000 gpm. The Eau Claire and Mt. Simon formations have also demonstrated high production capability. Because they are deeper (and hence more costly to construct and operate) than the Ironton-Galesville formation and because, in some cases, the total dissolved solids levels within the Mt. Simon aquifer have been excessive, the Eau Claire and Mt. Simon formations are often times not considered. However, as presented later in this section, sometimes localized water quality conditions of the Ironton-Galesville compel an investigation into the use of the Mt. Simon formation.

In the past (1970s and 1980s), the deep formations throughout northeastern Illinois had experienced declining static and pumping water levels, in some instances, due to aquifer mining of groundwater systems. Aquifer mining occurs when groundwater is withdrawn from an aquifer at unsustainable rates for a period of time such that the critical water level is reached and exceeded. The critical water level for the deep bedrock system in Northeastern Illinois according to most researchers is the top of the Ironton-Galesville aquifer. The demand from growing populations resulted in over-pumping and thus, lowered groundwater levels. In fact, some literature has suggested that water levels within the high pumping centers had dropped more than 900 feet in the deep sandstone aquifers lying deep below the Fox River Valley. This trend was due to the fact that the demand from the deep wells was in excess of the naturally occurring recharge rate. Because of the declining yields of the deep well formations, many Chicago suburban communities turned to alternate sources of supply including shallow groundwater and surface water from adjacent rivers. Moreover, Lake Michigan water became available for many communities in Cook, DuPage, Lake, and Will Counties. Since many suburban communities took advantage of these alternate water supply sources, the burden on the deep well supply has been reduced and the static water levels rebounded.

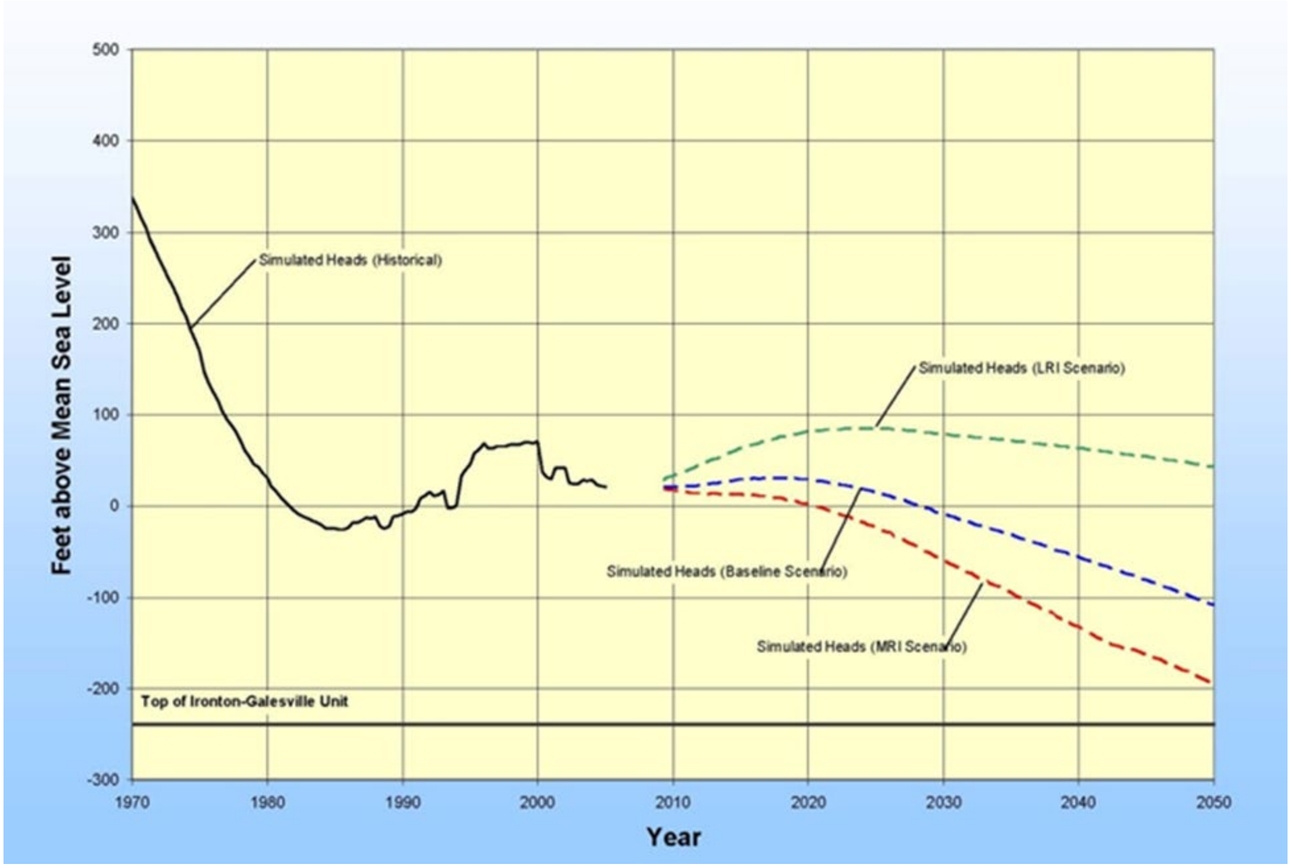
However, literature from the Illinois State Water Survey (ISWS) has suggested that in 1995 the deep bedrock withdrawals totaled 67 MGD and in 2000 the total was about 72 MGD. It has been suggested that the maximum sustainable yield of the deep aquifer system in northeastern Illinois is approximately 65 – 80 MGD. If the estimates of the practical sustained yield are correct and if the withdrawals continue to exceed that level, the recovery may eventually discontinue and water levels could potentially decline once again. In fact, it has been documented that there already is some decline in some localized cases.

As previously identified, the ISWS has recently completed regional groundwater modeling of the Quaternary coarse-grained aquifers, as well as the deep bedrock Ancell and Ironton-Galesville Aquifers. Simulated hydrograph locations are identified on Exhibit No. 9-2. A simulated hydrograph of the deep bedrock Ironton-Galesville Aquifer at Lake in the Hills was modeled. The results of the simulated water levels, or heads, for various projected water use scenarios are shown in Exhibit No. 9-4. Under the More Resource Intensive (MRI) and Baseline (CT) Scenarios, the simulated head declines from over 100 to 200 feet and approach the top of the Ironton-Galesville unit. However, under the LRI scenario, the model projects a much more stable overall simulated head condition.

Exhibit No. 9-5 presents additional results of ISWS modeling efforts of the projected available hydrostatic head above the Ironton-Galesville formation for the eleven county area in northeastern Illinois. This data projects that the Ironton-Galesville formation could be dewatered in portions of southeastern Kane County and western Will County by the year 2050. Also, without conservation, the projections indicate that the available head above the Ironton-Galesville formation near Huntley may be less than 150 feet and possibly even less than 50 feet if the regional demands on the aquifer are increased. However, a change in water use patterns, such as increased regional implementation of water conservation practices, will extend the sustainability of this aquifer. The results of the model represent another important factor of implementing water conservation measures. For the planning period of this report, deep wells of the Cambrian-Ordovician aquifer system should be considered as a viable source of supply for the Village.

Exhibit No. 9-4: Simulated Hydrograph of Ironton-Galesville Unit at Lake in the Hills

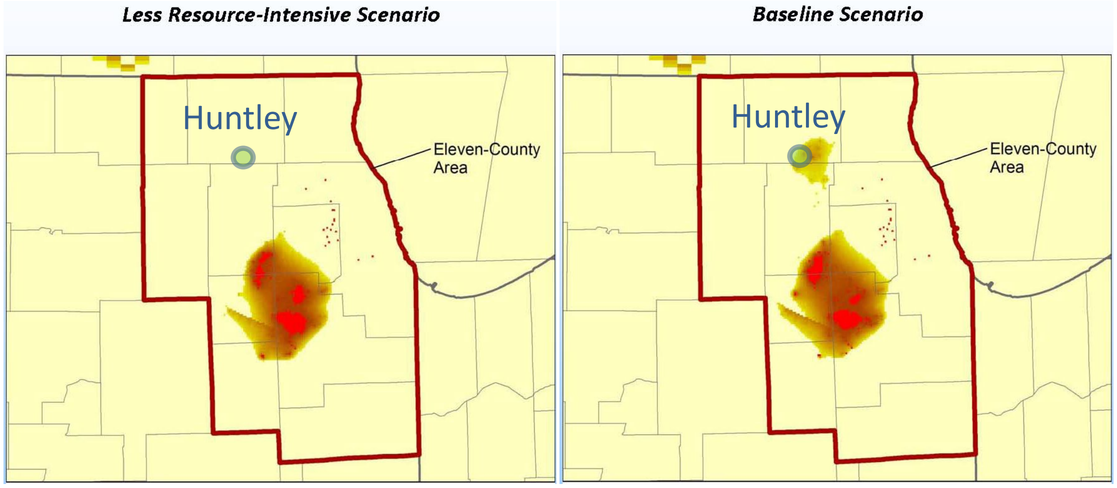
Village of Huntley, IL

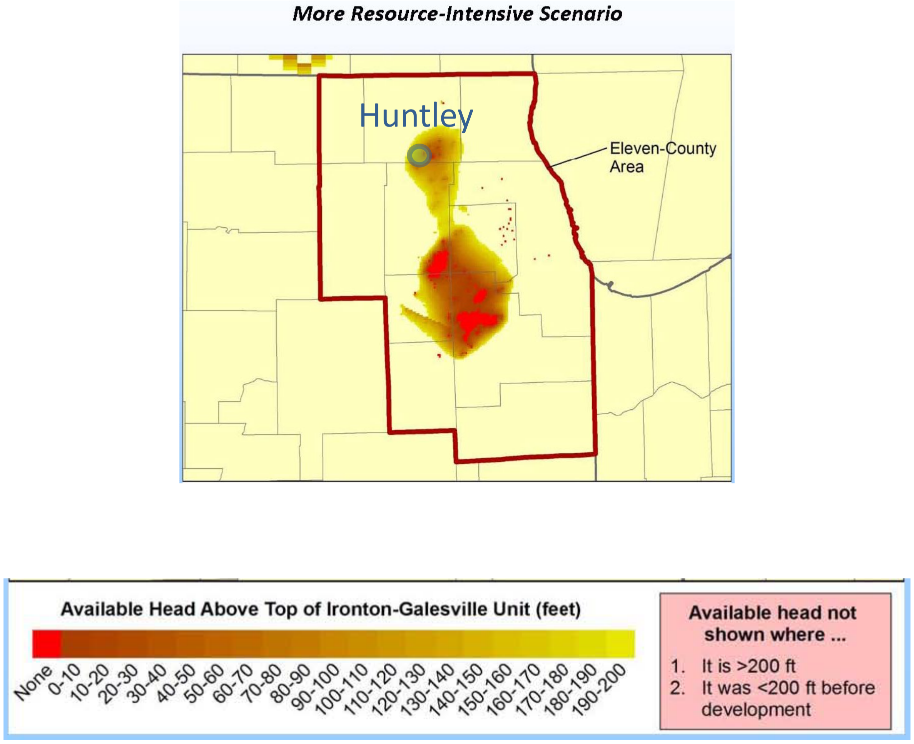


Source: Regional Groundwater Modeling Results for Water Supply Planning in Northeast Illinois -- Presented by Allen Wehrmann, Illinois State Water Survey, on December 16, 2008 at a meeting of the NE Illinois Regional Water Supply Planning Group in Chicago, Illinois. (http://www.isws.illinois.edu/iswsdocs/wsp/ppt/NEIL_RWSPG_Dec2008.pdf)

Exhibit No. 9-5: Projected Available Head Above the Ironton-Galesville Sandstone in 2050

Village of Huntley, IL





Source: Regional Groundwater Modeling Update for Northeast Illinois -- Presented by Allen Wehrmann, Illinois State Water Survey, on March 24, 2009 at a meeting of the NE Illinois Regional Water Supply Planning Group in Chicago, Illinois. (http://www.isws.illinois.edu/iswsdocs/wsp/ppt/NEIL_RWSPG_Mar2009.pdf)

Through investigation, it has been determined that the Ironton Galesville aquifer in northern Kane County and southern McHenry County, including the Village of Huntley planning area, has elevated levels of barium and radium when compared to other similarly constructed deep wells in northeastern Illinois. Barite rock, whose chemical composition is $BaSO_{4(s)}$, is naturally occurring within the Ironton-Galesville sandstone. Under reducing conditions, which is commonly present in the Ironton-Galesville formation within the Huntley area, the barite rock dissolves into the barium (Ba^{2+}) cation and the sulfate (SO^{4-}) anion. Under these reducing conditions, the sulfate cations are often quickly reduced to sulfide species ($H_2S_{(g)}$, HS^- and S^{2-}). The high sulfide species often contribute to aesthetic issues (rotten egg smell), while the high barium concentrations in the formation typically contribute barium levels in excess of the barium MCL.

Exhibit No. 9-6 provides a graph of the barium concentration in numerous Ironton-Galesville wells in the northern Kane/southern McHenry County region and compares them to a couple of known Mt. Simon wells from the same region. The differences are profound. For instance, Huntley's Ironton-Galesville Well No. 9 has a barium concentration of about 5.7 mg/l whereas the two Mt. Simon wells are approximately 0.2 mg/l.

Similarly, Exhibit No. 9-7 provides a graph of the combined radium concentrations of numerous Ironton-Galesville wells in the northern Kane/southern McHenry County region and compares them to the Mt. Simon wells from the same region. While the differences are not as drastic as they were with barium, the evidence suggests that there is a potential that lower radium concentrations can be found from the Mt. Simon formation in this localized region, as well.

Exhibit No. 9-6: Barium Concentrations In the Local Ironton-Galesville and Mt. Simon Aquifer

Village of Huntley, IL

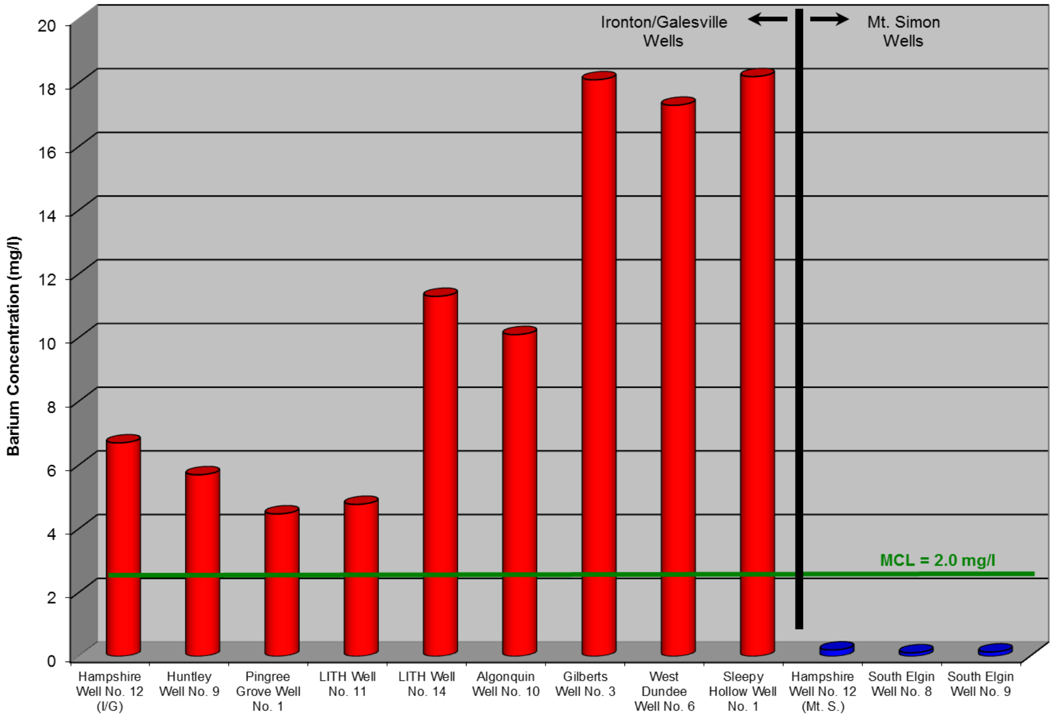
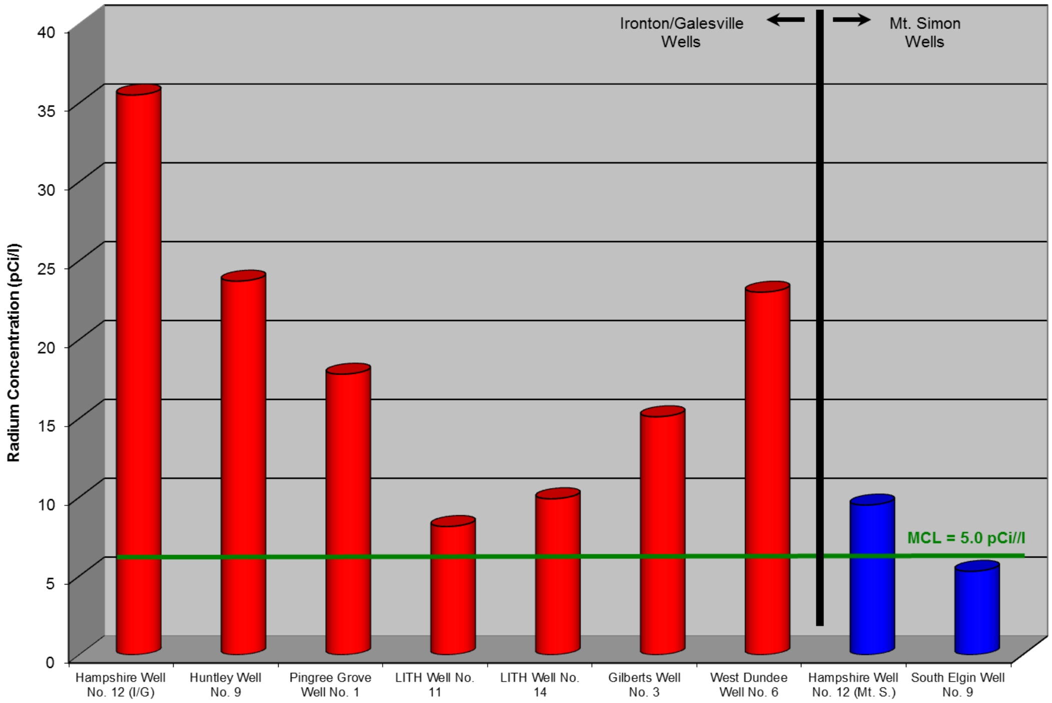


Exhibit No. 9-7: Radium Concentrations In the Local Ironton-Galesville and Mt. Simon Aquifer

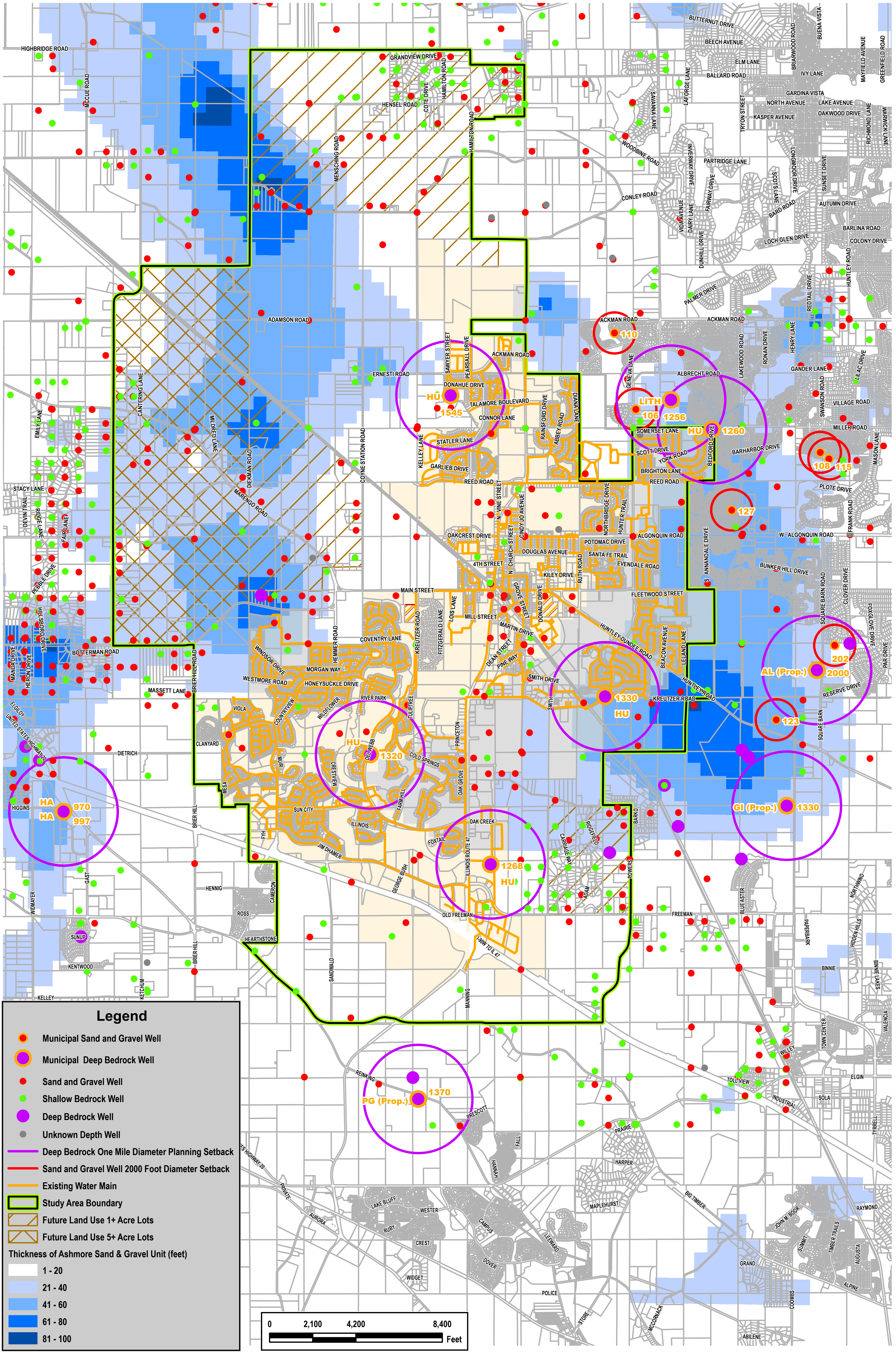
Village of Huntley, IL



Given the regional long term sustainability of the deep sandstone aquifer, a more focused review of the sustainability of the formation in the Huntley area was deemed to be warranted. The modeling of Ironton-Galesville alternatives in the Huntley Planning Area will be presented in Section 9.2. That being said, the water quality characteristics of the Mt. Simon aquifer could prove to be beneficial, and therefore this aquifer should not be discounted as an option. The Village of Hampshire, which is southwest of the Village of Huntley, encountered very high radium levels within some recent Ironton Galesville wells. The Village elected to drill one of the wells deeper into the Mt. Simon formation. While it may not be necessary for the Village of Huntley to drill to the Mt. Simon formation immediately, it would be wise for all future deep sandstone wells to be constructed (i.e. with larger surface and long string casing) such that deepening is a cost-effective option.

9.1.4 Sustainable Water Supply Planning Map

In an effort to pull all of the existing groundwater resources information together, the project team, which included staff from the ISWS, utilized the ISGS/ISWS Northeastern Illinois geodatabase to map the existing water wells within, and adjacent to, the Planning Area. Exhibit No. 9-8 is a map of the existing wells and depicts the thickness of the Ashmore Formation throughout the planning area.



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DATE:	JULY 2014
PROJECT NO.:	HU1401
BY:	KKP
PATH:	H:\GIS\PUBLIC\HUNTLEYEY\HU1401\
FILE:	HU1401_EXH_7-8_WATER SUPPLY.MXD

COMPREHENSIVE WATER AND WASTEWATER SYTEMS MASTER PLAN

EXHIBIT NO. 9-8
SUSTAINABLE WATER SUPPLY PLANNING MAP

As expected, there is a high density of water wells on the eastern side of the planning area. Algonquin and Lake in the Hills have multiple shallow sand and gravel wells that appear to be withdrawing from the Ashmore Formation in that area. Lake in the Hills also has a deep sandstone well very close to the Village of Huntley's Well No. 8. Given the short distance between the two, approximately 2,300 feet, it seems quite likely that the two wells interfere with each other when they are both pumping. Both the Villages of Algonquin and Gilberts have sited deep sandstone wells east of the Village. Based on the proposed depth of the Gilberts well, it would appear it will be drilled into the Ironton-Galesville formation. The proposed Algonquin well is planned to be a Mt. Simon well. The Village of Pingree Grove has sited a proposed deep well, which appears to be an Ironton Galesville targeted well, just south of the Village's planning boundary. The Village of Hampshire has one existing and one proposed St. Peter well southwest of of the Village of Huntley's Planning Area.

There are many private wells within the Village's Planning Area. There are many wells that are finished in the shallow sand and gravel and many wells that are finished in the shallow bedrock. There also are some private wells that withdraw from the deep sandstone. The shallow sand and gravel well distribution is denser on the west side of the Village, which is probably a good indication that the sand and gravel deposits are relatively productive in that area. There are less sand and gravel wells to the northwest of the Village, primarily because the area is undeveloped. Given the projected Ashmore Formation thickness northwest of the Village's Well No. 11 and the relatively minimal amount of wells tapped into the aquifer in that area, it would seem that is the area with the greatest shallow and gravel potential for the Village.

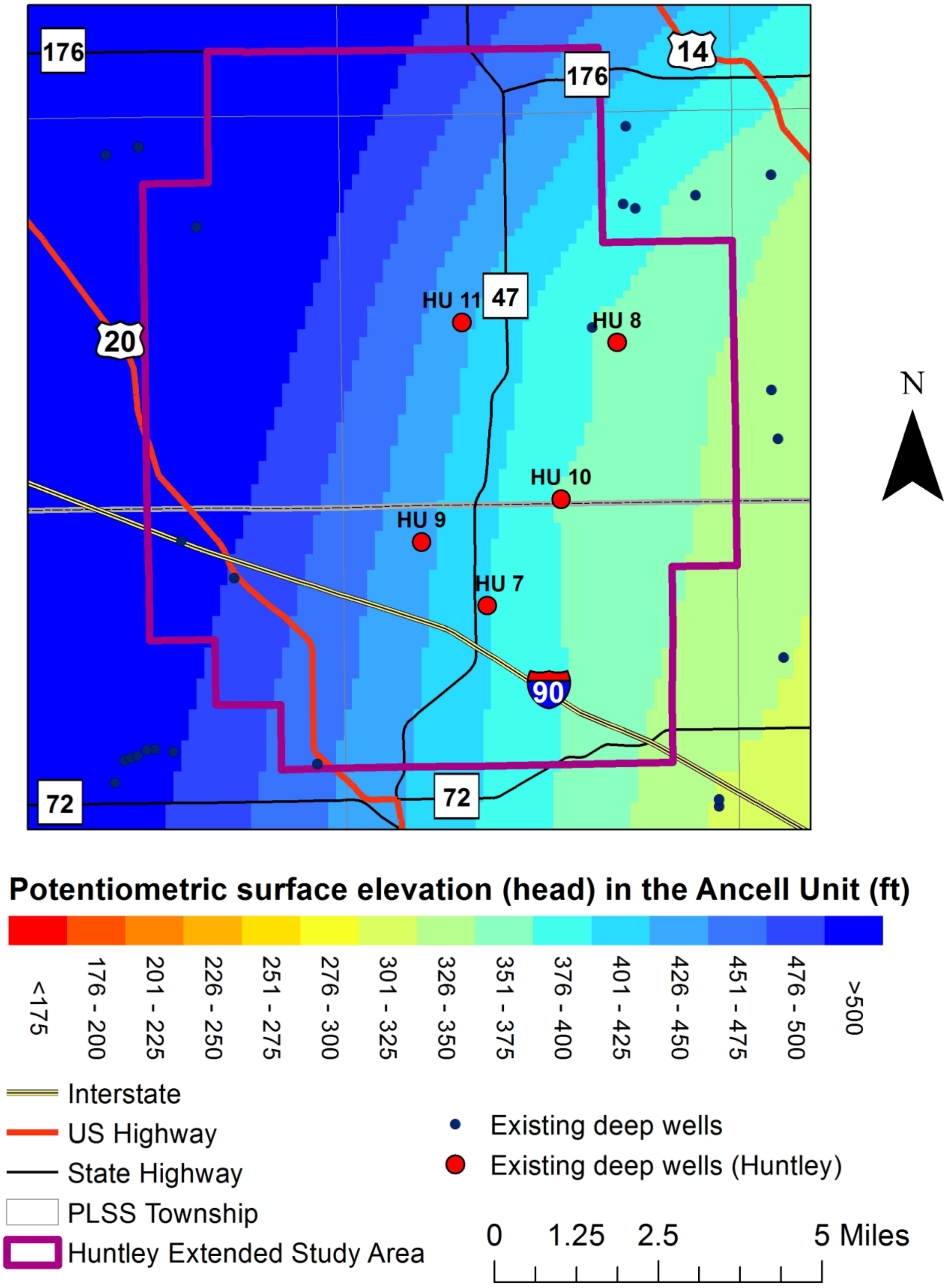
9.2 Deep Sandstone Aquifer Model

As previously summarized, the ISGS and ISWS collaboratively developed a regional (multistate) deep sandstone aquifer model. Initial model results, which were presented in Section 9.1.3, indicate the water levels within the aquifer are declining. The results also suggest the projected growth in the region, along with a current trends per capita water usage, could create some major aquifer challenges in portions of the region – primarily in Southeast Kane County and Northwest Will County. Alternative regional water use scenarios also were modeled to project water levels under those scenarios. As one would expect, lower water demands under less resource intensive water use scenarios extend the capacity of the deep sandstone water supply resource further into the future.

The baseline water levels in the deep sandstone aquifer model, which are referenced to as the Ancell Unit, are summarized in Exhibit No. 9-9.

Exhibit No. 9-9: 2009 Ancell Unit Potentiometric Surface Regional Model Elevation Simulation

Village of Huntley, IL



When looking at the geologic stratigraphy of the region, the St. Peter Sandstone (Ancell Unit) and the Ironton-Galesville Sandstone appear to be separate aquifer units. However, many municipal wells in Northeastern Illinois are open to both units, and therefore water has transferred across those two units for many years. Given the manmade connection between the two units, the water levels of each individual unit have essentially merged together in most areas of Northeastern Illinois. Even though four of five of the Village's wells are cased through the Ancell unit, the hydraulic interconnection between the Ancell and Ironton-Galesville likely exists in the Huntley area, too. Therefore, water levels in the model utilized the upper Ancell Unit as the reference point.

The top of the Ancell Unit in the Huntley area is approximately at an elevation of 200 ft MSL. Therefore, a 2009 static water level of the Ancell unit at Well No. 7 of approximately 400 ft MSL means the aquifer contained approximately 200 feet of artesian head above the Ancell Unit in 2009. At a static water elevation of approximately 430 ft, the artesian head above the top of the Ancell Unit at Well No. 11 was approximately 230 feet in 2009.

Over the last five years the ISWS has made some refinements within the regional models, and the more recent model results are getting even closer to replicating actual water level measurements in the region. In addition, the Village was interested in utilizing the model to evaluate the sustainability of the deep sandstone formation with multiple deep sandstone water well options in the Huntley area. Therefore, the project team, which included members from the ISWS who developed and refined the models, completed several modeling scenarios for this plan. A summary of the modeling efforts and results is as follows.

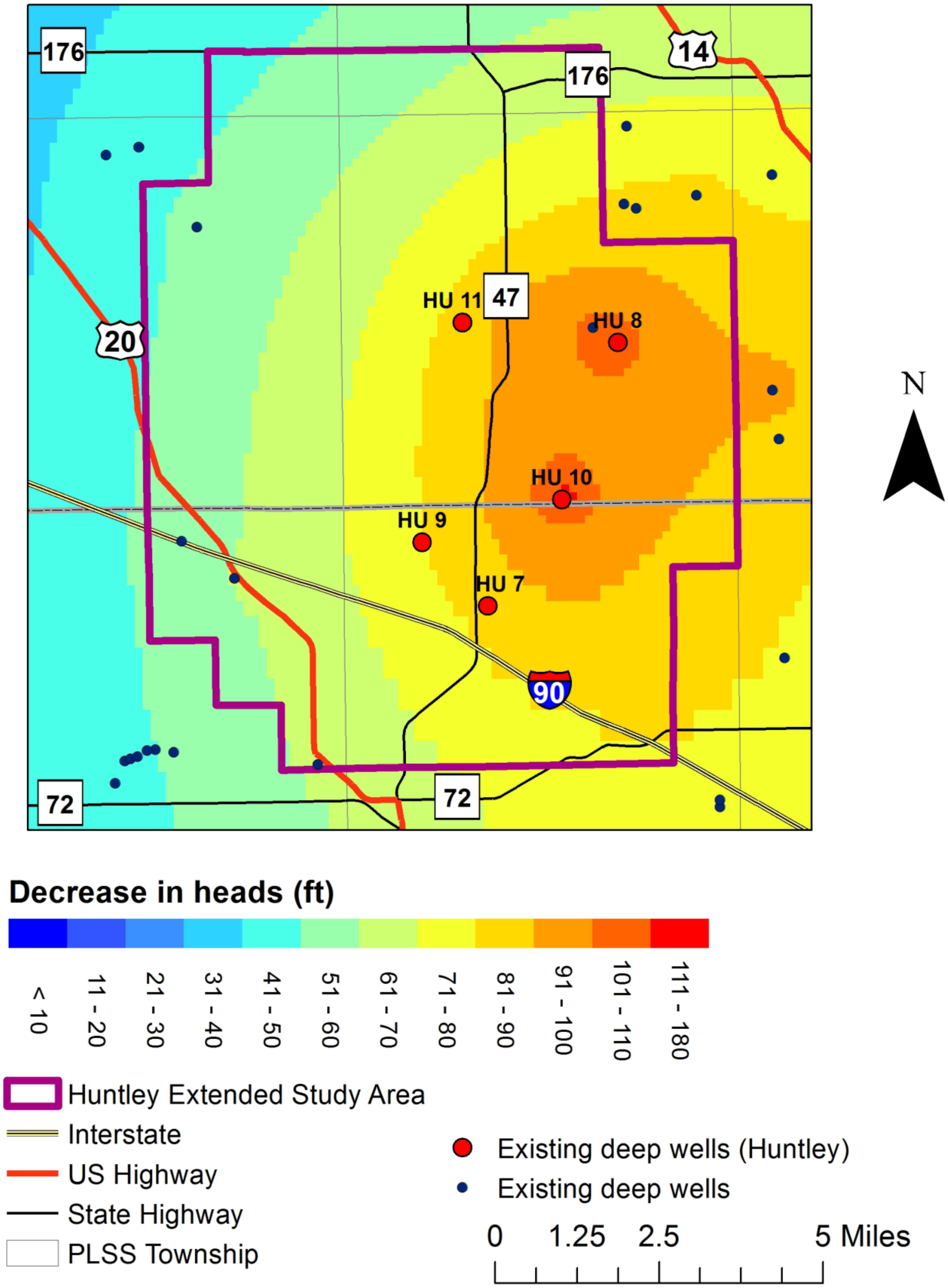
9.2.1 2040 Northeastern Illinois Regional Deep Sandstone Aquifer Modeling

The first model run included the use of the refined model to reestablish the 2040 projected deep sandstone water levels in the Huntley area under the original modeling assumptions. When the ISWS conducted the initial regional modeling, all of the projected water use increases for a community were applied to the community's existing wells. While it is understood why they needed to proceed in that manner, it is overly conservative. When water demands increase, most communities would install new wells to increase the pumping distribution from the aquifer.

Exhibit No. 9-10 summarizes the potentiometric surface elevation change from the 2009 baseline with the CT water use applied to the Village's five existing deep sandstone wells. Under this modeling scenario, water levels drop over 100 feet in the areas of Wells No. 8 and 10. The water levels drop between 70 – 85 feet at the Village's wells No. 7, 9 and 11. The water level decreases decline in a northwesterly direction, primarily due to the fact that water levels are higher in that direction to start with, and there is less urbanization and deep sandstone pumping in that direction.

Exhibit No. 9-10: 2040 Ancell Unit Potentiometric Surface Regional Model Simulation Elevation Change – CT Water Use With Existing Wells

Village of Huntley, IL



9.2.2 Alternate 1: 2040 CT Deep Sandstone Aquifer Modeling With Proposed Ironton-Galesville Wells

In the second model run, the CT water demand was spread across the existing and potential future Ironton-Galesville wells. As stated in Section 5.1.1, the Village will need to increase the water supply resources by approximately 7,300 gpm. A typical target flow rate for an Ironton-Galesville well is 1,000 gpm. Therefore, this model run assumed seven 1,000 gpm wells and one 300 gpm well were added to the water supply network. The distribution of the proposed wells is depicted on Exhibit No. 9-11.

Exhibit No. 9-12 summarizes the water level changes when compared to the 2009 levels for all of the future condition analyses. With the additional wells and wider spread of withdrawal from the deep sandstone aquifer, the water level decline reduces approximately 5 – 10 feet across the entire region. There are no areas where the decline exceeds 100 feet and the total area where the drawdown was 90 – 100 feet is considerably smaller.

9.2.3 Alternate 2: 2040 LRI Deep Sandstone Aquifer Modeling With Proposed Ironton-Galesville Wells

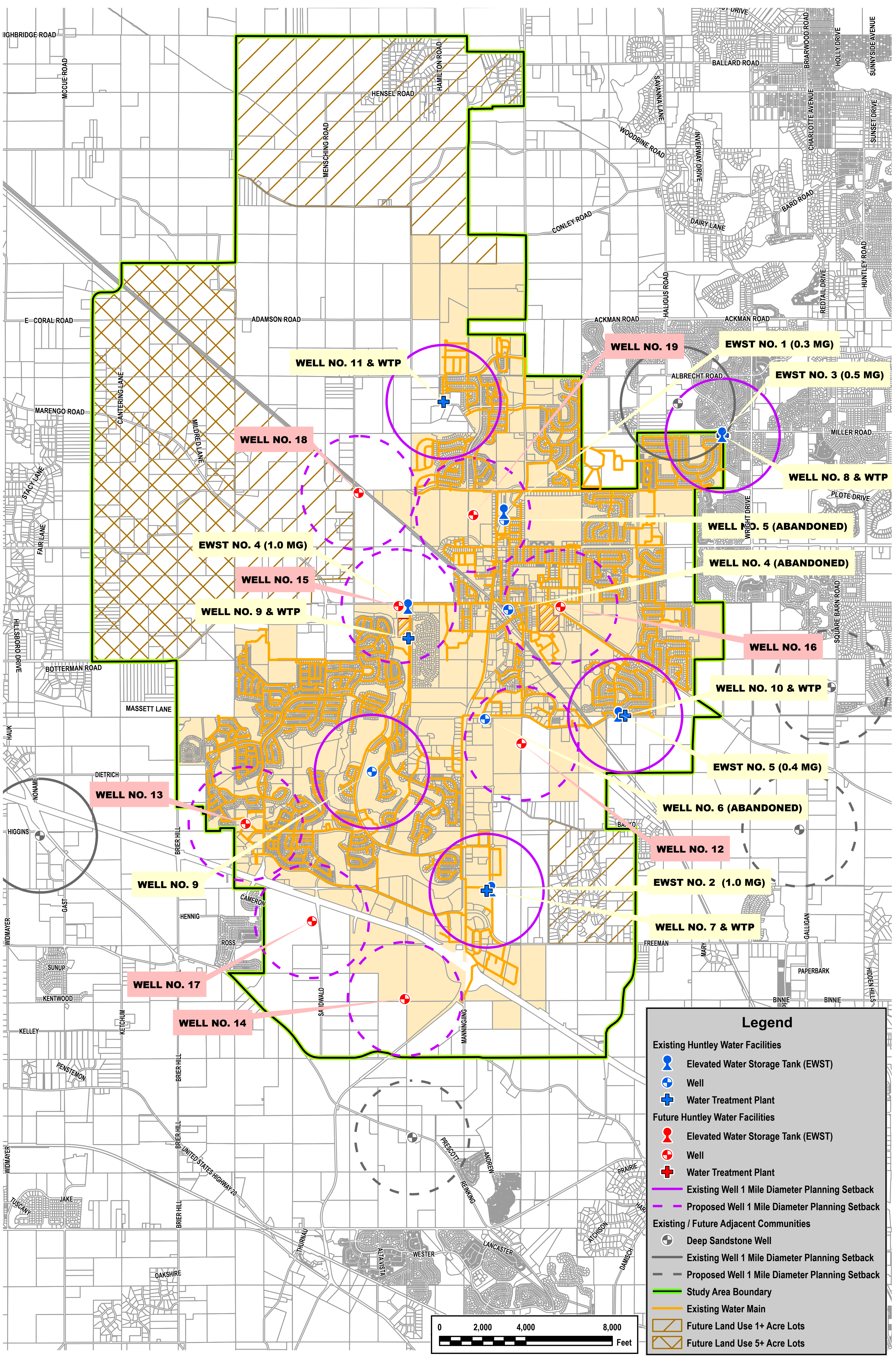
The purpose of the third model run was to determine the change in water levels if the LRI water use demand was applied to the deep sandstone aquifer. Section 5.1.3 determined the Village would need to add approximately 3,700 gpm of water supply resources to the Water Works System to meet the 2040 LRI water demand. Therefore, four (4) Ironton-Galesville wells were added to the existing well network for this modeling scenario. The four wells that were added for this model run were Wells No. 13, 15, 16 & 18 as depicted on Exhibit No. 9-11.

Exhibit No. 9-13 depicts the 2040 water level decline from the 2009 baseline for this modeling scenario. The water level declines reduce another 5 – 10 feet across the region when compared to the CT water demand distribution across the eight wells. The maximum predicted decline in the water levels is projected to be 80 – 90 feet over the 31 year period which would be an average decline around three feet per year. The water level declines in the northwest portion of the Village’s planning area are projected to be only 40 – 50 feet, which would be less than two feet per year on average.

9.2.4 Alternate 3: 2040 CT Deep Sandstone Aquifer Modeling With Partial Alternate Aquifer Withdrawal

The fourth, and final, model run assumed the Village maintained the CT water use demand throughout the planning period, but only utilized the Ironton-Galesville aquifer for one half of the water demand increase for the time period. Under this scenario, alternative water supply resources (i.e. shallow sand and gravel wells and/or Mt. Simon wells) would be tapped to make up the remaining 3,650 gpm of needed supply expansion. While the future withdrawal rate is less than the LRI water use scenario (3,650 gpm versus 4,700 gpm), it is comparable. In an effort to test another dimension of the model, alternate potential future wells were selected for this alternative to see if it would have a noticeable effect on the water level declines in the aquifer. Under this modeling scenario, the reduced water demand projection was applied to Wells No. 13, 15, 16 and 19, as depicted on Exhibit No. 9-11.

The results of this model run are summarized on Exhibit No. 9-14. The water level declines another 5 – 10



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DATE: JULY 2014
PROJECT NO.: HU1401
BY: KKP
PATH: H:\GIS\PUBLIC\HUNTLEY\HU1401\
FILE: HU1401_EXH_7-11_WATER SUPPLY.MXD

COMPREHENSIVE WATER AND WASTEWATER SYTEMS MASTER PLAN

EXHIBIT NO. 9-11
SUSTAINABLE SOURCE WATER SUPPLY DEEP SANDSTONE MODELING WELL CONFIGURATION SUMMARY

Exhibit No. 9-12: 2040 Ancell Unit Potentiometric Surface Regional Model Simulation Elevation Change – CT Water Use Including Eight New Ironton-Galesville Wells

Village of Huntley, IL

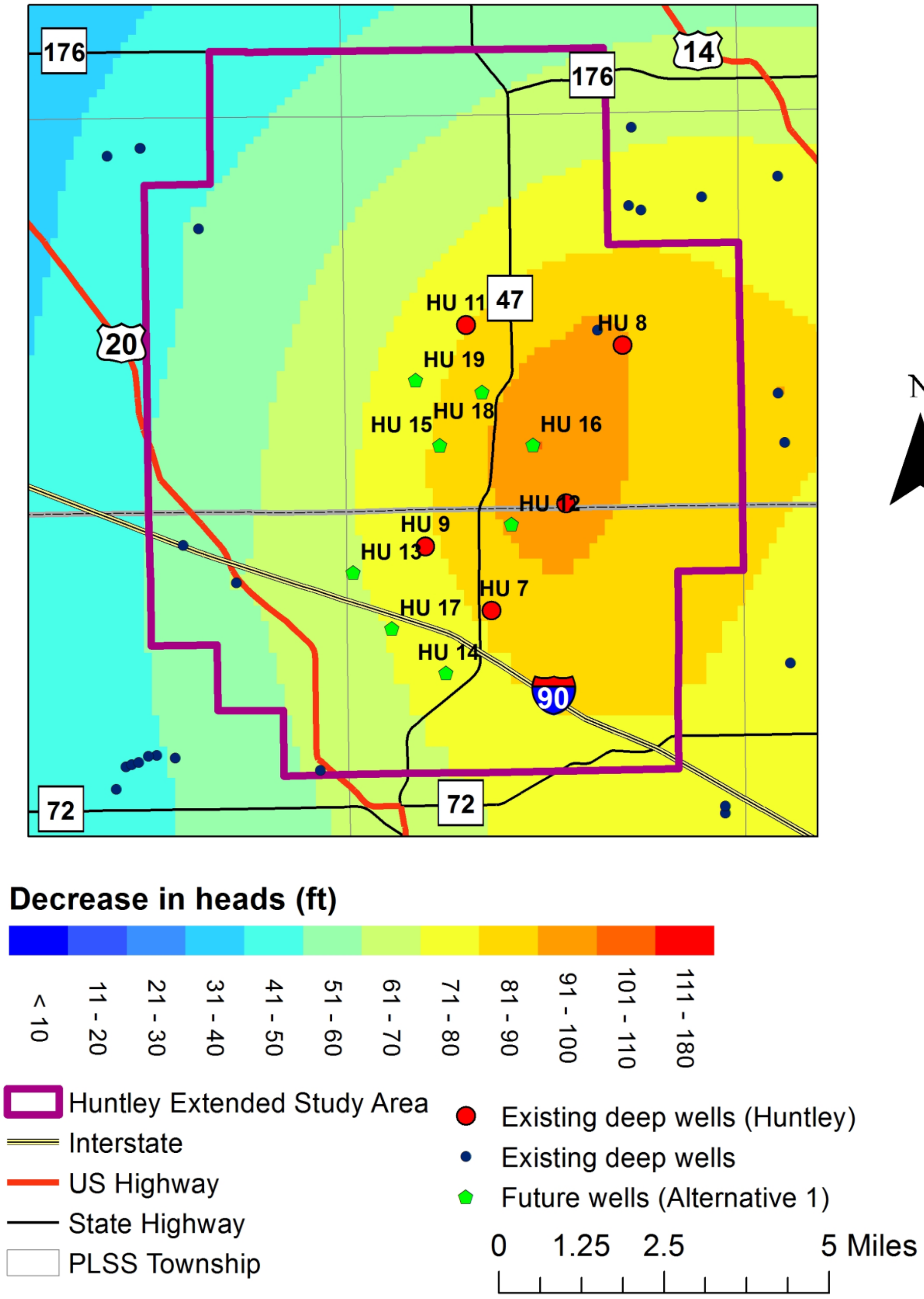


Exhibit No. 9-13: 2040 Ancell Unit Potentiometric Surface Regional Model Simulation Elevation Change – LRI Water Use Including Four New Ironton-Galesville Wells

Village of Huntley, IL

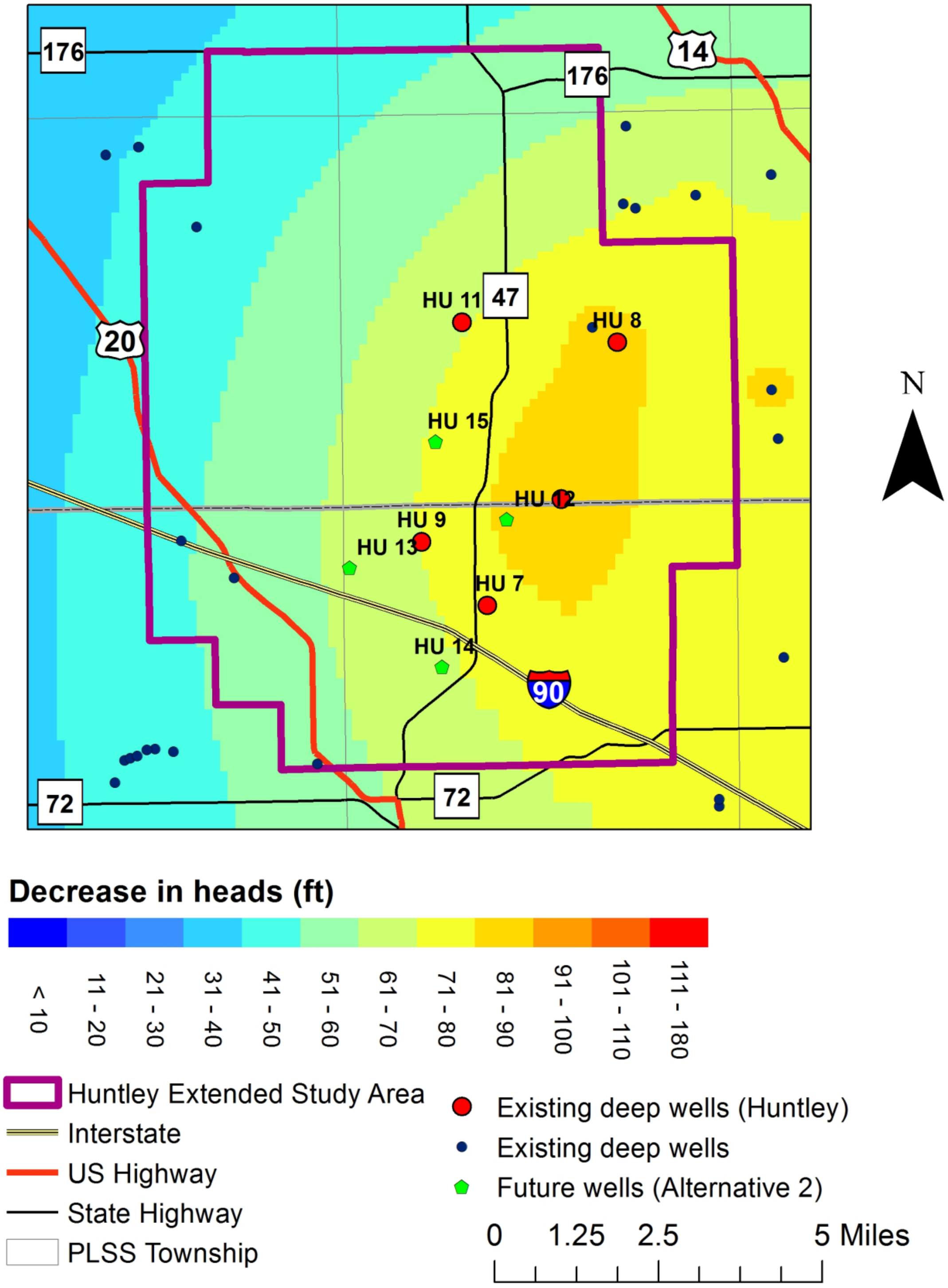
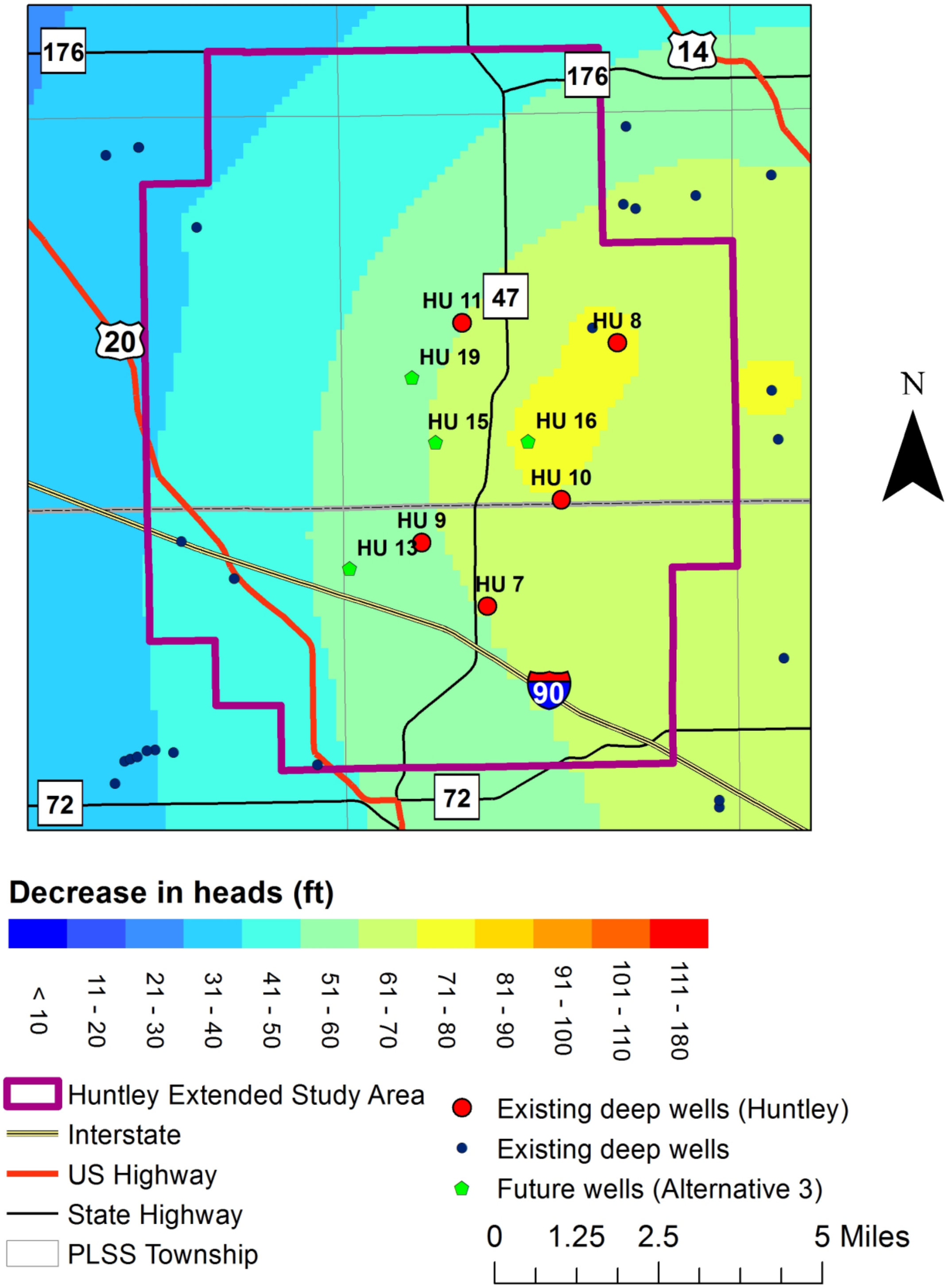


Exhibit No. 9-14: 2040 Ancell Unit Potentiometric Surface Regional Model Simulation Elevation Change – ½ CT Water Use Including Four New Ironton-Galesville Wells

Village of Huntley, IL



feet under this modeling scenario. By switching Wells No. 18 and 19, and consequently moving the withdrawal further west, the water level declines around the Village's Wells No. 8 and 10 are down to 70 – 80 feet total over the 31 year time period. The predicted water level declines in the northwest portion of the Village's planning area would only be 30 – 40 feet.

9.2.5 Model Results Summary

The goal of this section of the report was to evaluate the long term sustainable of the deep sandstone aquifer in the Huntley area. The deep sandstone aquifer was modeled to determine the effects of multiple water demand scenarios and multiple well distribution scenarios. The 2009 modeled water levels were referenced to the top of the Ancell Unit and then the alternative scenarios were compared to those values. In general terms, the sustainable yield of an aquifer would be a yield that does not dewater the aquifer. In essence, the withdrawal rate from the aquifer would not exceed the flow passing through the aquifer. As water levels decline, the aquifer gradient steepens and more water is transferred to the lowered water level area. With continuous pumping from the aquifer over a long duration, the gradient steepens even more and then eventually the aquifer reaches equilibrium. At this point, when the water level does not continue to decline, the sustainable yield is theoretically established. However, since demands on the aquifer continue to change over time, and it is impractical to evaluate withdrawals from the aquifer beyond 2040, an alternative method to define the sustainability of the aquifer must be established.

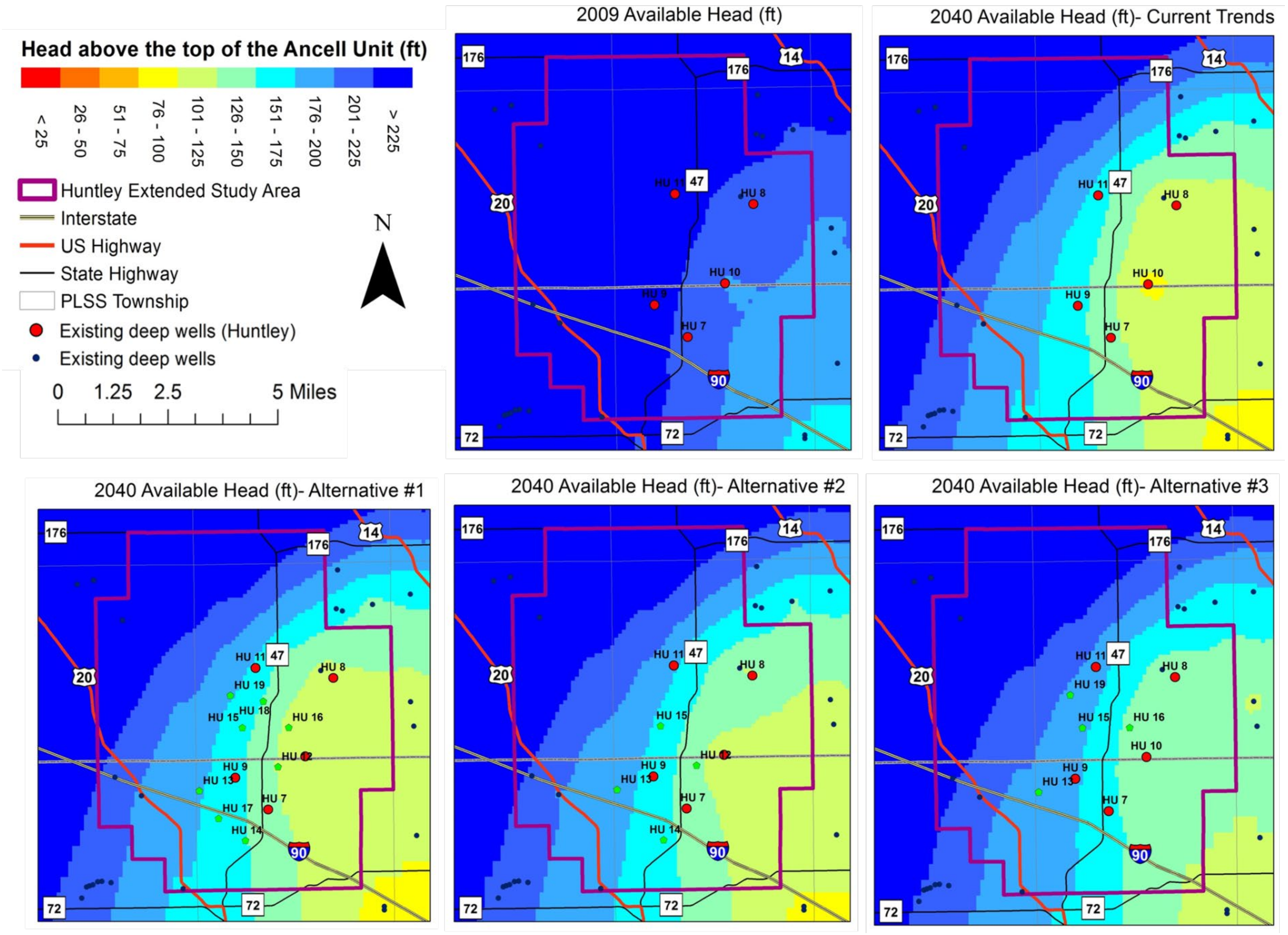
While the definition of the sustainable yield of the deep sandstone aquifer continues to be debated, the current thinking is that maintaining static water levels above the Ancell unit is a reasonable goal. Being that the Ancell unit is the uppermost sandstone formation in the aquifer, and once it were to be dewatered there would be major issues as water level declines approach the top of the Ironton-Galesville, this seems like a reasonable planning constraint for the time period of this study. Exhibit No. 9-15 summarizes the head above the Ancell Unit for each of the modeling scenarios. As one can see, the only scenario where the head above the Ancell Unit is less than 100 feet is the scenario where all of the CT water demand is applied to the Village's five existing wells – which is unreasonable consideration. With water levels over 100 feet above the Ancell Unit and water level declines below 100 feet for the 31 years of modeled in all scenarios, it is reasonable to assume the Ancell Unit and Ironton-Galesville aquifers have sufficient capacity to meet water demands in the Huntley area throughout the planning period.

9.3 Lake Michigan Interconnection

Lake Michigan is currently the primary source of water for the majority of the population served within northeastern Illinois. Confronted with diminishing groundwater resources, many communities in northeastern Illinois joined together and formed unique intergovernmental cooperatives that own and operate independent Water Systems using Lake Michigan water as the source. Many of these cooperatives, under Illinois State Statute, have formed into a Joint Action Water Agency (JAWA) and are responsible for managing the delivery and pricing of the water supply to its charter communities.

Exhibit No. 9-15: Modeling Results Summary – Head Above Top of Ancell Unit

Village of Huntley, IL



There is an allocation of Lake Michigan water usage allotted to the State of Illinois that limits the quantity used and indirectly the area and population that can be served by this resource. In the report *Water 2050: Northeastern Illinois Regional Water Supply/Demand Plan*, March 2010, published by the Chicago Metropolitan Agency for Planning, it was estimated that 50 to 75 MGD in domestic water supply allocation may be available to new areas. This estimate takes into account a number of variables that could greatly affect this allocation including diversion of stormwater runoff, Lake Michigan water levels (which affects volume of water required to work the locks and leakage through the locks), discretionary diversions required to maintain water quality in the Chicago Sanitary and Ship Canal, and accounting issues (a running average is used to evaluate the diversion). Also, as the population that currently uses Lake Michigan water continues to develop water conservation practices, water loss will be reduced and more water may become available to those communities seeking to use Lake Michigan water. Maximizing the Lake Michigan allocation to northeastern Illinois communities will help preserve the groundwater resources in the region. With this guiding principle, the project team explored opportunities for a Lake Michigan water interconnection.

Among the multiple potential Lake Michigan water supplies in northeastern Illinois, the Northwest Suburban Municipal JAWA (NSMJAWA) is closest to the Village of Huntley's Planning Area. NSMJAWA was established in 1982 with the following Charter Municipalities:

- Elk Grove Village
- Village of Mount Prospect
- Village of Rolling Meadows
- Village of Hoffman Estates
- Village of Schaumburg
- Village of Hanover Park
- Village of Streamwood

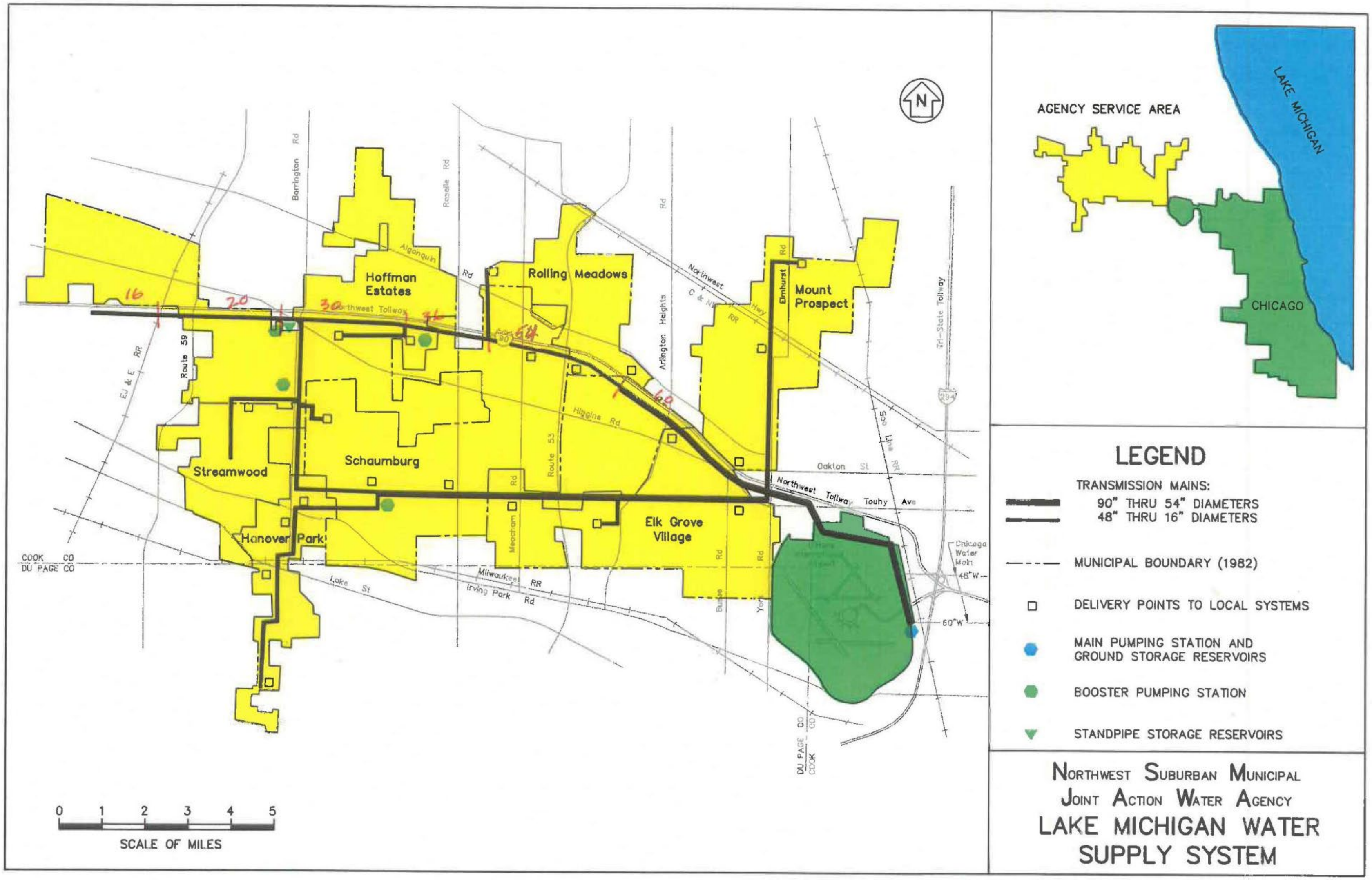
The seven member municipalities own 100% of the system capacity and no additional members have been added since its inception. A map of the system is included in Exhibit No. 9-16. The following is a summary of the NSMJAWA system:

- Service area 90 square miles
- Nominal System Capacity: 120 MGD
- Firm System Capacity: 95 MGD (considering hydraulic limitations)
- Current Average Day Use: 30 MGD (18% decrease in demand over last decade)
- Current Peak Day Use: 63 MGD

NSMJAWA does not treat Lake Michigan water but rather obtains its source of treated water supply from the City of Chicago with a connection from the Mayfield Pumping Station located at O'Hare International Airport. There are ground storage reservoirs and a main pumping station located at I-190 and Manheim Road that are

Exhibit No. 9-16: NSMJAWA System Map

Village of Huntley, IL



utilized to deliver the high pressure water through 60 miles of transmission mains ranging in size from 16” to 90” in diameter. There are 17 pressure reducing delivery points from which the charter members receive their water. NSMJAWA has an agreement with the City of Chicago that expires in 2023. The agreement establishes the bulk water rate at $3.81 per 1,000 gallons in 2015. The current average water rate to the charter members is approximately $5.03 per 1,000 gallons with the difference used to finance capital improvements, utility and other operating costs.

To become a member of NSMJAWA, one or more of the charter members would need to give a portion of their allocated capacity and the requesting member community would need to apply and maintain a Lake Michigan water allocation through the Illinois Department of Natural Resources – Office of Water Resources (IDNR-OWR). Also, the requesting member community likely would need to make a payment to NSMJAWA to pay a capital contribution (similar to a connection fee) and plan for capital improvement costs to extend the system. The capital improvements could include new pumping stations, transmission main, delivery structures and additional storage facilities to store a water volume equal to two (2) days of average day demand.

Review of the NSMJAWA system identified that the closest point of connection for the Village of Huntley is a 16” transmission main located at I-90 and Beverly Road. To reach the Village of Huntley’s Water Works System at I-90 and Route 47, approximately 14 miles (74,000 feet) of 16”, or greater, water main is required, along with upgrades to the NSMJAWA network that would likely include pump station(s) and transmission main improvements. Also, to maintain 2 days of storage volume at the 2040 CT water use projection, an additional 7.4 MG of storage would be required, which is 4.3 MG more than the peak hour storage CT water use scenario defined deficit. The extent of these capital improvements makes the Lake Michigan interconnection cost prohibitive for the Village of Huntley at this time.

9.4 Source Water Plan

The three sources of water supply available to the Village were analyzed for their long term sustainability potential. There appear to be a moderate amount of sand and gravel deposits in the Huntley area that could someday be a water source for the community. While the deposits on the east side of the Village appeareto be fully developed by the adjacent communities of Algonquin and Lake in the Hills, the deposits on the northwest end of the Village’s planning area could someday be a productive source of water supply for the community. Given the likely fact that shallow sand and gravel wells in Ashmore formation would have elevated iron levels, the source water would require some level of iron removal treatment. In addition, in an effort to match the hardness of the water distributed by the existing cation exchange water treatment plants, a second treatment step of softening likely would be required for shallow sand and gravel wells. Given the distance from the existing Village Water Works System infrastructure and the fact that extension of the Water Works System to the area where tapping into the shallow sand and gravel deposits seems feasible, it is not recommended that shallow sand and gravel wells be considered as part of the Village’s supply portfolio for the planning period of this report. However, as the northwest area of the Village develops, the Village should strongly consider further evaluation of this resource.

A Lake Michigan water interconnection could potentially become available from the NSMJAWA. However, the charter members own all of the allocation and obtaining an allowance from one or more members would likely be an obstacle. Also, the extent of the capital improvements necessary to extend the service to the Village of Huntley make the Lake Michigan interconnection cost prohibitive for the Village at this time. If an adjacent community was to connect to NSMJAWA, and therefore the supply connection potential was much closer, then it could someday be feasible. It is recommended the Village continue to monitor Lake Michigan water service extension, just in case an alternative supply source is needed decades into the future.

Regional modeling of the deep sandstone aquifer indicates its long term sustainability could be an issue in parts of Northeastern Illinois by 2050. However, the regional projections indicate water levels within the Huntley area likely will remain reasonable even under significantly higher water demand scenarios. While the long term sustainability of the deep aquifer could be a concern for the region, it can be concluded that the use of the deep aquifer as a supply source for the Village of Huntley within this report's planning period is appropriate. The Village and region should continue to conserve water such that the capacity of this limited resource can be extended, but ultimately large amounts of population growth in the region likely will force many portions of the region to consider other source water options in the long term.

The modeling conducted as part of this report indicates water wells that withdraw from the Ironton-Galesville formation will have the needed water supply capacity for the Village for the planning period. However, the Village should be aware that the Ironton-Galesville formation could have localized elevated levels of barium and radium in the Huntley planning area that could make treating the Ironton-Galesville formation very difficult. On the other hand, the even deeper Mt. Simon formation appears to have water quality properties that could prove to be a viable, alternate supply source for the Village. Given the potential of the Ironton-Galesville formation having extraordinarily high levels of barium and/or radium in portions of the Village (especially to the south), it is recommended all future Ironton-Galesville wells in the southern portion of the Village be constructed such that deepening to the Mt. Simon formation can be accomplished cost effectively. This would be accomplished by drilling the Ironton-Galesville wells with a larger diameter surface casing (26 inch versus 24 inch) and larger diameter long string casing (22 inch versus 18 inch) than a well that is targeted to be completed in the Ironton-Galesville formation, only.

SECTION 10: SUSTAINABLE WATER WORKS SYSTEM AND WASTEWATER SYSTEM PLANNING

Although both population and approximate timeframes for improvements have been provided in the previous sections as part of the Phasing and Implementation Plans, it is ultimately the water demands and wastewater flows on the systems that dictate when and what improvements will need to be constructed. As the Village continues to mature, expand, and implement water conservation strategies, the water demands will evolve, as they already have since the previous Master Plan. It is recommended that the Village continuously monitor and evaluate its Water Works and Wastewater Systems as the Village develops. The staging of improvements within this plan is dependent on the financing and construction schedule of the annexed and proposed developments. The Phasing and Implementation Plan must continually be reviewed and should be modified based on the rate of development and where the development is actually occurring.

As emphasized in Section 7.5.3 with the cost comparison of recommended Water Works System improvements between the CT and LRI scenarios and comparison between past and current water usage trends, the financial benefits of minimal levels of water conservation are huge for the Village. To that end, this Comprehensive Water Works and Wastewater System Master Plan is a valuable planning tool and steppingstone for the Village's Water Works System. The recommended next steps for the Village are as follows:

- Review current policies, consider revising existing policies and then enforce adopted policies regarding water conservation strategies and goals, and develop financing alternatives for the identified improvements. By evaluating water conservation opportunities, the Village will not only show how it continues to be a good steward of our limited resource of water, but the Village also has the potential to significantly reduce the required capital investment in the system.
- Review its water rates to determine how revenue will be impacted by a further decrease in water consumption resulting from water conservation measures. This will allow the Village's water conservation efforts to be successful from a financial perspective.

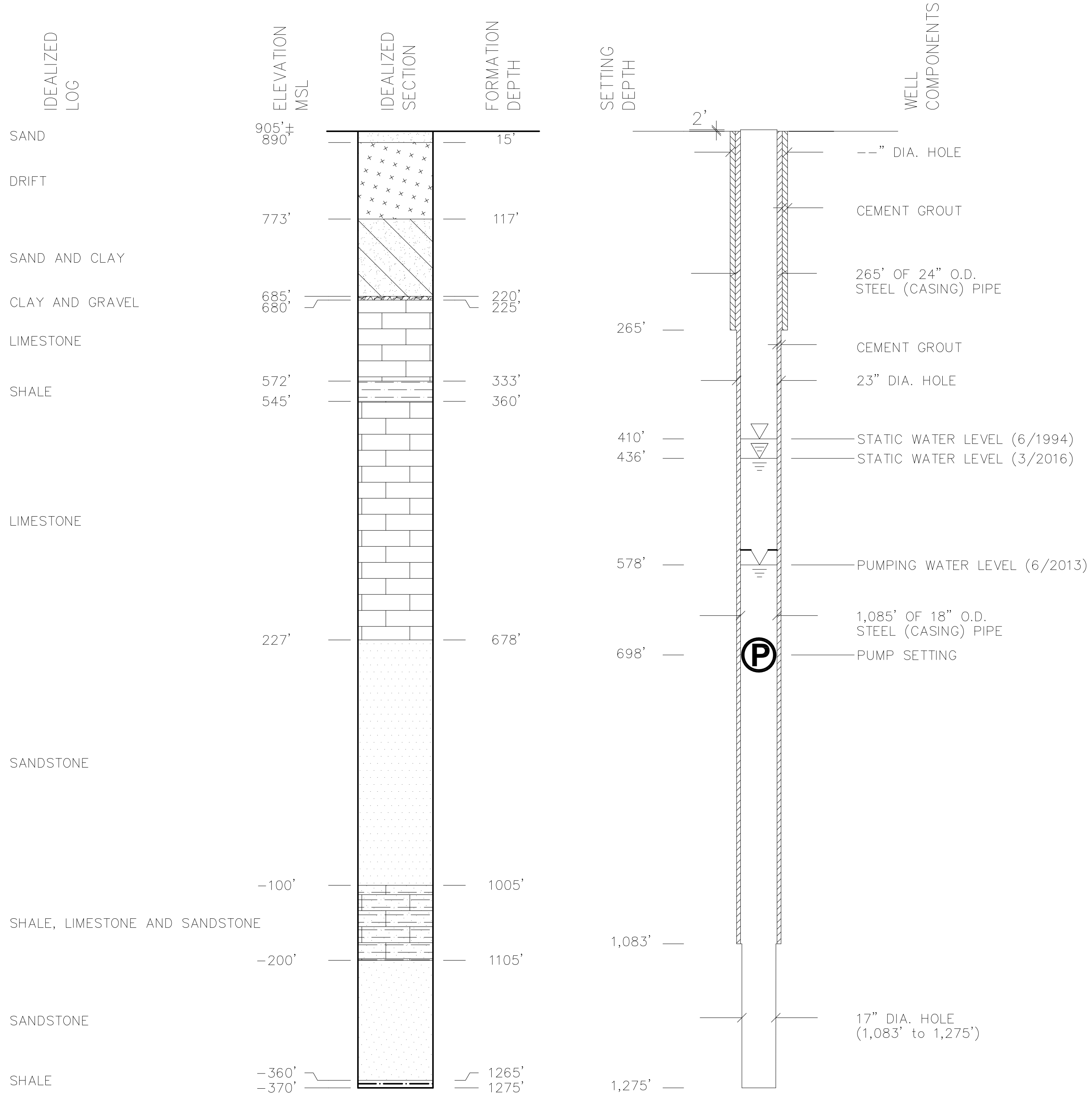
This Master Plan advocates similar goals to those of the regional water supply planning efforts. The water supply sources of Northeastern Illinois, namely Lake Michigan, various inland supply sources including rivers, shallow groundwater, and deep groundwater, know no political boundaries. Their geographic extent is such that their availabilities are dependent on everyone's wise use of the resource. Therefore, we also recommend the Village continue to build strong, collaborative relationships regionally for sustainable water use so the region and the Village of Huntley can extend the capacity of the local water resources for an economically and environmentally sustainable region.

Appendix A

Well Schematics

SCHEMATIC OF EXISTING
WATER WELL No. 7
(DEEP CONSOLIDATED AQUIFER)
VILLAGE OF HUNTLEY
McHENRY & KANE COUNTIES, ILLINOIS

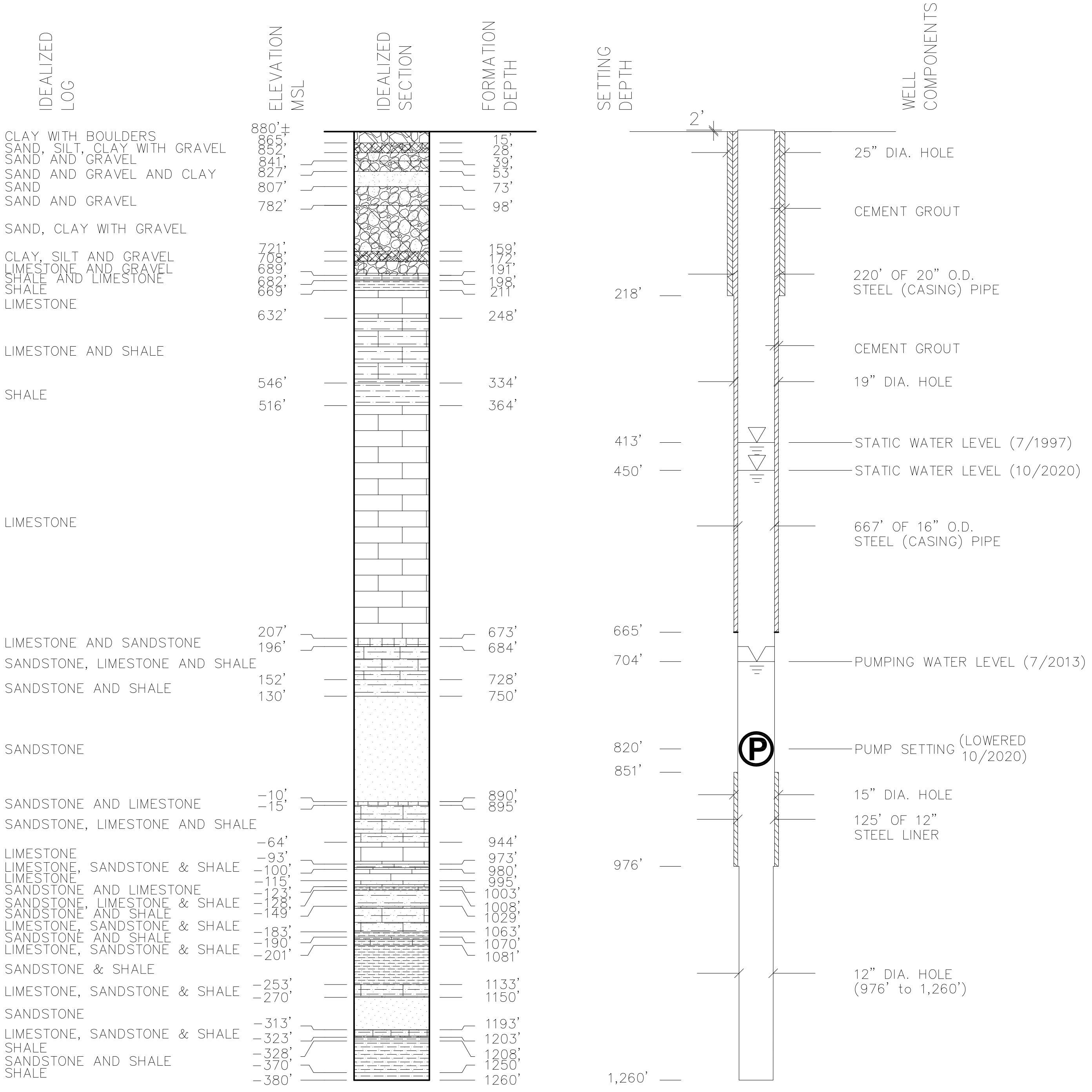
DATA DERIVED FROM ILLINOIS STATE GEOLOGICAL SURVEY,
WEB BASED WATER WELL DATA AND WELL MAINTENANCE RECORDS



-- = NO RECORD

SCHEMATIC OF EXISTING WATER WELL No. 8
(DEEP CONSOLIDATED AQUIFER)
VILLAGE OF HUNTLEY
McHENRY & KANE COUNTIES, ILLINOIS

DATA DERIVED FROM ILLINOIS STATE GEOLOGICAL SURVEY,
WEB BASED WATER WELL DATA AND WELL MAINTENANCE RECORDS



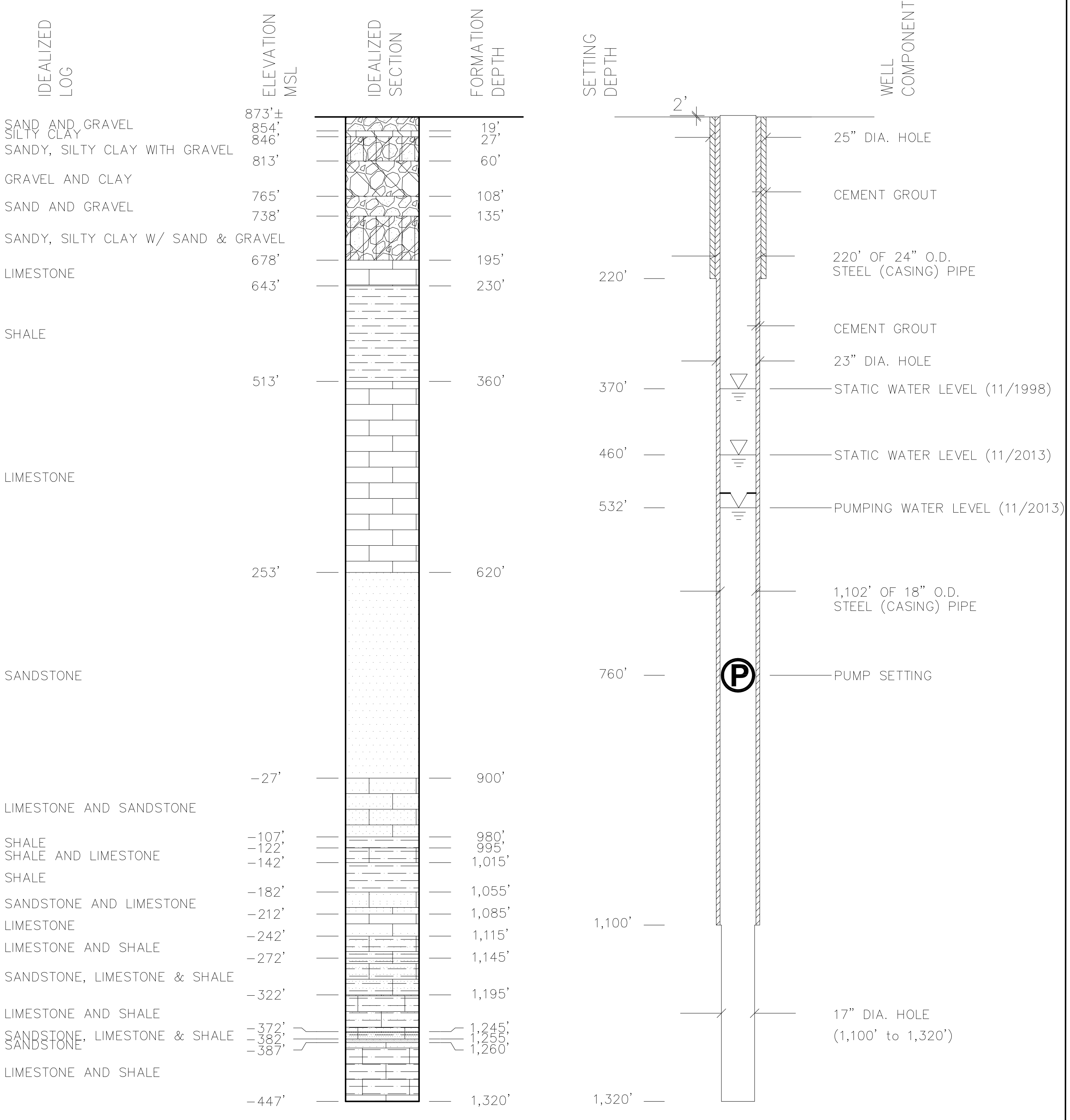
FILE NO: HLTY-WELL 8 BW

Plotted: October 30, 2020 @ 11:15 AM By: James Williams - Tab: 200 Scale

Path: G:\PUBLIC WORKS\4-UTILITIES\1-WATER SYSTEM\1-WELL & WTP INFO\WELL EXHIBITS\HLTY-WELL 8 BW

SCHEMATIC OF EXISTING WATER WELL No. 9
(DEEP CONSOLIDATED AQUIFER)
VILLAGE OF HUNTLEY
McHENRY & KANE COUNTIES, ILLINOIS

DATA DERIVED FROM ILLINOIS STATE GEOLOGICAL SURVEY,
WEB BASED WATER WELL DATA AND WELL MAINTENANCE RECORDS



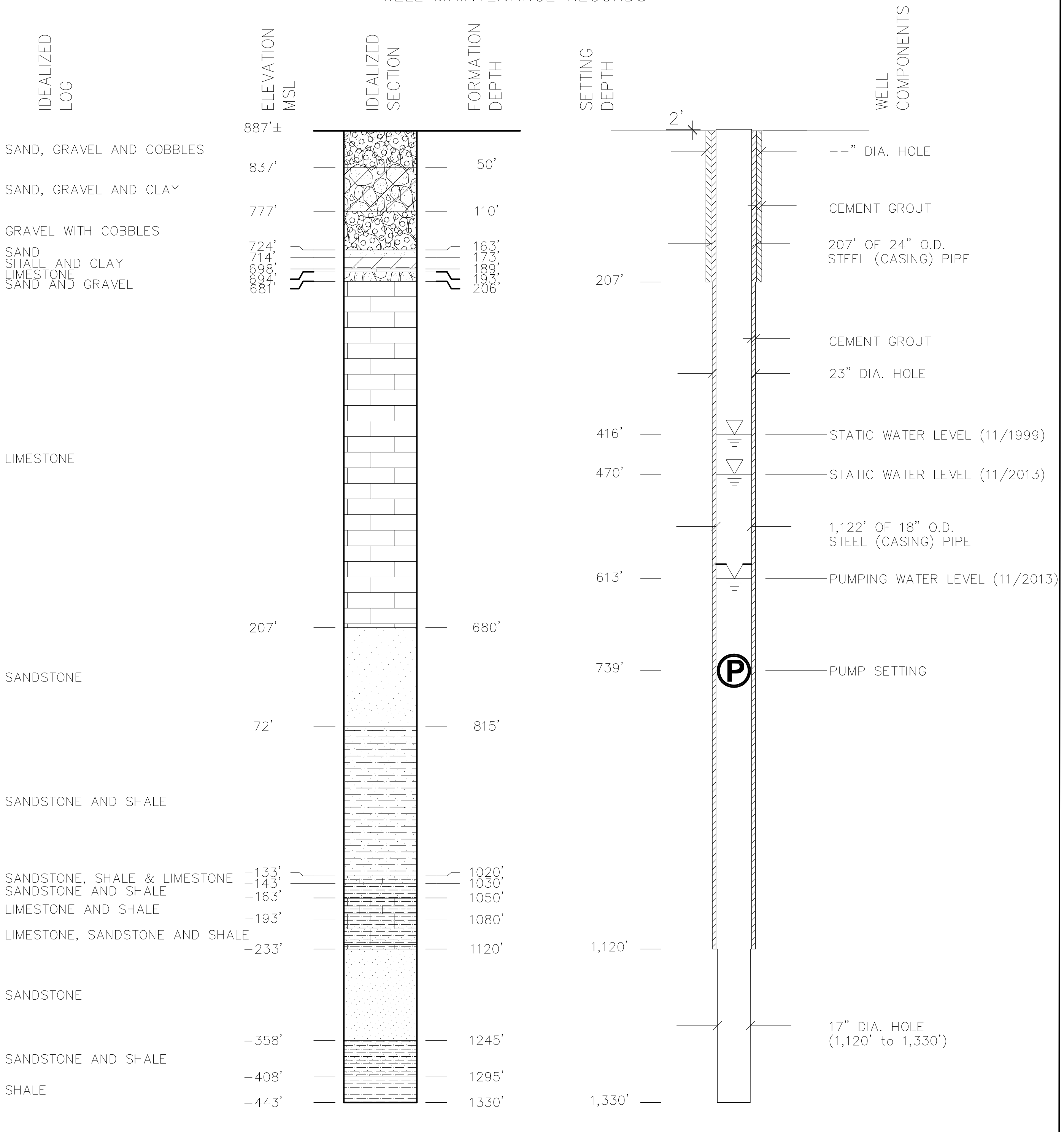
FILE NO: HLTY-WELL 9 BW

Plotted: September 10, 2014 @ 1:46 PM By: James Williams – Tab: 200 Scale

Path: G:\DEVELOPMENT SERVICES\DSD – PLANNINGZONINGDIVISION\AUTOCAD\VOH WELL X-SECTION EXHIBITS\HLTY-WELL 9 BW

SCHEMATIC OF EXISTING
WATER WELL No. 10
(DEEP CONSOLIDATED AQUIFER)
VILLAGE OF HUNTLEY
McHENRY & KANE COUNTIES, ILLINOIS

DATA DERIVED FROM WELL DRILLER'S LOG AND
WELL MAINTENANCE RECORDS



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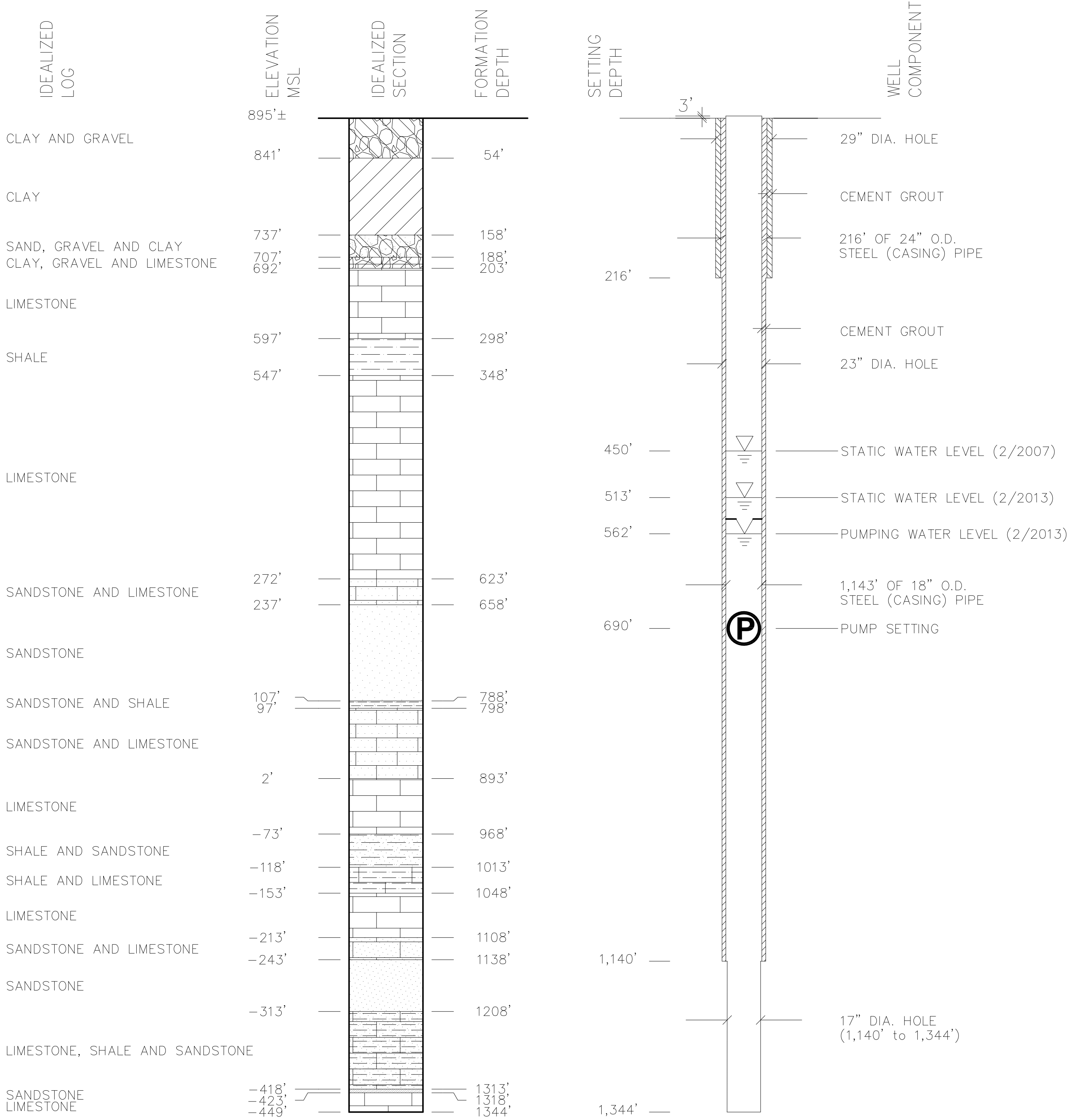
FILE NO: HLTY-WELL 10 BW-032222

Plotted: March 22, 2022 @ 3:28 PM By: James Williams – Tab: 200 Scale

Path: W:\4-UTILITIES\1-WATER SYSTEM\1-WELL & WTP INFO\WELL EXHIBITS\HLTY-WELL 10 BW 032222

SCHEMATIC OF EXISTING WATER WELL No. 11
(DEEP CONSOLIDATED AQUIFER)
VILLAGE OF HUNTLEY
McHENRY & KANE COUNTIES, ILLINOIS

DATA DERIVED FROM WELL DRILLER'S LOG AND
WELL MAINTENANCE RECORDS



Appendix B

Current NPDES Permits

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
1021 NORTH GRAND AVENUE EAST, P.O. BOX 19276, SPRINGFIELD, ILLINOIS 62794-9276 · (217) 782-3397
JB PRITZKER, GOVERNOR **JOHN J. KIM**, DIRECTOR

217/782-0610

January 22, 2021

Village of Huntley
10897 Main Street
Huntley, Illinois 60142

Re: Village of Huntley - East WWTP
NPDES Permit No. IL0029238
Bureau of Water ID: W1110350009
Final Permit

Gentlemen:

Attached is the final NPDES Permit for your discharge. The Permit as issued covers discharge limitations, monitoring, and reporting requirements. Failure to meet any portion of the Permit could result in civil and/or criminal penalties. The Illinois Environmental Protection Agency is ready and willing to assist you in interpreting any of the conditions of the Permit as they relate specifically to your discharge.

Pursuant to the Final NPDES Electronic Reporting Rule, all permittees must report DMRs electronically unless a waiver has been granted by the Agency. The Agency utilizes NetDMR, a web based application, which allows the submittal of electronic Discharge Monitoring Reports instead of paper Discharge Monitoring Reports (DMRs). More information regarding NetDMR can be found on the Agency website, https:www2.illinois.gov/epa/topics/water-quality/surface-water/netdmr/pages/quick-answer-guide.aspx. If your facility has received a waiver from the NetDMR program, a supply of preprinted paper DMR Forms will be sent to your facility. Additional information and instructions will accompany the preprinted DMRs. Please see the attachment regarding the electronic reporting rule.

The attached Permit is effective as of the date indicated on the first page of the Permit. Until the effective date of any re-issued Permit, the limitations and conditions of the previously-issued Permit remain in full effect. You have the right to appeal any condition of the Permit to the Illinois Pollution Control Board within a 35 day period following the issuance date

Should you have questions concerning the Permit, please contact Kaushal Desai at 217/782-0610.

Sincerely,

Brant D. Fleming, P.E.
Manager, Municipal Unit, Permit Section
Division of Water Pollution Control

BDF:KKD:20081901.bah

Attachment: Final Permit

cc: Records
Compliance Assurance Section
Des Plaines Region
Billing
CMAP

NPDES Permit No. IL0029238

Illinois Environmental Protection Agency

Division of Water Pollution Control

1021 North Grand Avenue East

Post Office Box 19276

Springfield, Illinois 62794-9276

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

Reissued (NPDES) Permit

Expiration Date: January 31, 2026

Issue Date: January 22, 2021
Effective Date: February 01, 2021

Name and Address of Permittee:
Village of Huntley
10897 Main Street
Huntley, Illinois 60142

Facility Name and Address:
Village of Huntley - East WWTP
11313 Dundee Road
Huntley, Illinois 60142
(McHenry County)

Receiving Waters: Huntley Branch to South Branch of the Kishwaukee River

In compliance with the provisions of the Illinois Environmental Protection Act, Title 35 of the Ill. Adm. Code, Subtitle C, Chapter I, and the Clean Water Act (CWA), the above-named Permittee is hereby authorized to discharge at the above location to the above-named receiving stream in accordance with the Effluent Limitations, Monitoring, and Reporting requirements; Special Conditions and Attachment H Standard Conditions attached herein.

Permittee is not authorized to discharge after the above expiration date. In order to receive authorization to discharge beyond the expiration date, the Permittee shall submit the proper application as required by the Illinois Environmental Protection Agency (IEPA) not later than 180 days prior to the expiration date.

Brant D. Fleming, P.E.
Manager, Municipal Unit, Permit Section
Division of Water Pollution Control

BDF:KKD:20081901.bah

Effluent Limitations, Monitoring, and Reporting

FINAL

Discharge Number(s) and Name(s): 001 STP Outfall

Load limits computed based on a design average flow (DAF) of 1.8 MGD (design maximum flow (DMF) of 4.5 MGD).

From the effective date of this Permit until the expiration date, the effluent of the above discharge(s) shall be monitored and limited at all times as follows:

	LOAD LIMITS lbs/day DAF (DMF)*			CONCENTRATION LIMITS mg/L				
Parameter	Monthly Average	Weekly Average	Daily Maximum	Monthly Average	Weekly Average	Daily Maximum	Sample Frequency	Sample Type
Flow (MGD)							Continuous	
CBOD$_5$**,*****	150 (375)		300 (751)	10		20	1 Day/Week	Composite
Suspended Solids*****	180 (450)		360 (901)	12		24	1 Day/Week	Composite
pH	Shall be in the range of 6 to 9 Standard Units						1 Day/Week	Grab
Fecal Coliform***	Daily Maximum shall not exceed 400 per 100 mL (May through October)						1 Day/Week	Grab
Chlorine Residual****						0.038	****	Grab
Ammonia Nitrogen: As (N)								
April-May/Sept.-Oct.	17 (41)	50 (124)	71 (176)	1.1	3.3	4.7	1 Day/Week	Composite
June-August	17 (41)	42 (105)	71 (176)	1.1	2.8	4.7	1 Day/Week	Composite
Nov.-Feb.	21 (53)		75 (188)	1.4		5.0	1 Day/Week	Composite
March	21 (53)	57 (143)	71 (176)	1.4	3.8	4.7	1 Day/Week	Composite
Total Phosphorus (as P)	15 (38)			1.0			1 Day/Week	Composite
Total Nitrogen (as N)	Monitor only						1 Day/Month	Composite
				Monthly Average not less than	Weekly Average not less than	Daily Minimum		
Dissolved Oxygen								
March-July				N/A	6.0	5.0	1 Day/Week	Grab
August-February				5.5	4.0	3.5	1 Day/Week	Grab

*Load limits based on design maximum flow shall apply only when flow exceeds design average flow.
**Carbonaceous BOD$_5$ (CBOD$_5$) testing shall be in accordance with 40 CFR 136.
***See Special Condition 9.
****See Special Condition 14.
*****BOD$_5$ and Suspended Solids (85% removal required): In accordance with 40 CFR 133, the 30-day average percent removal shall not be less than 85 percent. The percent removal need not be reported to the IEPA on DMRs but influent and effluent data must be available, as required elsewhere in this Permit, for IEPA inspection and review. For measuring compliance with this requirement, 5 mg/L shall be added to the effluent CBOD$_5$ concentration to determine the effluent BOD$_5$ concentration. Percent removal is a percentage expression of the removal efficiency across a treatment plant for a given pollutant parameter, as determined from the 30-day average values of the raw wastewater influent concentrations to the facility and the 30-day average values of the effluent pollutant concentrations for a given time period.

(Continue on next page)

Effluent Limitations, Monitoring, and Reporting

FINAL

Discharge Number(s) and Name(s): 001 STP Outfall (Continued)

Flow shall be reported on the Discharge Monitoring Report (DMR) as monthly average and daily maximum.

Fecal Coliform shall be reported on the DMR as a daily maximum value.

pH shall be reported on the DMR as minimum and maximum value.

Chlorine Residual shall be reported on the DMR as a Daily Maximum Value.

Dissolved oxygen shall be reported on the DMR as a minimum value.

Total Phosphorus shall be reported on the DMR as a monthly average and daily maximum value.

Total Nitrogen shall be reported on the DMR as a daily maximum value. Total Nitrogen is the sum total of Total Kjeldahl Nitrogen, Nitrate, and Nitrite.

Influent Monitoring, and Reporting

The influent to the plant shall be monitored as follows:

Parameter	Sample Frequency	Sample Type
Flow (MGD)	Continuous	
BOD_5	1 Day/Week	Composite
Suspended Solids	1 Day/Week	Composite

Influent samples shall be taken at a point representative of the influent.

Flow (MGD) shall be reported on the Discharge Monitoring Report (DMR) as monthly average and daily maximum.

BOD_5 and Suspended Solids shall be reported on the DMR as a monthly average concentration.

Special Conditions

SPECIAL CONDITION 1. This Permit may be modified to include different final effluent limitations or requirements which are consistent with applicable laws and regulations. The IEPA will public notice the permit modification.

SPECIAL CONDITION 2. The use or operation of this facility shall be by or under the supervision of a Certified Class 1 operator.

SPECIAL CONDITION 3. The IEPA may request in writing submittal of operational information in a specified form and at a required frequency at any time during the effective period of this Permit.

SPECIAL CONDITION 4. The IEPA may request more frequent monitoring by permit modification pursuant to 40 CFR § 122.63 and Without Public Notice.

SPECIAL CONDITION 5. The effluent, alone or in combination with other sources, shall not cause a violation of any applicable water quality standard outlined in 35 Ill. Adm. Code 302 and 303.

SPECIAL CONDITION 6. The Permittee shall record monitoring results on Discharge Monitoring Report (DMR) electronic forms using one such form for each outfall each month.

In the event that an outfall does not discharge during a monthly reporting period, the DMR Form shall be submitted with no discharge indicated.

The Permittee is required to submit electronic DMRs (NetDMRs) instead of mailing paper DMRs to the IEPA unless a waiver has been granted by the Agency. More information, including registration information for the NetDMR program, can be obtained on the IEPA website, https:www2.illinois.gov/epa/topics/water-quality/surface-water/netdmr/pages/quick-answer-guide.aspx.

The completed Discharge Monitoring Report forms shall be submitted to IEPA no later than the 25th day of the following month, unless otherwise specified by the permitting authority.

Permittees that have been granted a waiver shall mail Discharge Monitoring Reports with an original signature to the IEPA at the following address:

Illinois Environmental Protection Agency
Division of Water Pollution Control
Attention: Compliance Assurance Section, Mail Code # 19
1021 North Grand Avenue East
Post Office Box 19276
Springfield, Illinois 62794-9276

SPECIAL CONDITION 7. The provisions of 40 CFR Section 122.41(m) & (n) are incorporated herein by reference.

SPECIAL CONDITION 8. Samples taken in compliance with the effluent monitoring requirements shall be taken at a point representative of the discharge, but prior to entry into the receiving stream.

SPECIAL CONDITION 9. This Permit may be modified to include alternative or additional final effluent limitations pursuant to an approved Total Maximum Daily Load (TMDL) Study, an approved Nutrient Assessment Reduction Plan, or an approved trading program.

SPECIAL CONDITION 10. The Permittee shall conduct semi-annual monitoring of the effluent and report concentrations (in mg/L) of the following listed parameters. Monitoring shall begin three (3) months from the effective date of this permit. The sample shall be a 24-hour effluent composite except as otherwise provided below and the results shall be submitted on Discharge Monitoring Report (DMR) electronic forms, unless otherwise specified by the IEPA. The parameters to be sampled and the minimum reporting limits to be attained are as follows:

STORET CODE	PARAMETER	Minimum reporting limit
01002	Arsenic	0.05 mg/L
01007	Barium	0.5 mg/L
01027	Cadmium	0.001 mg/L
01032	Chromium (hexavalent) (grab)	0.01 mg/L
01034	Chromium (total)	0.05 mg/L
01042	Copper	0.005 mg/L
00720	Cyanide (total) (grab)***	5.0 µg/L
00722	Cyanide (grab) (available**** or amenable to chlorination)***	5.0 µg/L
00951	Fluoride	0.1 mg/L
01045	Iron (total)	0.5 mg/L

Special Conditions

01046	Iron (Dissolved)	0.5 mg/L
01051	Lead	0.05 mg/L
01055	Manganese	0.5 mg/L
71900	Mercury (grab)**	1.0 ng/L*
01067	Nickel	0.005 mg/L
00556	Oil (hexane soluble or equivalent) (Grab Sample only)	5.0 mg/L
32730	Phenols (grab)	0.005 mg/L
01147	Selenium	0.005 mg/L
01077	Silver (total)	0.003 mg/L
01092	Zinc	0.025 mg/L

The minimum reporting limit for each parameter is specified by Illinois EPA as the regulatory authority.

The minimum reporting limit for each parameter shall be greater than or equal to the lowest calibration standard and within the acceptable calibration range of the instrument.

The minimum reporting limit is the value below which data are to be reported as non-detects.

The statistically-derived laboratory method detection limit for each parameter shall be less than the minimum reporting limit required for that parameter.

All sample containers, chemical and thermal preservation, holding times, analyses, method detection limit determinations and quality assurance/quality control requirements shall be in accordance with 40 CFR Part 136.

Unless otherwise indicated, concentrations refer to the total amount of the constituent present in all phases, whether solid, suspended or dissolved, elemental or combined, including all oxidation states.

*1.0 ng/L = 1 part per trillion.
**Utilize USEPA Method 1631E and the digestion procedure described in Section 11.1.1.2 of 1631E.
***Analysis for cyanide (available or amenable to chlorination) is only required if cyanide (total) is detected at or above the minimum reporting limit.
****USEPA Method OIA-1677 or Standard Method SM 4500-CN G.

The Permittee shall sample and analyze the effluent for the pollutants identified in 40 CFR Appendix J, Table 2. Provide data from a minimum of 3 samples taken within four and one-half years prior to the expiration of this Permit. Samples must be representative of the seasonal variation in the discharge. All samples must be collected and analyzed in accordance with analytical methods approved under 40 CFR Part 136. Sample results shall be submitted with the application for renewal of this Permit.

The Permittee must provide notice of any new introduction of pollutants from an indirect discharger which would be subject to Section 301 or 306 of the Clean Water Act as if it were directly discharging these pollutants and any substantial change in the volume or character of pollutants being introduced by a source introducing pollutants at the time of issuance of this Permit. The notice must include information on the quality and quantity of effluent introduced and any anticipated impact of the change on the quantity or quality of the effluent to be discharged.

The Permittee shall provide a report briefly describing the permittee's pretreatment activities and an updated listing of the Permittee's significant industrial users. The list should specify which categorical pretreatment standards, if any, are applicable to each Industrial User. Permittees who operate multiple plants may provide a single report. Such report shall be submitted within six (6) months of the effective date of this Permit to the following addresses:

U.S. Environmental Protection Agency
Region 5
77 West Jackson Blvd.
Chicago, Illinois 60604
Attention: Water Assurance Branch Enforcement and Compliance

Illinois Environmental Protection Agency
Division of Water Pollution Control
Attention: Compliance Assurance Section, Mail Code #19
1021 North Grand Avenue East
Post Office Box 19276
Springfield, Illinois 62794-9276

SPECIAL CONDITION 11. The Permittee shall conduct biomonitoring of the effluent from Discharge Number(s) 001.

Biomonitoring

A. Acute Toxicity - Standard definitive acute toxicity tests shall be run on at least two trophic levels of aquatic species (fish, invertebrate) representative of the aquatic community of the receiving stream. Testing must be consistent with Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms (Fifth Ed.) EPA/821-R-02-012. Unless substitute tests are pre-approved; the following tests are required:

  1. Fish 96-hour static LC_{50} Bioassay using fathead minnows (*Pimephales promelas*).

  2. Invertebrate 48-hour static LC_{50} Bioassay using *Ceriodaphnia*.

B. Testing Frequency - The above tests shall be conducted using 24-hour composite samples unless otherwise authorized by the IEPA. Sample collection and testing must be conducted in the 18th, 15th, 12th, and 9th month prior to the expiration date of this Permit. When possible, bioassay sample collection should coincide with sample collection for metals analysis or other parameters that may contribute to effluent toxicity.

C. Reporting - Results shall be reported according to EPA/821-R-02-012, Section 12, Report Preparation, and shall be mailed to IEPA, Bureau of Water, Compliance Assurance Section or emailed to EPA.PrmtSpecCondtns@Illinois.gov within one week of receipt from the laboratory. Reports are due to the IEPA no later than the 16th, 13th, 10th, and 7th month prior to the expiration date of this Permit.

D. Toxicity – Should a bioassay result in toxicity to >20% of organisms tested in the 100% effluent treatment, the IEPA may require, upon notification, six (6) additional rounds of monthly testing on the affected organism(s) to be initiated within 30 days of the toxic bioassay. Results shall be submitted to IEPA within one (1) week of becoming available to the Permittee. Should any of the additional bioassays result in toxicity to ≥50% of organisms tested in the 100% effluent treatments, the Permittee must contact the IEPA within one (1) day of the results becoming available to the Permittee and begin the toxicity identification and reduction evaluation process as outlined below.

E. Toxicity Identification and Reduction Evaluation - Should any of the additional bioassays result in toxicity to ≥50% of organisms tested in the 100% effluent treatment, the Permittee must contact the IEPA within one (1) day of the results becoming available to the Permittee and begin the toxicity identification evaluation process in accordance with Methods for Aquatic Toxicity Identification Evaluations, EPA/600/6-91/003. The IEPA may also require, upon notification, that the Permittee prepare a plan for toxicity reduction evaluation to be developed in accordance with Toxicity Reduction Evaluation Guidance for Municipal Wastewater Treatment Plants, EPA/833B-99/002, which shall include an evaluation to determine which chemicals have a potential for being discharged in the plant wastewater, a monitoring program to determine their presence or absence and to identify other compounds which are not being removed by treatment, and other measures as appropriate. The Permittee shall submit to the IEPA its plan for toxicity reduction evaluation within ninety (90) days following notification by the IEPA. The Permittee shall implement the plan within ninety (90) days or other such date as contained in a notification letter received from the IEPA.

The IEPA may modify this Permit during its term to incorporate additional requirements or limitations based on the results of the biomonitoring. In addition, after review of the monitoring results, the IEPA may modify this Permit to include numerical limitations for specific toxic pollutants. Modifications under this condition shall follow public notice and opportunity for hearing.

SPECIAL CONDITION 12. The Permittee shall work towards the goals of achieving no discharges from sanitary sewer overflows or basement back-ups and ensuring that overflows or back-ups, when they do occur do not cause or contribute to violations of applicable standards or cause impairment in any adjacent receiving water. Overflows from sanitary sewers are expressly prohibited by this permit and by Ill. Adm. Code 306.304. As part of the process to ultimately achieve compliance through the elimination of and mitigating the adverse impacts of any such overflows if they do occur, the Permittee shall (A) identify and report to IEPA all SSOs that do occur, and (B) update the existing Capacity, Management, Operations, and Maintenance (CMOM) plan at least annually and maintain it at the facility for review during Agency Field Operations Section inspections. The Permittee shall submit copies of the CMOM to the IEPA upon written request. The Permittee shall modify the Plan to incorporate any comments that it receives from IEPA and shall implement the modified plan as soon as possible. The Permittee should work as appropriate, in consultation with affected authorities at the local, county, and/or state level to develop the plan components involving third party notification of overflow events. The Permittee may be required to construct additional sewage transport and/or treatment facilities in future permits or other enforceable documents should the implemented CMOM plan indicate that the Permittee's facilities are not capable of conveying and treating the flow for which they are designed.

The CMOM plan shall include the following elements:

A. Measures and Activities:

  1. A complete map and system inventory for the collection system owned and operated by the Permittee;

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2. Organizational structure; budgeting; training of personnel; legal authorities; schedules for maintenance, sewer system cleaning, and preventative rehabilitation; checklists, and mechanisms to ensure that preventative maintenance is performed on equipment owned and operated by the Permittee;
3. Documentation of unplanned maintenance;
4. An assessment of the capacity of the collection and treatment system owned and operated by the Permittee at critical junctions and immediately upstream of locations where overflows and backups occur or are likely to occur; use flow monitoring and/or sewer hydraulic modeling, as necessary;
5. Identification and prioritization of structural deficiencies in the system owned and operated by the Permittee. Include preventative maintenance programs to prevent and/or eliminate collection system blockages from roots or grease, and prevent corrosion or negative effects of hydrogen sulfide which may be generated within collection system;
6. Operational control, including documented system control procedures, scheduled inspections and testing, list of scheduled frequency of cleaning (and televising as necessary) of sewers;
7. The Permittee shall develop and implement an Asset Management strategy to ensure the long-term sustainability of the collection system. Asset Management shall be used to assist the Permittee in making decisions on when it is most appropriate to repair, replace or rehabilitate particular assets and develop long-term funding strategies; and
8. Asset Management shall include but is not limited to the following elements:
    a. Asset Inventory and State of the Asset;
    b. Level of Service;
    c. Critical Asset Identification;
    d. Life Cycle Cost; and
    e. Long-Term Funding Strategy.

B. Design and Performance Provisions:

1. Monitor the effectiveness of CMOM;
2. Upgrade the elements of the CMOM plan as necessary; and
3. Maintain a summary of CMOM activities.

C. Overflow Response Plan:

1. Know where overflows and back-ups within the facilities owned and operated by the Permittee occur;
2. Respond to each overflow or back-up to determine additional actions such as clean up; and
3. Locations where basement back-ups and/or sanitary sewer overflows occur shall be evaluated as soon as practicable for excessive inflow/infiltration, obstructions or other causes of overflows or back-ups as set forth in the System Evaluation Plan.
4. Identify the root cause of the overflow or basement backup, and document to files;
5. Identify actions or remediation efforts to reduce risk of reoccurrence of these overflows or basement backups in the future, and document to files.

D. System Evaluation Plan:

1. Summary of existing SSO and Excessive I/I areas in the system and sources of contribution;
2. Evaluate plans to reduce I/I and eliminate SSOs;
3. Evaluate the effectiveness and performance in efforts to reduce excessive I/I in the collection system;
4. Special provisions for Pump Stations and force mains and other unique system components; and
5. Construction plans and schedules for correction.

E. Reporting and Monitoring Requirements:

1. Program for SSO detection and reporting; and
2. Program for tracking and reporting basement back-ups, including general public complaints.

F. Third Party Notice Plan:

1. Describes how, under various overflow scenarios, the public, as well as other entities, would be notified of overflows within the Permittee's system that may endanger public health, safety or welfare;
2. Identifies overflows within the Permittee's system that would be reported, giving consideration to various types of events including events with potential widespread impacts;
3. Identifies who shall receive the notification;
4. Identifies the specific information that would be reported including actions that will be taken to respond to the overflow;
5. Includes a description of the lines of communication; and
6. Includes the identities and contact information of responsible POTW officials and local, county, and/or state level officials.

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For additional information concerning USEPA CMOM guidance and Asset Management please refer to the following web site addresses. http://www.epa.gov/npdes/pubs/cmom_guide_for_collection_systems.pdf and http://water.epa.gov/type/watersheds/wastewater/upload/guide_smallsystems_assetmanagement_bestpratices.pdf

SPECIAL CONDITION 13. For the duration of this Permit, the Permittee shall determine the quantity of sludge produced by the treatment facility in dry tons or gallons with average percent total solids analysis. The Permittee shall maintain adequate records of the quantities of sludge produced and have said records available for U.S. EPA and IEPA inspection. The Permittee shall submit to the IEPA, at a minimum, a semi-annual summary report of the quantities of sludge generated and disposed of, in units of dry tons or gallons (average total percent solids) by different disposal methods including but not limited to application on farmland, application on reclamation land, landfilling, public distribution, dedicated land disposal, sod farms, storage lagoons or any other specified disposal method. Said reports shall be submitted to the IEPA by January 31 and July 31 of each year reporting the preceding January thru June and July thru December interval of sludge disposal operations.
Duty to Mitigate. The Permittee shall take all reasonable steps to minimize any sludge use or disposal in violation of this Permit.

Sludge monitoring must be conducted according to test procedures approved under 40 CFR 136 unless otherwise specified in 40 CFR 503, unless other test procedures have been specified in this Permit.

Planned Changes. The Permittee shall give notice to the IEPA on the semi-annual report of any changes in sludge use and disposal.

The Permittee shall retain records of all sludge monitoring, and reports required by the Sludge Permit as referenced in Standard Condition 25 for a period of at least five (5) years from the date of this Permit.

If the Permittee monitors any pollutant more frequently than required by this permit or the Sludge Permit, the results of this monitoring shall be included in the reporting of data submitted to the IEPA.

The Permittee shall comply with existing federal regulations governing sewage sludge use or disposal and shall comply with all existing applicable regulations in any jurisdiction in which the sewage sludge is actually used or disposed.

The Permittee shall comply with standards for sewage sludge use or disposal established under section 405(d) of the CWA within the time provided in the regulations that establish the standards for sewage sludge use or disposal even if the permit has not been modified to incorporate the requirement.

The Permittee shall ensure that the applicable requirements in 40 CFR Part 503 are met when the sewage sludge is applied to the land, placed on a surface disposal site, or fired in a sewage sludge incinerator.

Monitoring reports for sludge shall be reported on the form titled "Sludge Management Reports" to the following address:

Illinois Environmental Protection Agency
Bureau of Water
Compliance Assurance Section
Mail Code #19
1021 North Grand Avenue East
Post Office Box 19276
Springfield, Illinois 62794-9276

SPECIAL CONDITION 14. For Discharge No. 001, any use of chlorine to control slime growths, odors or as an operational control, etc. shall not exceed the limit of 0.038 mg/L (daily maximum) total residual chlorine in the effluent. Sampling is required on a daily grab basis during the chlorination process. Reporting shall be submitted on the DMR's on a monthly basis.

SPECIAL CONDITION 15. Fecal Coliform limits for Discharge Number 001 are effective May thru October. Sampling of Fecal Coliform is only required during this time period.

SPECIAL CONDITION 16. During January of each year the Permittee shall submit annual fiscal data regarding sewerage system operations to the Illinois Environmental Protection Agency/Division of Water Pollution Control/Compliance Assurance Section. The Permittee may use any fiscal year period provided the period ends within twelve (12) months of the submission date.

Submission shall be on forms provided by IEPA titled "Fiscal Report Form For NPDES Permittees".

SPECIAL CONDITION 17. Consistent with permit modification procedures in 40 CFR 122.62 and 63, this Permit may be modified to include requirements for the Permittee on a continuing basis to evaluate and detail its efforts to effectively control sources of infiltration and inflow into the sewer system and to submit reports to the IEPA if necessary.

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SPECIAL CONDITION 18. The Agency has determined that the Permittee's treatment plant effluent is located upstream of a waterbody or stream segment that has been determined to have a phosphorus related impairment. This determination was made upon reviewing available information concerning the characteristics of the relevant waterbody/segment and the relevant facility (such as quantity of discharge flow and nutrient load relative to the stream flow).

A phosphorus related impairment means that the downstream waterbody or segment is listed by the Agency as impaired due to dissolved oxygen and/or offensive condition (algae and/or aquatic plant growth) impairments that is related to excessive phosphorus levels.

The Permittee shall develop, or be a part of a watershed group that develops, a Nutrient Assessment Reduction Plan (NARP) that will meet the following requirements:

A. The NARP shall be developed and submitted to the Agency by December 31, 2024. This requirement can be accomplished by the Permittee, by participation in an existing watershed group or by creating a new group. The NARP shall be supported by data and sound scientific rationale.
B. The Permittee shall cooperate with and work with other stakeholders in the watershed to determine the most cost-effective means to address the phosphorus related impairment. If other stakeholders in the watershed will not cooperate in developing the NARP, the Permittee shall develop its own NARP for submittal to the Agency to comply with this condition.
C. In determining the target levels of various parameters necessary to address the phosphorus related impairment, the NARP shall either utilize the recommendations by the Nutrient Science Advisory Committee or develop its own watershed-specific target levels.
D. The NARP shall identify phosphorus input reductions by point source discharges and non-point source discharges in addition to other measures necessary to remove phosphorus related impairments in the watershed. The NARP may determine, based on an assessment of relevant data, that the watershed does not have an impairment related to phosphorus, in which case phosphorus input reductions or other measures would not be necessary. Alternatively, the NARP could determine that phosphorus input reductions from point sources are not necessary, or that phosphorus input reductions from both point and nonpoint sources are necessary, or that phosphorus input reductions are not necessary and that other measures, besides phosphorus input reductions, are necessary._
E. The NARP shall include a schedule for the implementation of the phosphorus input reductions by point sources, non-point sources and other measures necessary to remove phosphorus related impairments. The NARP schedule shall be implemented as soon as possible, and shall identify specific timelines applicable to the Permittee.
F. The NARP can include provisions for water quality trading to address the phosphorus related impairments in the watershed. Phosphorus/Nutrient trading cannot result in violations of water quality standards or applicable antidegradation requirements.
G. The Permittee shall request modification of the permit within 90 days after the NARP has been completed to include necessary phosphorus input reductions identified within the NARP. The Agency will modify the NPDES permit, if necessary.
H. If the Permittee does not develop or assist in developing the NARP, and such a NARP is developed for the watershed, the Permittee will become subject to effluent limitations necessary to address the phosphorus related impairments. The Agency shall calculate these effluent limits by using the NARP and any applicable data. If no NARP has been developed, the effluent limits shall be determined for the Permittee on a case-by-case basis, so as to ensure that the Permittee's discharge will not cause or contribute to violations of the dissolved oxygen or narrative water quality standards.

SPECIAL CONDITION 19.

A. Subject to paragraph B below, an effluent limit of 0.5 mg/L Total Phosphorus 12 month rolling geometric mean (calculated monthly) basis (hereinafter "Limit"), shall be met by the Permittee by January 1, 2030, unless the Permittee demonstrates that meeting such Limit is not technologically or economically feasible in one of the following manners:
    1. the Limit is not technologically feasible through the use of biological phosphorus removal (BPR) process(es) at the treatment facility; or
    2. the Limit would result in substantial and widespread economic or social impact. Substantial and widespread economic impacts must be demonstrated using applicable USEPA guidance, including but not limited to any of the following documents:
        a. Interim Economic Guidance for Water Quality Standards, March 1995, EPA-823-95-002;
        b. Combined Sewer Overflows – Guidance for Financial Capability Assessment and Schedule Development, February 1997, EPA-832—97-004;
        c. Financial Capability Assessment Framework for Municipal Clean Water Act Requirements, November 24, 2014; and
        d. any additional USEPA guidance on affordability issues that revises, supplements or replaces those USEPA guidance documents; or
    3. the Limit can only be met by chemical addition for phosphorus removal at the treatment facility in addition to those processes currently contemplated; or
    4. the Limit is demonstrated not to be feasible by January 1, 2030, but is feasible within a longer timeline, then the Limit shall be met as soon feasible and approved by the Agency; or
    5. the Limit is demonstrated not to be achievable, then an effluent limit that is achievable by the Permittee (along with associated timeline) will apply instead, except that the effluent limit shall not exceed 0.6 mg/L Total Phosphorus 12 month rolling geometric

mean (calculated monthly).

B. The Limit shall be met by the Permittee by January 1, 2030, except in the following circumstances:
   1. If the Permittee develops a written plan, preliminary engineering report or facility plan no later than January 1, 2025, to rebuild or replace the secondary treatment process(es) of the treatment facility, the Limit shall be met by December 31, 2035; or
   2. If the Permittee decides to construct/operate biological nutrient removal (BNR) process(es), incorporating nitrogen reduction, the Limit shall be met by December 31, 2035; or
   3. If the Permittee decides to use chemical addition for phosphorus removal instead of BPR, the Limit and the effluent limit of 1.0 mg/L Total Phosphorus monthly average shall be met by December 31, 2025; or
   4. If the Permittee has already installed chemical addition for phosphorus removal instead of BPR, and has a 1.0 mg/L Total Phosphorus monthly average effluent limit in its permit, or the Permittee is planning to install chemical addition with an IEPA construction permit that is issued on or before July 31, 2018, the 1.0 mg/L Total Phosphorus monthly average effluent limit (and associated compliance schedule) shall apply, and the Limit shall not be applicable.
   5. The NARP determines that a limit lower than the Limit is necessary and attainable. The lower limit and timeline identified in the NARP shall apply to the Permittee.

C. The Permittee shall identify and provide adequate justification of any exception identified in paragraph A or circumstance identified in paragraph B, regarding meeting the Limit. The justification shall be submitted to the Agency at the time of renewal of this permit or by December 31, 2023, whichever date is first. Any justification or demonstration performed by the Permittee pursuant to paragraph A or circumstance pursuant to paragraph B must be reviewed and approved by the Agency. The Agency will renew or modify the NPDES permit as necessary.

D. For purposes of this permit, the following definitions are used:
   1. BPR (Biological Phosphorus Removal) is defined herein as treatment processes which do not require use of supplemental treatment processes at the treatment facilities before or after the biological system, such as but not limited to, chemical addition, carbon supplementation, fermentation, or filtration. The use of filtration or additional equipment to meet other effluent limits is not prohibited, but those processes will not be considered part of the BPR process for purposes of this permit; and
   2. BNR (Biological Nutrient Removal) is defined herein as treatment processes used for nitrogen and phosphorus removal from wastewater before it is discharged. BNR treatment processes, as defined herein, do not require use of supplemental treatment processes at the treatment facilities before or after the biological system, such as but not limited to, chemical addition, carbon supplementation, fermentation or filtration. The use of filtration or additional equipment to meet other effluent limits is not prohibited, but those processes will not be considered part of the BNR process for purposes of this permit.

E. The 0.5 mg/L Total Phosphorus 12 month rolling geometric mean (calculated monthly) effluent limit applies to the effluent from the treatment plant.

SPECIAL CONDITION 20. The Permittee shall maintain and implement a Phosphorus Discharge Optimization Plan. The plan shall include a schedule for the implementation of these optimization measures. Annual progress reports on the optimization of the existing treatment facilities shall be submitted electronically to EPA.PrmtSpecCondtns@illinois.gov with "IL0029238 Special Condition 20" as the subject of the email by March 31 of each year. As part of the plan, the Permittee shall evaluate a range of measures for reducing phosphorus discharges from the treatment plant, including possible source reduction measures, operational improvements, and minor facility modifications that will optimize reductions in phosphorus discharges from the wastewater treatment facility. The Permittee's evaluation shall include, but not be limited to, an evaluation of the following optimization measures:

A. WWTF influent reduction measures.
   1. Evaluate the phosphorus reduction potential of users.
   2. Determine which sources have the greatest opportunity for reducing phosphorus (i.e., industrial, commercial, institutional, municipal and others).
      a. Determine whether known sources (i.e., restaurant and food preparation) can adopt phosphorus minimization and water conservation plans.
      b. Evaluate implementation of local limits on influent sources of excessive phosphorus.
B. WWTF effluent reduction measures.
   1. Reduce phosphorus discharges by optimizing existing treatment processes.
      a. Adjust the solids retention time for either nitrification, denitrification, or biological phosphorus removal.
      b. Adjust aeration rates to reduce dissolved oxygen and promote simultaneous nitrification-denitrification.
      c. Add baffles to existing units to improve microorganism conditions by creating divided anaerobic, anoxic, and aerobic zones.
      d. Change aeration settings in plug flow basins by turning off air or mixers at the inlet side of the basin system.
      e. Minimize impact on recycle streams by improving aeration within holding tanks.
      f. Reconfigure flow through existing basins to enhance biological nutrient removal.
      g. Increase volatile fatty acids for biological phosphorus removal.

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SPECIAL CONDITION 21. The Permittee has undergone a Monitoring Reduction review and the influent and effluent sample frequency has been reduced for parameters due to sustained compliance. The IEPA may require that the influent and effluent sampling frequency for these parameters be increased without Public Notice. This provision does not limit EPA's authority to require additional monitoring, information or studies pursuant to Section 308 of the CWA.

Attachment H

Standard Conditions

Definitions

Act means the Illinois Environmental Protection Act, 415 ILCS 5 as Amended.

Agency means the Illinois Environmental Protection Agency.

Board means the Illinois Pollution Control Board.

Clean Water Act (formerly referred to as the Federal Water Pollution Control Act) means Pub. L 92-500, as amended. 33 U.S.C. 1251 et seq.

NPDES (National Pollutant Discharge Elimination System) means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 402, 318 and 405 of the Clean Water Act.

USEPA means the United States Environmental Protection Agency.

Daily Discharge means the discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurements, the "daily discharge" is calculated as the average measurement of the pollutant over the day.

Maximum Daily Discharge Limitation (daily maximum) means the highest allowable daily discharge.

Average Monthly Discharge Limitation (30 day average) means the highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

Average Weekly Discharge Limitation (7 day average) means the highest allowable average of daily discharges over a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week.

Best Management Practices (BMPs) means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the State. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Aliquot means a sample of specified volume used to make up a total composite sample.

Grab Sample means an individual sample of at least 100 milliliters collected at a randomly-selected time over a period not exceeding 15 minutes.

24-Hour Composite Sample means a combination of at least 8 sample aliquots of at least 100 milliliters, collected at periodic intervals during the operating hours of a facility over a 24-hour period.

8-Hour Composite Sample means a combination of at least 3 sample aliquots of at least 100 milliliters, collected at periodic intervals during the operating hours of a facility over an 8-hour period.

Flow Proportional Composite Sample means a combination of sample aliquots of at least 100 milliliters collected at periodic intervals such that either the time interval between each aliquot or the volume of each aliquot is proportional to either the stream flow at the time of sampling or the total stream flow since the collection of the previous aliquot.

(1) **Duty to comply.** The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Act and is grounds for enforcement action, permit termination, revocation and reissuance, modification, or for denial of a permit renewal application. The permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions, even if the permit has not yet been modified to incorporate the requirements.

(2) **Duty to reapply.** If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit. If the permittee submits a proper application as required by the Agency no later than 180 days prior to the expiration date, this permit shall continue in full force and effect until the final Agency decision on the application has been made.

(3) **Need to halt or reduce activity not a defense.** It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

(4) **Duty to mitigate.** The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

(5) **Proper operation and maintenance.** The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up, or auxiliary facilities, or similar systems only when necessary to achieve compliance with the conditions of the permit.

(6) **Permit actions.** This permit may be modified, revoked and reissued, or terminated for cause by the Agency pursuant to 40 CFR 122.62 and 40 CFR 122.63. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

(7) **Property rights.** This permit does not convey any property rights of any sort, or any exclusive privilege.

(8) **Duty to provide information.** The permittee shall furnish to the Agency within a reasonable time, any information which the Agency may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with the permit. The permittee shall also furnish to the Agency upon request, copies of records required to be kept by this permit.

(9) **Inspection and entry.** The permittee shall allow an authorized representative of the Agency or USEPA (including an authorized contractor acting as a representative of the Agency or USEPA), upon the presentation of credentials and other documents as may be required by law, to:

- (a) Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

(b) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

(c) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

(d) Sample or monitor at reasonable times, for the purpose of assuring permit compliance, or as otherwise authorized by the Act, any substances or parameters at any location.

(10) **Monitoring and records.**

(a) Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

(b) The permittee shall retain records of all monitoring information, including all calibration and maintenance records, and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of this permit, measurement, report or application. Records related to the permittee's sewage sludge use and disposal activities shall be retained for a period of at least five years (or longer as required by 40 CFR Part 503). This period may be extended by request of the Agency or USEPA at any time.

(c) Records of monitoring information shall include:

(1) The date, exact place, and time of sampling or measurements;
(2) The individual(s) who performed the sampling or measurements;
(3) The date(s) analyses were performed;
(4) The individual(s) who performed the analyses;
(5) The analytical techniques or methods used; and
(6) The results of such analyses.

(d) Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit. Where no test procedure under 40 CFR Part 136 has been approved, the permittee must submit to the Agency a test method for approval. The permittee shall calibrate and perform maintenance procedures on all monitoring and analytical instrumentation at intervals to ensure accuracy of measurements.

(11) **Signatory requirement.** All applications, reports or information submitted to the Agency shall be signed and certified.

(a) **Application.** All permit applications shall be signed as follows:

(1) For a corporation: by a principal executive officer of at least the level of vice president or a person or position having overall responsibility for environmental matters for the corporation:
(2) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or
(3) For a municipality, State, Federal, or other public agency: by either a principal executive officer or ranking elected official.

(b) **Reports.** All reports required by permits, or other information requested by the Agency shall be signed by a person described in paragraph (a) or by a duly authorized representative of that person. A person is a duly authorized representative only if:

(1) The authorization is made in writing by a person described in paragraph (a); and
(2) The authorization specifies either an individual or a position responsible for the overall operation of the facility, from which the discharge originates, such as a plant manager, superintendent or person of equivalent responsibility; and
(3) The written authorization is submitted to the Agency.

(c) **Changes of Authorization.** If an authorization under (b) is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of (b) must be submitted to the Agency prior to or together with any reports, information, or applications to be signed by an authorized representative.

(d) **Certification.** Any person signing a document under paragraph (a) or (b) of this section shall make the following certification:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

(12) **Reporting requirements.**

(a) **Planned changes.** The permittee shall give notice to the Agency as soon as possible of any planned physical alterations or additions to the permitted facility.
Notice is required when:

(1) The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source pursuant to 40 CFR 122.29 (b); or
(2) The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements pursuant to 40 CFR 122.42 (a)(1).
(3) The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan.

(b) **Anticipated noncompliance.** The permittee shall give advance notice to the Agency of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

(c) **Transfers.** This permit is not transferable to any person except after notice to the Agency.

(d) **Compliance schedules.** Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date.

(e) **Monitoring reports.** Monitoring results shall be reported at the intervals specified elsewhere in this permit.

(1) Monitoring results must be reported on a Discharge Monitoring Report (DMR).
(2) If the permittee monitors any pollutant more frequently than required by the permit, using test procedures approved under 40 CFR 136 or as specified in the permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR.
(3) Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified by the Agency in the permit.

(f) **Twenty-four hour reporting**. The permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24-hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and time; and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. The following shall be included as information which must be reported within 24-hours:

(1) Any unanticipated bypass which exceeds any effluent limitation in the permit.

(2) Any upset which exceeds any effluent limitation in the permit.

(3) Violation of a maximum daily discharge limitation for any of the pollutants listed by the Agency in the permit or any pollutant which may endanger health or the environment.

The Agency may waive the written report on a case-by-case basis if the oral report has been received within 24-hours.

(g) **Other noncompliance**. The permittee shall report all instances of noncompliance not reported under paragraphs (12) (d), (e), or (f), at the time monitoring reports are submitted. The reports shall contain the information listed in paragraph (12) (f).

(h) **Other information**. Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application, or in any report to the Agency, it shall promptly submit such facts or information.

(13) **Bypass.**

(a) Definitions.

(1) Bypass means the intentional diversion of waste streams from any portion of a treatment facility.

(2) Severe property damage means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

(b) Bypass not exceeding limitations. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs (13)(c) and (13)(d).

(c) Notice.

(1) Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least ten days before the date of the bypass.

(2) Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in paragraph (12)(f) (24-hour notice).

(d) Prohibition of bypass.

(1) Bypass is prohibited, and the Agency may take enforcement action against a permittee for bypass, unless:

(i) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

(ii) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

(iii) The permittee submitted notices as required under paragraph (13)(c).

(2) The Agency may approve an anticipated bypass, after considering its adverse effects, if the Agency determines that it will meet the three conditions listed above in paragraph (13)(d)(1).

(14) **Upset.**

(a) Definition. Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

(b) Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of paragraph (14)(c) are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

(c) Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

(1) An upset occurred and that the permittee can identify the cause(s) of the upset;

(2) The permitted facility was at the time being properly operated; and

(3) The permittee submitted notice of the upset as required in paragraph (12)(f)(2) (24-hour notice).

(4) The permittee complied with any remedial measures required under paragraph (4).

(d) Burden of proof. In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.

(15) **Transfer of permits**. Permits may be transferred by modification or automatic transfer as described below:

(a) Transfers by modification. Except as provided in paragraph (b), a permit may be transferred by the permittee to a new owner or operator only if the permit has been modified or revoked and reissued pursuant to 40 CFR 122.62 (b) (2), or a minor modification made pursuant to 40 CFR 122.63 (d), to identify the new permittee and incorporate such other requirements as may be necessary under the Clean Water Act.

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
1021 NORTH GRAND AVENUE EAST, P.O. BOX 19276, SPRINGFIELD, ILLINOIS 62794-9276 · (217) 782-3397
JB PRITZKER, GOVERNOR JOHN J. KIM, DIRECTOR

217/782-0610
July 16, 2020

Village of Huntley
10987 Main Street
Huntley, Illinois 60142

Re: Village of Huntley
Huntley – West WWTP
NPDES Permit No. IL0070688
Bureau ID W1110350003
Final Permit

Gentlemen:

Attached is the final NPDES Permit for your discharge. The Permit as issued covers discharge limitations, monitoring, and reporting requirements. Failure to meet any portion of the Permit could result in civil and/or criminal penalties. The Illinois Environmental Protection Agency is ready and willing to assist you in interpreting any of the conditions of the Permit as they relate specifically to your discharge.

The following changes have been made to the permit since the public notice period.

1. The total residual chlorine limit for outfall 001 has been reduced to 0.038 mg/L.
2. A total phosphorus (as P) limit of 0.5 mg/L will be required for outfall 001 upon completion of Phase 4 as found on page 4 of the permit
3. Language was updated in Special Condition 15 to include annual reporting on the progress of Phase 4.
4. Language was updated in Special Condition 17 to include reference to Attachment H Standard Conditions (12) (f).
5. Language was updated to Special Condition 18, the Phosphorus Discharge Optimization Plan to recognize the original submittal to the Agency and annual progress reports.

Pursuant to the Final NPDES Electronic Reporting Rule, all permittees must report DMRs electronically unless a waiver has been granted by the Agency. The Agency utilizes NetDMR, a web based application, which allows the submittal of electronic Discharge Monitoring Reports instead of paper Discharge Monitoring Reports (DMRs). More information regarding NetDMR can be found on the Agency website, https:www2.illinois.gov/epa/topics/water-quality/surface-water/netdmr/pages/quick-answer-guide.aspx. If your facility has received a waiver from the NetDMR program, a supply of preprinted paper DMR Forms will be sent to your facility. Additional information and instructions will accompany the preprinted DMRs. Please see the attachment regarding the electronic reporting rule.

The attached Permit is effective as of the date indicated on the first page of the Permit. Until the effective date of any re-issued Permit, the limitations and conditions of the previously-issued Permit remain in full effect. You have the right to appeal any condition of the Permit to the Illinois Pollution Control Board within a 35 day period following the issuance date.

Should you have questions concerning the Permit, please contact Corey Branson at 217/782-0610.

Sincerely,

Amy L. Dragovich, P.E.
Manager, Permit Section
Division of Water Pollution Control

ALD:CWB:19042501.cwb

Attachments: Final Permit

cc:
Records Unit
Des Plaines FOS
Compliance Assurance Section
Billing
USEPA (via e-mail)
CMAP
DRSCW/The Conservation Foundation

NPDES Permit No. IL0070688

Illinois Environmental Protection Agency

Division of Water Pollution Control

1021 North Grand Avenue East

Post Office Box 19276

Springfield, Illinois 62794-9276

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

Reissued (NPDES) Permit

Expiration Date: July 31, 2025

Issue Date: July 16, 2020
Effective Date: August 1, 2020

Name and Address of Permittee:
Village of Huntley
10987 Main Street
Huntley, Illinois 60142

Facility Name and Address:
Huntley - West WWTP
12603 West Main Street
Huntley, Illinois 60142
(McHenry County)

Receiving Waters: East Fork of the South Branch Kishwaukee River

In compliance with the provisions of the Illinois Environmental Protection Act, Title 35 of the Ill. Adm. Code, Subtitle C, Chapter I, and the Clean Water Act (CWA), the above-named Permittee is hereby authorized to discharge at the above location to the above-named receiving stream in accordance with the Effluent Limitations, Monitoring, and Reporting requirements; Special Conditions and Attachment H Standard Conditions attached herein.

Permittee is not authorized to discharge after the above expiration date. In order to receive authorization to discharge beyond the expiration date, the Permittee shall submit the proper application as required by the Illinois Environmental Protection Agency (IEPA) not later than 180 days prior to the expiration date.

Amy L. Dragovich

Amy L. Dragovich, P.E.
Manager, Permit Section
Division of Water Pollution Control

ALD:CWB:19042501.cwb

NPDES Permit No. IL0070688

Effluent Limitations, Monitoring, and Reporting

FINAL

Discharge Number(s) and Name(s): 001 STP Outfall (Existing facility – Phase 3)

Load limits computed based on a design average flow (DAF) of 2.6 MGD (design maximum flow (DMF) of 6.5 MGD).

From the effective date of this Permit until the operation of the expanded facility or expiration date whichever comes first, the effluent of the above discharge(s) shall be monitored and limited at all times as follows:

	LOAD LIMITS lbs/day* DAF (DMF)*			CONCENTRATION LIMITS mg/L				
Parameter	Monthly Average	Weekly Average	Daily Maximum	Monthly Average	Weekly Average	Daily Maximum	Sample Frequency	Sample Type
Flow (MGD)							Continuous	
$CBOD_5$**, ****	217(542)		434(1084)	10		20	1 Day/Week	Composite
Suspended Solids****	260(651)		520(1301)	12		24	1 Day/Week	Composite
pH	Shall be in the range of 6 to 9 Standard Units						1 Day/Week	Grab
Fecal Coliform***	Daily Maximum shall not exceed 400 per 100 mL (May through October)						1 Day/Week	Grab
Chlorine Residual***						0.038	***	Grab
Ammonia Nitrogen: As (N)								
April-May/Sept.-Oct.	26(65)	82(206)	102(255)	1.2	3.8	4.7	1 Day/Week	Composite
June-August	26(65)	76(190)	102(255)	1.2	3.5	4.7	1 Day/Week	Composite
Nov.-Feb.	33(81)		111(276)	1.5		5.1	1 Day/Week	Composite
March	33(81)	82(206)	102(255)	1.5	3.8	4.7	1 Day/Week	Composite
Total Phosphorus (as P)	22(54)			1.0			1 Day/Week	Composite
Total Nitrogen (as N)	Monitor only						1 Day/Month	Composite
				Monthly Average not less than	Weekly Average not less than	Daily Minimum		
Dissolved Oxygen								
March-July				N.A.	6.25	5.0	3 Days/Week	Grab
August-February				6.0	4.5	4.0	3 Days/Week	Grab

*Load limits based on design maximum flow shall apply only when flow exceeds design average flow.

**Carbonaceous BOD_5 ($CBOD_5$) testing shall be in accordance with 40 CFR 136.

***See Special Condition 9.

**** BOD_5 and Suspended Solids (85% removal required): In accordance with 40 CFR 133, the 30-day average percent removal shall not be less than 85 percent. The percent removal need not be reported to the IEPA on DMRs but influent and effluent data must be available, as required elsewhere in this Permit, for IEPA inspection and review. For measuring compliance with this requirement, 5 mg/L shall be added to the effluent $CBOD_5$ concentration to determine the effluent BOD_5 concentration. Percent removal is a percentage expression of the removal efficiency across a treatment plant for a given pollutant parameter, as determined from the 30-day average values of the raw wastewater influent concentrations to the facility and the 30-day average values of the effluent pollutant concentrations for a given time period.

Total Phosphorus shall be reported on the DMR as a daily maximum and monthly average value.

Effluent Limitations, Monitoring, and Reporting

FINAL

Discharge Number(s) and Name(s): 001 STP Outfall (Existing facility – Phase 3) (continued)

Flow shall be reported on the Discharge Monitoring Report (DMR) as monthly average and daily maximum.

Fecal Coliform shall be reported on the DMR as a daily maximum value.

pH shall be reported on the DMR as minimum and maximum value.

Chlorine Residual shall be reported on the DMR as daily maximum value.

Dissolved oxygen shall be reported on the DMR as a minimum value.

Total Nitrogen shall be reported on the DMR as monthly average and daily maximum value. Total Nitrogen is the sum total of Total Kjeldahl Nitrogen, Nitrate, and Nitrite.

Effluent Limitations, Monitoring, and Reporting

FINAL

Discharge Number(s) and Name(s): 001 STP Outfall (Expanded facility - Phase 4)

Load limits computed based on a design average flow (DAF) of 4.9 MGD (design maximum flow (DMF) of 11.0 MGD).

From the operational date of the Phase 4 expansion until the expiration date of this permit, the effluent of the above discharge shall be monitored and limited at all times as follows:

	LOAD LIMITS lbs/day* DAF (DMF)			CONCENTRATION LIMITS mg/L				
Parameter	Monthly Average	Weekly Average	Daily Maximum	Monthly Average	Weekly Average	Daily Maximum	Sample Frequency	Sample Type
Flow (MGD)							Continuous	
CBOD$_5$**, ****	409(917)		817(1835)	10		20	3 Days/Week	Composite
Suspended Solids****	490(1101)		981(2202)	12		24	3 Days/Week	Composite
pH	Shall be in the range of 6 to 9 Standard Units						3 Days/Week	Grab
Fecal Coliform***	Daily Maximum shall not exceed 400 per 100 mL (May through October)						3 Days/Week	Grab
Chlorine Residual***						0.038	***	Grab
Ammonia Nitrogen: As (N)								
April-May/Sept.-Oct.	49(110)	155(349)	192(431)	1.2	3.8	4.7	3 Days/Week	Composite
June-August	49(110)	143(321)	192(431)	1.2	3.5	4.7	3 Days/Week	Composite
Nov.-Feb.	61(138)		208(468)	1.5		5.1	3 Days/Week	Composite
March	61(138)	155(349)	192(431)	1.5	3.8	4.7	3 Days/Week	Composite
Total Phosphorus (as P)	20(46)			0.5			3 Days/Week	Composite
Total Nitrogen (as N)	Monitor only						3 Days/Week	Composite
				Monthly Average not less than	Weekly Average not less than	Daily Minimum		
Dissolved Oxygen								
March-July				N.A.	6.25	5.0	3 Days/Week	Grab
August-February				6.0	4.5	4.0	3 Days/Week	Grab

*Load limits based on design maximum flow shall apply only when flow exceeds design average flow.

**Carbonaceous BOD$_5$ (CBOD$_5$) testing shall be in accordance with 40 CFR 136.

***See Special Condition 9.

**** BOD$_5$ and Suspended Solids (85% removal required) For Discharge No. 001. In accordance with 40 CFR 133, the 30-day average percent removal shall not be less than 85 percent. The percent removal need not be reported to the IEPA on DMRs but influent and effluent data must be available, as required elsewhere in this Permit, for IEPA inspection and review. For measuring compliance with this requirement, 5 mg/L shall be added to the effluent CBOD$_5$ concentration to determine the effluent BOD$_5$ concentration. Percent removal is a percentage expression of the removal efficiency across a treatment plant for a given pollutant parameter, as determined from the 30-day average values of the raw wastewater influent concentrations to the facility and the 30-day average values of the effluent pollutant concentrations for a given time period.

Total Phosphorus shall be reported on the DMR as a daily maximum and monthly average value.

Effluent Limitations, Monitoring, and Reporting

FINAL

Discharge Number(s) and Name(s): 001 STP Outfall (Expanded facility - Phase 4) (continued)

Flow shall be reported on the Discharge Monitoring Report (DMR) as monthly average and daily maximum.

Fecal Coliform shall be reported on the DMR as a daily maximum value.

pH shall be reported on the DMR as minimum and maximum value.

Chlorine Residual shall be reported on the DMR as daily maximum value.

Dissolved oxygen shall be reported on the DMR as a minimum value.

Total Nitrogen shall be reported on the DMR as monthly average and daily maximum value. Total Nitrogen is the sum total of Total Kjeldahl Nitrogen, Nitrate, and Nitrite.

Influent Monitoring, and Reporting

The influent to the treatment plant shall be monitored as follows:

Parameter	Sample Frequency*	Sample Type
Flow (MGD)	Continuous	
BOD_5	1 Day/Week	Composite
Suspended Solids	1 Day/Week	Composite
Total Phosphorus	1 Day/Week	Composite

Influent samples shall be taken at a point representative of the influent.

Flow (MGD) shall be reported on the Discharge Monitoring Report (DMR) as monthly average and daily maximum.

BOD_5 and Suspended Solids shall be reported on the DMR as a monthly average concentration.

Total Phosphorus shall be reported on the DMR as monthly average and daily maximum value.

*The sample frequency shall be increased to 3 Days/Week when the expanded facility (Phase 4) DAF of 4.9 MGD is completed and operational.

Special Conditions

SPECIAL CONDITION 1. This Permit may be modified to include different final effluent limitations or requirements which are consistent with applicable laws and regulations. The IEPA will public notice the permit modification.

SPECIAL CONDITION 2. The use or operation of this facility shall be by or under the supervision of a Certified Class 1 operator.

SPECIAL CONDITION 3. The IEPA may request in writing submittal of operational information in a specified form and at a required frequency at any time during the effective period of this Permit.

SPECIAL CONDITION 4. The IEPA may request more frequent monitoring by permit modification pursuant to 40 CFR § 122.63 and Without Public Notice.

SPECIAL CONDITION 5. The effluent, alone or in combination with other sources, shall not cause a violation of any applicable water quality standard outlined in 35 Ill. Adm. Code 302 and 303.

SPECIAL CONDITION 6. The Permittee shall record monitoring results on Discharge Monitoring Report (DMR) electronic forms using one such form for each outfall each month.

In the event that an outfall does not discharge during a monthly reporting period, the DMR Form shall be submitted with no discharge indicated.

The Permittee is required to submit electronic DMRs (NetDMRs) instead of mailing paper DMRs to the IEPA unless a waiver has been granted by the Agency. More information, including registration information for the NetDMR program, can be obtained on the IEPA website, https:www2.illinois.gov/epa/topics/water-quality/surface-water/netdmr/pages/quick-answer-guide.aspx.

The completed Discharge Monitoring Report forms shall be submitted to IEPA no later than the 25th day of the following month, unless otherwise specified by the permitting authority.

Permittees that have been granted a waiver shall mail Discharge Monitoring Reports with an original signature to the IEPA at the following address:

Illinois Environmental Protection Agency
Division of Water Pollution Control
Attention: Compliance Assurance Section, Mail Code # 19
1021 North Grand Avenue East
Post Office Box 19276
Springfield, Illinois 62794-9276

SPECIAL CONDITION 7. The provisions of 40 CFR Section 122.41(m) & (n) are incorporated herein by reference.

SPECIAL CONDITION 8. Samples taken in compliance with the effluent monitoring requirements shall be taken at a point representative of the discharge, but prior to entry into the receiving stream.

SPECIAL CONDITION 9. Fecal Coliform limits for Discharge Number 001 are effective May thru October. Sampling of Fecal Coliform is only required during this time period.

Any use of chlorine to control slime growths, odors or as an operational control, etc. shall not exceed the limit of 0.038 mg/L (daily maximum) total residual chlorine in the effluent. Sampling is required on a daily grab basis during the chlorination process. Reporting shall be submitted on the DMR's on a monthly basis.

SPECIAL CONDITION 10. During January of each year the Permittee shall submit annual fiscal data regarding sewerage system operations to the Illinois Environmental Protection Agency/Division of Water Pollution Control/Compliance Assurance Section. The Permittee may use any fiscal year period provided the period ends within twelve (12) months of the submission date.

Submission shall be on forms provided by IEPA titled "Fiscal Report Form For NPDES Permittees".

SPECIAL CONDITION 11. For the duration of this Permit, the Permittee shall determine the quantity of sludge produced by the treatment facility in dry tons or gallons with average percent total solids analysis. The Permittee shall maintain adequate records of the quantities of sludge produced and have said records available for U.S. EPA and IEPA inspection. The Permittee shall submit to the IEPA, at a minimum, a semi-annual summary report of the quantities of sludge generated and disposed of, in units of dry tons or gallons (average total percent solids) by different disposal methods including but not limited to application on farmland, application on reclamation land, landfilling, public distribution, dedicated land disposal, sod farms, storage lagoons or any other specified disposal method. Said reports shall be submitted to the IEPA by January 31 and July 31 of each year reporting the preceding January thru June and July thru December interval of sludge disposal operations.

Duty to Mitigate. The Permittee shall take all reasonable steps to minimize any sludge use or disposal in violation of this Permit.

Special Conditions

Sludge monitoring must be conducted according to test procedures approved under 40 CFR 136 unless otherwise specified in 40 CFR 503, unless other test procedures have been specified in this Permit.

Planned Changes. The Permittee shall give notice to the IEPA on the semi-annual report of any changes in sludge use and disposal.

The Permittee shall retain records of all sludge monitoring, and reports required by the Sludge Permit as referenced in Standard Condition 25 for a period of at least five (5) years from the date of this Permit.

If the Permittee monitors any pollutant more frequently than required by this permit or the Sludge Permit, the results of this monitoring shall be included in the reporting of data submitted to the IEPA.

The Permittee shall comply with existing federal regulations governing sewage sludge use or disposal and shall comply with all existing applicable regulations in any jurisdiction in which the sewage sludge is actually used or disposed.

The Permittee shall comply with standards for sewage sludge use or disposal established under section 405(d) of the CWA within the time provided in the regulations that establish the standards for sewage sludge use or disposal even if the permit has not been modified to incorporate the requirement.

The Permittee shall ensure that the applicable requirements in 40 CFR Part 503 are met when the sewage sludge is applied to the land, placed on a surface disposal site, or fired in a sewage sludge incinerator.

Monitoring reports for sludge shall be reported on the form titled "Sludge Management Reports" to the following address:

Illinois Environmental Protection Agency
Bureau of Water
Compliance Assurance Section
Mail Code #19
1021 North Grand Avenue East
Post Office Box 19276
Springfield, Illinois 62794-9276

SPECIAL CONDITION 12. This Permit may be modified to include alternative or additional final effluent limitations pursuant to an approved Total Maximum Daily Load (TMDL) Study or upon completion of an alternate Water Quality Study.

SPECIAL CONDITION 13. The Permittee shall conduct biomonitoring of the effluent from Discharge Number(s) 001.

Biomonitoring

A. Acute Toxicity - Standard definitive acute toxicity tests shall be run on at least two trophic levels of aquatic species (fish, invertebrate) representative of the aquatic community of the receiving stream. Testing must be consistent with Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms (Fifth Ed.) EPA/821-R-02-012. Unless substitute tests are pre-approved; the following tests are required:

    1. Fish 96-hour static LC_{50} Bioassay using fathead minnows (*Pimephales promelas*).

    2. Invertebrate 48-hour static LC_{50} Bioassay using *Ceriodaphnia*.

B. Testing Frequency - The above tests shall be conducted using 24-hour composite samples unless otherwise authorized by the IEPA. Sample collection and testing must be conducted in the 18th, 15th, 12th, and 9th month prior to the expiration date of this Permit. When possible, bioassay sample collection should coincide with sample collection for metals analysis or other parameters that may contribute to effluent toxicity.

C. Reporting - Results shall be reported according to EPA/821-R-02-012, Section 12, Report Preparation, and shall be mailed to IEPA, Bureau of Water, Compliance Assurance Section or emailed to EPA.PrmtSpecCondtns@Illinois.gov within one week of receipt from the laboratory. Reports are due to the IEPA no later than the 16th, 13th, 10th, and 7th month prior to the expiration date of this Permit.

D. Toxicity – Should a bioassay result in toxicity to >20% of organisms tested in the 100% effluent treatment, the IEPA may require, upon notification, six (6) additional rounds of monthly testing on the affected organism(s) to be initiated within 30 days of the toxic bioassay. Results shall be submitted to IEPA within one (1) week of becoming available to the Permittee. Should any of the additional bioassays result in toxicity to ≥50% of organisms tested in the 100% effluent treatments, the Permittee must contact the IEPA within one (1) day of the results becoming available to the Permittee and begin the toxicity identification and reduction evaluation process as outlined below.

E. Toxicity Identification and Reduction Evaluation - Should any of the additional bioassays result in toxicity to ≥50% of organisms tested in the 100% effluent treatment, the Permittee must contact the IEPA within one (1) day of the results becoming available to the Permittee and begin the toxicity identification evaluation process in accordance with Methods for Aquatic Toxicity Identification Evaluations, EPA/600/6-91/003. The IEPA may also require, upon notification, that the Permittee prepare a plan for toxicity reduction evaluation to be developed in accordance with Toxicity Reduction Evaluation Guidance for Municipal Wastewater Treatment Plants, EPA/833B-99/002, which shall include an evaluation to determine which chemicals have a potential for being discharged in the plant wastewater, a monitoring program to determine their presence or absence and to identify other compounds which are not being removed by treatment, and other measures as appropriate. The Permittee shall submit to the IEPA its plan for toxicity reduction evaluation within ninety (90) days following notification by the IEPA. The Permittee shall implement the plan within ninety (90) days or other such date as contained in a notification letter received from the IEPA.

The IEPA may modify this Permit during its term to incorporate additional requirements or limitations based on the results of the biomonitoring. In addition, after review of the monitoring results, the IEPA may modify this Permit to include numerical limitations for specific toxic pollutants. Modifications under this condition shall follow public notice and opportunity for hearing.

SPECIAL CONDITION 14. The Permittee shall operate the facilities designed for biological nutrient removal (BNR). Monitoring for Total Nitrogen is required to document the actual total nitrogen effluent concentration. The Permittee shall monitor the effluent for total nitrogen once per month. The monitoring shall be a composite sample and the results reported as a daily maximum on the Permittee's Discharge Monitoring Forms.

SPECIAL CONDITION 15. The Permittee shall report to IEPA on progress toward completion of Phase 4 treatment plant expansion annually by December 31 each year until the Phase 4 treatment plant becomes operational. The Permittee shall notify the IEPA in writing once the treatment plant expansion has been completed. Annual reports and a letter stating the date that the Phase 4 expansion was completed shall be sent to the following address within fourteen (14) days of the expansion becoming operational:

Illinois Environmental Protection Agency
Bureau of Water
Compliance Assurance Section, Mail Code #19
1021 North Grand Avenue East
Post Office Box 19276
Springfield, Illinois 62794-9276

SPECIAL CONDITION 16. The Permittee shall land apply up to 34% of the total effluent that would have otherwise been discharged through Outfall 001 during the months of April through October. In November of each year, the Permittee shall report the quantities discharged during the months of April through October and the amount diverted on the Discharge Monitoring Reports in accordance with Special Condition 6. The permittee shall obtain a state operating permit for the land application of tertiary treated wastewater effluent and shall be subject to the applicable requirements of 35 Illinois Administrative Code Part 372, Illinois Design Standards for Slow Rate Land Application of Treated Wastewater. The operating permit shall be renewed within five (5) years of the date the permit was issued. The treated wastewater utilized for irrigation shall be disinfected prior to being land applied.

SPECIAL CONDITION 17. The Permittee shall work towards the goals of achieving no discharges from sanitary sewer overflows or basement back-ups and ensuring that overflows or back-ups, when they do occur do not cause or contribute to violations of applicable standards or cause impairment in any adjacent receiving water. Overflows from sanitary sewers are expressly prohibited by this permit and by Ill. Adm. Code 306.304. As part of the process to ultimately achieve compliance through the elimination of and mitigating the adverse impacts of any such overflows if they do occur, the Permittee shall (A) identify and report to IEPA all SSOs that do occur, and (B) update the existing Capacity, Management, Operations, and Maintenance (CMOM) plan at least annually and maintain it at the facility for review during Agency Field Operations Section inspections. Reporting shall conform to Attachment H Standard Conditions (12) (f). The Permittee shall submit copies of the CMOM to the IEPA upon written request. The Permittee shall modify the Plan to incorporate any comments that it receives from IEPA and shall implement the modified plan as soon as possible. The Permittee should work as appropriate, in consultation with affected authorities at the local, county, and/or state level to develop the plan components involving third party notification of overflow events. The Permittee may be required to construct additional sewage transport and/or treatment facilities in future permits or other enforceable documents should the implemented CMOM plan indicate that the Permittee's facilities are not capable of conveying and treating the flow for which they are designed.

The CMOM plan shall include the following elements:

A. Measures and Activities:

1. A complete map and system inventory for the collection system owned and operated by the Permittee;
2. Organizational structure; budgeting; training of personnel; legal authorities; schedules for maintenance, sewer system cleaning, and preventative rehabilitation; checklists, and mechanisms to ensure that preventative maintenance is performed on equipment owned and operated by the Permittee;
3. Documentation of unplanned maintenance;
4. An assessment of the capacity of the collection and treatment system owned and operated by the Permittee at critical junctions and immediately upstream of locations where overflows and backups occur or are likely to occur; use flow monitoring and/or

sewer hydraulic modeling, as necessary;

5. Identification and prioritization of structural deficiencies in the system owned and operated by the Permittee. Include preventative maintenance programs to prevent and/or eliminate collection system blockages from roots or grease, and prevent corrosion or negative effects of hydrogen sulfide which may be generated within collection system;
6. Operational control, including documented system control procedures, scheduled inspections and testing, list of scheduled frequency of cleaning (and televising as necessary) of sewers;
7. The Permittee shall develop and implement an Asset Management strategy to ensure the long-term sustainability of the collection system. Asset Management shall be used to assist the Permittee in making decisions on when it is most appropriate to repair, replace or rehabilitate particular assets and develop long-term funding strategies; and
8. Asset Management shall include but is not limited to the following elements:
   a. Asset Inventory and State of the Asset;
   b. Level of Service;
   c. Critical Asset Identification;
   d. Life Cycle Cost; and
   e. Long-Term Funding Strategy.

B. Design and Performance Provisions:

1. Monitor the effectiveness of CMOM;
2. Upgrade the elements of the CMOM plan as necessary; and
3. Maintain a summary of CMOM activities.

C. Overflow Response Plan:

1. Know where overflows and back-ups within the facilities owned and operated by the Permittee occur;
2. Respond to each overflow or back-up to determine additional actions such as clean up; and
3. Locations where basement back-ups and/or sanitary sewer overflows occur shall be evaluated as soon as practicable for excessive inflow/infiltration, obstructions or other causes of overflows or back-ups as set forth in the System Evaluation Plan.
4. Identify the root cause of the overflow or basement backup, and document to files;
5. Identify actions or remediation efforts to reduce risk of reoccurrence of these overflows or basement backups in the future, and document to files.

D. System Evaluation Plan:

1. Summary of existing SSO and Excessive I/I areas in the system and sources of contribution;
2. Evaluate plans to reduce I/I and eliminate SSOs;
3. Evaluate the effectiveness and performance in efforts to reduce excessive I/I in the collection system;
4. Special provisions for Pump Stations and force mains and other unique system components; and
5. Construction plans and schedules for correction.

E. Reporting and Monitoring Requirements:

1. Program for SSO detection and reporting; and
2. Program for tracking and reporting basement back-ups, including general public complaints.

F. Third Party Notice Plan:

1. Describes how, under various overflow scenarios, the public, as well as other entities, would be notified of overflows within the Permittee's system that may endanger public health, safety or welfare;
2. Identifies overflows within the Permittee's system that would be reported, giving consideration to various types of events including events with potential widespread impacts;
3. Identifies who shall receive the notification;
4. Identifies the specific information that would be reported including actions that will be taken to respond to the overflow;
5. Includes a description of the lines of communication; and
6. Includes the identities and contact information of responsible POTW officials and local, county, and/or state level officials.

For additional information concerning USEPA CMOM guidance and Asset Management please refer to the following web site addresses.
http://www.epa.gov/npdes/pubs/cmom_guide_for_collection_systems.pdf and
http://water.epa.gov/type/watersheds/wastewater/upload/guide_smallsystems_assetmanagement_bestpratices.pdf

SPECIAL CONDITION 18. The Permittee submitted to the Agency a Phosphorus Discharge Optimization Plan in November 2016. The Permittee shall maintain and implement a Phosphorus Discharge Optimization Plan. The plan shall include a schedule for the implementation of these optimization measures. Annual progress reports on the optimization of the existing treatment facilities shall be submitted electronically to EPA.PrmtSpecCondtns@illinois.gov with "IL00070688 Special Condition 18" as the subject of the email by March 31 of each year. As part of the plan, the Permittee shall evaluate a range of measures for reducing phosphorus discharges from

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the treatment plant, including possible source reduction measures, operational improvements, and minor facility modifications that will optimize reductions in phosphorus discharges from the wastewater treatment facility. The Permittee's evaluation shall include, but not be limited to, an evaluation of the following optimization measures:

A. WWTF influent reduction measures.
   1. Evaluate the phosphorus reduction potential of users.
   2. Determine which sources have the greatest opportunity for reducing phosphorus (i.e., industrial, commercial, institutional, municipal and others).
      a. Determine whether known sources (i.e., restaurant and food preparation) can adopt phosphorus minimization and water conservation plans.
      b. Evaluate implementation of local limits on influent sources of excessive phosphorus.

B. WWTF effluent reduction measures.
   1. Reduce phosphorus discharges by optimizing existing treatment processes.
      a. Adjust the solids retention time for either nitrification, denitrification, or biological phosphorus removal.
      b. Adjust aeration rates to reduce dissolved oxygen and promote simultaneous nitrification-denitrification.
      c. Add baffles to existing units to improve microorganism conditions by creating divided anaerobic, anoxic, and aerobic zones.
      d. Change aeration settings in plug flow basins by turning off air or mixers at the inlet side of the basin system.
      e. Minimize impact on recycle streams by improving aeration within holding tanks.
      f. Reconfigure flow through existing basins to enhance biological nutrient removal.
      g. Increase volatile fatty acids for biological phosphorus removal.

SPECIAL CONDITION 19. The Permittee shall conduct a biosurvey in the receiving stream that repeats the investigations contained in a study report entitled Biological Assessment of the Kishwaukee River Huntley Illinois, October 2010. Huff & Huff Inc. Water quality data consisting of temperature, pH, dissolved oxygen, conductivity, BOD_5, total phosphorus, total nitrogen and ammonia nitrogen must be collected on each day that the biological sampling occurs. The survey must take place during the first July through October period following the expansion of the treatment plant to 4.9 MGD DAF. A report for the biosurvey must be submitted to the Agency by the end of the calendar year in which it was conducted.

SPECIAL CONDITION 20.

A. Publicly Owned Treatment Works (POTW) Pretreatment Program General Provisions

1. The Permittee shall implement and enforce its approved Pretreatment Program which was approved on June 17, 2015 and all approved subsequent modifications thereto. The Permittee shall maintain legal authority adequate to fully implement the Pretreatment Program in compliance with Federal (40 CFR 403), State, and local laws and regulations. All definitions in this section unless specifically otherwise defined in this section, are those definitions listed in 40 CFR 403.3. U.S. EPA Region 5 is the Approval Authority for the administration of pretreatment programs in Illinois. The Permittee shall:

   a. Develop and implement procedures to ensure compliance with the requirements of a pretreatment program as specified in 40 CFR 403.8(f)(2)

   b. Carry out independent inspection and monitoring procedures at least once per year, which will determine whether each significant industrial user (SIU) is in compliance with applicable pretreatment standards

   c. Evaluate whether each SIU needs a slug control plan or other action to control slug discharges. If needed, the SIU slug control plan shall include the items specified in 40 CFR 403.8(f)(2)(vi). For IUs identified as significant prior to November 14, 2005, this evaluation must have been conducted at least once by October 14, 2006; additional SIUs must be evaluated within 1 year of being designated an SIU;

   d. Update its inventory of Industrial Users (IUs) at least annually and as needed to ensure that all SIUs are properly identified, characterized, and categorized;

   e. Receive and review self monitoring and other IU reports to determine compliance with all pretreatment standards and requirements, and obtain appropriate remedies for noncompliance by any IU with any pretreatment standard and/or requirement;

   f. Investigate instances of noncompliance, collect and analyze samples, and compile other information with sufficient care as to produce evidence admissible in enforcement proceedings, including judicial action;

   g. Require development, as necessary, of compliance schedules by each industrial user to meet applicable pretreatment standards; and,

   h. Maintain an adequate revenue structure and staffing level for continued operation of the Pretreatment Program.

2. The Permittee shall issue/reissue permits or equivalent control mechanisms to all SIUs prior to expiration of existing permits or prior to commencement of discharge in the case of new discharges. The permits at a minimum shall include the elements listed

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in 40 CFR § 403.8(f)(1)(iii)(B).

3. The Permittee shall develop, maintain, and enforce, as necessary, local limits to implement the general and specific prohibitions in 40 CFR § 403.5 which prohibit the introduction of any pollutant(s) which cause pass through or interference and the introduction of specific pollutants to the waste treatment system from any source of nondomestic discharge.

4. In addition to the general limitations expressed in Paragraph 3 above, applicable pretreatment standards must be met by all industrial users of the POTW. These limitations include specific standards for certain industrial categories as determined by Section 307(b) and (c) of the Clean Water Act, State limits, or local limits, whichever are more stringent.

5. The USEPA and IEPA individually retain the right to take legal action against any industrial user and/or the POTW for those cases where an industrial user has failed to meet an applicable pretreatment standard by the deadline date regardless of whether or not such failure has resulted in a permit violation.

6. The Permittee shall establish agreements with all contributing jurisdictions, as necessary, to enable it to fulfill its requirements with respect to all IUs discharging to its system.

7. Unless already completed, the Permittee shall within six (6) months of the effective date of this Permit submit to USEPA and IEPA a proposal to modify and update its approved Pretreatment Program to incorporate Federal revisions to the general pretreatment regulations. The proposal shall include all changes to the approved program and the sewer use ordinance which are necessary to incorporate the revisions of the Pretreatment Streamlining Rule (which became effective on November 14, 2005), which are considered required changes, as described in the Pretreatment Streamlining Rule Fact Sheet 2.0: Required changes, available at: http://cfpub.epa.gov/npdes/whatsnew.cfm?program_id=3. This includes any necessary revisions to the Permittee's Enforcement Response Plan (ERP).

8. Within 18 months from the effective date of this permit, the Permittee shall conduct a technical re-evaluation of its local limitations consistent with U.S. EPA's Local Limits Development Guidance (July 2004), and submit the evaluation and any proposed revisions to its local limits to IEPA and U.S. EPA Region 5 for review and approval. U.S. EPA Region 5 will request Permittee to submit the evaluation and any proposed revisions to its local limits on the spreadsheet found at http://www.epa.gov/region5/water/npdestek/Locallmt.xlx. To demonstrate technical justification for new local industrial user limits or justification for retaining existing limits, the following information must be submitted to U.S. EPA:

   a. Total plant flow
   b. Domestic/commercial pollutant contributions for pollutants of concern
   c. Industrial pollutant contributions and flows
   d. Current POTW pollutant loadings, including loadings of conventional pollutants
   e. Actual treatment plant removal efficiencies, as a decimal (primary, secondary, across the wastewater treatment plant)
   f. Safety factor to be applied
   g. Identification of applicable criteria:
      i. NPDES permit conditions
         •Specific NPDES effluent limitations
         •Water-quality criteria
         •Whole effluent toxicity requirements
         •Criteria and other conditions for sludge disposal
      ii. Biological process inhibition
         •Nitrification
         •Sludge digester
      iii. Collection system problems
   h. The Permittee's sludge disposal methods (land application, surface disposal, incineration, landfill)
   i. Sludge flow to digester
   j. Sludge flow to disposal
   k. % solids in sludge to disposal, not as a decimal
   l. % solids in sludge to digester, not as a decimal
   m. Plant removal efficiencies for conventional pollutants
   n. If revised industrial user discharge limits are proposed, the method of allocating available pollutants loads to industrial users
   o. A comparison of maximum allowable headworks loadings based on all applicable criteria listed in g, above
   p. Pollutants that have caused:
      i. Violations or operational problems at the POTW, including conventional pollutants
      ii. Fires and explosions
      iii. Corrosion
      iv. Flow obstructions
      v. Increased temperature in the sewer system
      vi. Toxic gases, vapors or fumes that caused acute worker health and safety problems
      vii. Toxicity found through Whole Effluent Toxicity testing
      viii. Inhibition

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q. Pollutants designated as "monitoring only" in the NPDES permit
r. Supporting data, assumptions, and methodologies used in establishing the information a through q above

B. Reporting and Records Requirements

1. The Permittee shall provide an annual report briefly describing the permittee's pretreatment program activities over the previous calendar year. Permittees who operate multiple plants may provide a single report providing all plant-specific reporting requirements are met. Such report shall be submitted no later than April 28 of each year to USEPA, Region 5, 77 West Jackson Blvd., Chicago, Illinois 60604, Attention: Water Enforcement & Compliance Assurance Branch, and shall be in the format set forth in IEPA's POTW Pretreatment Report Package which contains information regarding:

   a. An updated listing of the Permittee's significant industrial users, indicating additions and deletions from the previous year, along with brief explanations for deletions. The list shall specify which categorical Pretreatment standards, if any, are applicable to each Industrial User.

   b. A descriptive summary of the compliance activities including numbers of any major enforcement actions, (i.e., administrative orders, penalties, civil actions, etc.), and the outcome of those actions. This includes an assessment of the compliance status of the Permittee's industrial users and the effectiveness of the Permittee's Pretreatment Program in meeting its needs and objectives.

   c. A description of all substantive changes made to the Permittee's Pretreatment Program. Changes which are "substantial modifications" as described in 40 CFR § 403.18(c) must receive prior approval from the USEPA.

   d. Results of sampling and analysis of POTW influent, effluent, and sludge.

   e. A summary of the findings from the priority pollutants sampling. As sufficient data becomes available the IEPA may modify this Permit to incorporate additional requirements relating to the evaluation, establishment, and enforcement of local limits for organic pollutants. Any permit modification is subject to formal due process procedures pursuant to State and Federal law and regulation. Upon a determination that an organic pollutant is present that causes interference or pass through, the Permittee shall establish local limits as required by 40 CFR § 403.5(c).

2. The Permittee shall maintain all pretreatment data and records for a minimum of three (3) years. This period shall be extended during the course of unresolved litigation or when requested by the IEPA or the Regional Administrator of USEPA. Records shall be available to USEPA and the IEPA upon request.

3. The Permittee shall establish public participation requirements of 40 CFR 25 in implementation of its Pretreatment Program. The Permittee shall at least annually, publish the names of all IU's which were in significant noncompliance (SNC), as defined by 40 CFR § 403.8(f)(2)(viii), in a newspaper of general circulation that provides meaningful public notice within the jurisdictions served by the Permittee or based on any more restrictive definition of SNC that the POTW may be using.

4. The Permittee shall provide written notification to the USEPA, Region 5, 77 West Jackson Blvd., Chicago, Illinois 60604, Attention: NPDES Programs Branch and to the Deputy Counsel for the Division of Water Pollution Control, IEPA, 1021 North Grand Avenue East, P.O. Box 19276, Springfield, Illinois 62794-9276 within five (5) days of receiving notice that any Industrial User of its sewage treatment plant is appealing to the Circuit Court any condition imposed by the Permittee in any permit issued to the Industrial User by Permittee. A copy of the Industrial User's appeal and all other pleadings filed by all parties shall be mailed to the Deputy Counsel within five (5) days of the pleadings being filed in Circuit Court.

C. Monitoring Requirements

1. The Permittee shall monitor its influent, effluent and sludge and report concentrations of the following parameters on monitoring report forms provided by the IEPA and include them in its annual report. Samples shall be taken at semi-annual intervals at the indicated reporting limit or better and consist of a 24-hour composite unless otherwise specified below. Sludge samples shall be taken of final sludge and consist of a grab sample reported on a dry weight basis.

STORET CODE	PARAMETER	Minimum reporting limit
01097	Antimony	0.07 mg/L
01002	Arsenic	0.05 mg/L
01007	Barium	0.5 mg/L
01012	Beryllium	0.005 mg/L
01027	Cadmium	0.001 mg/L
01032	Chromium (hex) (grab not to exceed 24 hours)*	0.01 mg/L
01034	Chromium (total)	0.05 mg/L
01042	Copper	0.005 mg/L
00720	Cyanide (total) (grab)****	5.0 µg/L

00722	Cyanide (grab)*(available ***** or amenable to chlorination)****	5.0 µg/L
00951	Fluoride*	0.1 mg/L
01045	Iron (total)	0.5 mg/L
01046	Iron (Dissolved)*	0.5 mg/L
01051	Lead	0.05 mg/L
01055	Manganese	0.5 mg/L
71900	Mercury (effluent grab)***	1.0 ng/L**
01067	Nickel	0.005 mg/L
00556	Oil (hexane soluble or equivalent) (Grab Sample only)*	5.0 mg/L
32730	Phenols (grab)	0.005 mg/L
01147	Selenium	0.005 mg/L
01077	Silver (total)	0.003 mg/L
01059	Thallium	0.3 mg/L
01092	Zinc	0.025 mg/L

* Influent and effluent only
**1 ng/L = 1 part per trillion.
***Utilize USEPA Method 1631E and the digestion procedure described in Section 11.1.1.2 of 1631E, other approved methods may be used for influent (composite) and sludge.
****Analysis for cyanide (available or amenable to chlorination) is only required if cyanide (total) is detected at or above the minimum reporting limit.
*****USEPA Method OIA – 1677 or Standard Method SM 4500-CN G.

The minimum reporting limit for each parameter is specified by Illinois EPA as the regulatory authority.

The minimum reporting limit for each parameter shall be greater than or equal to the lowest calibration standard and within the acceptable calibration range of the instrument.

The minimum reporting limit is the value below which data are to be reported as non-detects.

The statistically-derived laboratory method detection limit for each parameter shall be less than the minimum reporting limit required for that parameter.

All sample containers, chemical and thermal preservation, holding times, analyses, method detection limit determinations and quality assurance/quality control requirements shall be in accordance with 40 CFR Part 136.

Unless otherwise indicated, concentrations refer to the total amount of the constituent present in all phases, whether solid, suspended or dissolved, elemental or combined including all oxidation states. Where constituents are commonly measured as other than total, the phase is so indicated.

2. The Permittee shall conduct an analysis for the one hundred and ten (110) organic priority pollutants identified in 40 CFR 122 Appendix D, Table II as amended. This monitoring shall be done annually and reported on monitoring report forms provided by the IEPA and shall consist of the following:

   a. The influent and effluent shall be sampled and analyzed for the one hundred and ten (110) organic priority pollutants. The sampling shall be done during a day when industrial discharges are expected to be occurring at normal to maximum levels.

      Samples for the analysis of acid and base/neutral extractable compounds shall be 24-hour composites.

      Five (5) grab samples shall be collected each monitoring day to be analyzed for volatile organic compounds. A single analysis for volatile pollutants (Method 624) may be run for each monitoring day by compositing equal volumes of each grab sample directly in the GC purge and trap apparatus in the laboratory, with no less than one (1) mL of each grab included in the composite.

      Wastewater samples must be handled, prepared, and analyzed by GC/MS in accordance with USEPA Methods 624 and 625 of 40 CFR 136 as amended.

   b. The sludge shall be sampled and analyzed for the one hundred and ten (110) organic priority pollutants. A sludge sample shall be collected concurrent with a wastewater sample and taken as final sludge.

      Sampling and analysis shall conform to USEPA Methods 624 and 625 unless an alternate method has been approved by IEPA.

   c. Sample collection, preservation and storage shall conform to approved USEPA procedures and requirements.

3. In addition, the Permittee shall monitor any new toxic substances as defined by the Clean Water Act, as amended, following notification by the IEPA or U.S. EPA.

4. Permittee shall report any noncompliance with effluent or water quality standards in accordance with Standard Condition 12(f) of this Permit.

5. Analytical detection limits shall be in accordance with 40 CFR 136. Minimum detection limits for sludge analyses shall be in accordance with 40 CFR 503.

D. Pretreatment Reporting

US EPA Region 5 is the approval Authority for administering the pretreatment program in Illinois. All requests for modification of pretreatment program elements should be submitted in redline/strikeout electronic format and must be sent to US EPA at r5npdes@epa.gov.

Permittee shall upon notice from US EPA, modify any pretreatment program element found to be inconsistent with 40 CFR 403.

SPECIAL CONDITION 21. The Permittee has undergone a Monitoring Reduction review and the influent and effluent sample frequency has been reduced for parameters due to sustained compliance. The IEPA may require that the influent and effluent sampling frequency for these parameters be increased without Public Notice. This provision does not limit EPA's authority to require additional monitoring, information or studies pursuant to Section 308 of the CWA.

SPECIAL CONDITION 22.

A. Subject to paragraph B below, an effluent limit of 0.5 mg/L Total Phosphorus 12 month rolling geometric mean (calculated monthly) basis (hereinafter "Limit"), shall be met by the Permittee by January 1, 2030, unless the Permittee demonstrates that meeting such Limit is not technologically or economically feasible in one of the following manners:
   1. the Limit is not technologically feasible through the use of biological phosphorus removal (BPR) process(es) at the treatment facility; or
   2. the Limit would result in substantial and widespread economic or social impact. Substantial and widespread economic impacts must be demonstrated using applicable USEPA guidance, including but not limited to any of the following documents:
      a. Interim Economic Guidance for Water Quality Standards, March 1995, EPA-823-95-002;
      b. Combined Sewer Overflows – Guidance for Financial Capability Assessment and Schedule Development, February 1997, EPA-832—97-004;
      c. Financial Capability Assessment Framework for Municipal Clean Water Act Requirements, November 24, 2014; and
      d. any additional USEPA guidance on affordability issues that revises, supplements or replaces those USEPA guidance documents; or
   3. the Limit can only be met by chemical addition for phosphorus removal at the treatment facility in addition to those processes currently contemplated; or
   4. the Limit is demonstrated not to be feasible by January 1, 2030, but is feasible within a longer timeline, then the Limit shall be met as soon feasible and approved by the Agency; or
   5. the Limit is demonstrated not to be achievable, then an effluent limit that is achievable by the Permittee (along with associated timeline) will apply instead, except that the effluent limit shall not exceed 0.6 mg/L Total Phosphorus 12 month rolling geometric mean (calculated monthly).

B. The Limit shall be met by the Permittee by January 1, 2030, except in the following circumstances:
   1. If the Permittee develops a written plan, preliminary engineering report or facility plan no later than January 1, 2025, to rebuild or replace the secondary treatment process(es) of the treatment facility, the Limit shall be met by December 31, 2035; or
   2. If the Permittee decides to construct/operate biological nutrient removal (BNR) process(es), incorporating nitrogen reduction, the Limit shall be met by December 31, 2035; or
   3. If the Permittee decides to use chemical addition for phosphorus removal instead of BPR, the Limit and the effluent limit of 1.0 mg/L Total Phosphorus monthly average shall be met by December 31, 2025; or
   4. If the Permittee has already installed chemical addition for phosphorus removal instead of BPR, and has a 1.0 mg/L Total Phosphorus monthly average effluent limit in its permit, or the Permittee is planning to install chemical addition with an IEPA construction permit that is issued on or before July 31, 2018, the 1.0 mg/L Total Phosphorus monthly average effluent limit (and associated compliance schedule) shall apply, and the Limit shall not be applicable.
   5. The NARP determines that a limit lower than the Limit is necessary and attainable. The lower limit and timeline identified in the NARP shall apply to the Permittee.
   6. If the Permittee is covered by any of the following scenarios:
      a. maintains a membership and participates in the DuPage River Salt Creek Workgroup or the Lower DuPage Watershed Coalition; or
      b. it participates in a watershed group that is developing a NARP for an impairment related to phosphorus or a risk eutrophication, and IEPA determines that the group has the financial and structural capability to develop the NARP by the deadline specified in the NARP provisions below; or
      c. it is covered by the 2017 Settlement Agreement between the Metropolitan Water Reclamation District of Greater Chicago and various environmental groups;[1] or

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d. it is covered by the Memorandum of Understanding, executed as of October 5, 2016, between the City of Joliet, Prairie Rivers Network, and the Illinois Chapter of Sierra Club concerning expansion of the City's Aux Sable Wastewater Treatment Plant.

[1] Those groups are: NRDC, Friends of the Chicago River, Gulf Restoration Network, the Environmental Law and Policy Center, Sierra Club, and Prairie Rivers Network.

C. The Permittee shall identify and provide adequate justification of any exception identified in paragraph A or circumstance identified in paragraph B, regarding meeting the Limit. The justification shall be submitted to the Agency at the time of renewal of this permit or by December 31, 2023, whichever date is first. Any justification or demonstration performed by the Permittee pursuant to paragraph A or circumstance pursuant to paragraph B must be reviewed and approved by the Agency. The Agency will renew or modify the NPDES permit as necessary. No date deadline modification or effluent limitation modification for any of the exceptions or circumstances specified in paragraphs A or B will be effective until it is included in a modified or reissued NPDES Permit.

D. For purposes of this permit, the following definitions are used:
   1. BPR (Biological Phosphorus Removal) is defined herein as treatment processes which do not require use of supplemental treatment processes at the treatment facilities before or after the biological system, such as but not limited to, chemical addition, carbon supplementation, fermentation, or filtration. The use of filtration or additional equipment to meet other effluent limits is not prohibited, but those processes will not be considered part of the BPR process for purposes of this permit; and
   2. BNR (Biological Nutrient Removal) is defined herein as treatment processes used for nitrogen and phosphorus removal from wastewater before it is discharged. BNR treatment processes, as defined herein, do not require use of supplemental treatment processes at the treatment facilities before or after the biological system, such as but not limited to, chemical addition, carbon supplementation, fermentation or filtration. The use of filtration or additional equipment to meet other effluent limits is not prohibited, but those processes will not be considered part of the BNR process for purposes of this permit.

E. The 0.5 mg/L Total Phosphorus 12 month rolling geometric mean (calculated monthly) effluent limit applies to the effluent from the treatment plant.

SPECIAL CONDITION 23. The Agency has determined that the Permittee's treatment plant effluent is located upstream of a waterbody or stream segment that has been determined to have a phosphorus related impairment. This determination was made upon reviewing available information concerning the characteristics of the relevant waterbody/segment and the relevant facility (such as quantity of discharge flow and nutrient load relative to the stream flow).

A phosphorus related impairment means that the downstream waterbody or segment is listed by the Agency as impaired due to dissolved oxygen and/or offensive condition (algae and/or aquatic plant growth) impairments that is related to excessive phosphorus levels.

The Permittee shall develop, or be a part of a watershed group that develops, a Nutrient Assessment Reduction Plan (NARP) that will meet the following requirements:

A. The NARP shall be developed and submitted to the Agency by December 31, 2024. This requirement can be accomplished by the Permittee, by participation in an existing watershed group or by creating a new group. The NARP shall be supported by data and sound scientific rationale.
B. The Permittee shall cooperate with and work with other stakeholders in the watershed to determine the most cost-effective means to address the phosphorus related impairment. If other stakeholders in the watershed will not cooperate in developing the NARP, the Permittee shall develop its own NARP for submittal to the Agency to comply with this condition.
C. In determining the target levels of various parameters necessary to address the phosphorus related impairment, the NARP shall either utilize the recommendations by the Nutrient Science Advisory Committee or develop its own watershed-specific target levels.
D. The NARP shall identify phosphorus input reductions by point source discharges and non-point source discharges in addition to other measures necessary to remove phosphorus related impairments in the watershed. The NARP may determine, based on an assessment of relevant data, that the watershed does not have an impairment related to phosphorus, in which case phosphorus input reductions or other measures would not be necessary. Alternatively, the NARP could determine that phosphorus input reductions from point sources are not necessary, or that phosphorus input reductions from both point and nonpoint sources are necessary, or that phosphorus input reductions are not necessary and that other measures, besides phosphorus input reductions, are necessary.
E. The NARP shall include a schedule for the implementation of the phosphorus input reductions by point sources, non-point sources and other measures necessary to remove phosphorus related impairments. The NARP schedule shall be implemented as soon as possible, and shall identify specific timelines applicable to the Permittee.
F. The NARP can include provisions for water quality trading to address the phosphorus related impairments in the watershed. Phosphorus/Nutrient trading cannot result in violations of water quality standards or applicable antidegradation requirements.
G. The Permittee shall request modification of the permit within 90 days after the NARP has been completed to include necessary phosphorus input reductions identified within the NARP. The Agency will modify the NPDES permit, if necessary.
H. If the Permittee does not develop or assist in developing the NARP, and such a NARP is developed for the watershed, the Permittee will become subject to effluent limitations necessary to address the phosphorus related impairments. The Agency shall calculate these effluent limits by using the NARP and any applicable data. If no NARP has been developed, the effluent limits shall be determined for the Permittee on a case-by-case basis, so as to ensure that the Permittee's discharge will not cause or contribute to violations of the dissolved oxygen or narrative water quality standards.

Attachment H

Standard Conditions

Definitions

Act means the Illinois Environmental Protection Act, 415 ILCS 5 as Amended.

Agency means the Illinois Environmental Protection Agency.

Board means the Illinois Pollution Control Board.

Clean Water Act (formerly referred to as the Federal Water Pollution Control Act) means Pub. L 92-500, as amended. 33 U.S.C. 1251 et seq.

NPDES (National Pollutant Discharge Elimination System) means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 402, 318 and 405 of the Clean Water Act.

USEPA means the United States Environmental Protection Agency.

Daily Discharge means the discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurements, the "daily discharge" is calculated as the average measurement of the pollutant over the day.

Maximum Daily Discharge Limitation (daily maximum) means the highest allowable daily discharge.

Average Monthly Discharge Limitation (30 day average) means the highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

Average Weekly Discharge Limitation (7 day average) means the highest allowable average of daily discharges over a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week.

Best Management Practices (BMPs) means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the State. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Aliquot means a sample of specified volume used to make up a total composite sample.

Grab Sample means an individual sample of at least 100 milliliters collected at a randomly-selected time over a period not exceeding 15 minutes.

24-Hour Composite Sample means a combination of at least 8 sample aliquots of at least 100 milliliters, collected at periodic intervals during the operating hours of a facility over a 24-hour period.

8-Hour Composite Sample means a combination of at least 3 sample aliquots of at least 100 milliliters, collected at periodic intervals during the operating hours of a facility over an 8-hour period.

Flow Proportional Composite Sample means a combination of sample aliquots of at least 100 milliliters collected at periodic intervals such that either the time interval between each aliquot or the volume of each aliquot is proportional to either the stream flow at the time of sampling or the total stream flow since the collection of the previous aliquot.

(1) **Duty to comply**. The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Act and is grounds for enforcement action, permit termination, revocation and reissuance, modification, or for denial of a permit renewal application. The permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions, even if the permit has not yet been modified to incorporate the requirements.

(2) **Duty to reapply**. If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit. If the permittee submits a proper application as required by the Agency no later than 180 days prior to the expiration date, this permit shall continue in full force and effect until the final Agency decision on the application has been made.

(3) **Need to halt or reduce activity not a defense.** It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

(4) **Duty to mitigate.** The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

(5) **Proper operation and maintenance**. The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up, or auxiliary facilities, or similar systems only when necessary to achieve compliance with the conditions of the permit.

(6) **Permit actions.** This permit may be modified, revoked and reissued, or terminated for cause by the Agency pursuant to 40 CFR 122.62 and 40 CFR 122.63. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

(7) **Property rights.** This permit does not convey any property rights of any sort, or any exclusive privilege.

(8) **Duty to provide information.** The permittee shall furnish to the Agency within a reasonable time, any information which the Agency may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with the permit. The permittee shall also furnish to the Agency upon request, copies of records required to be kept by this permit.

(9) **Inspection and entry**. The permittee shall allow an authorized representative of the Agency or USEPA (including an authorized contractor acting as a representative of the Agency or USEPA), upon the presentation of credentials and other documents as may be required by law, to:
   (a) Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records

must be kept under the conditions of this permit;

(b) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

(c) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

(d) Sample or monitor at reasonable times, for the purpose of assuring permit compliance, or as otherwise authorized by the Act, any substances or parameters at any location.

(10) **Monitoring and records.**

(a) Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

(b) The permittee shall retain records of all monitoring information, including all calibration and maintenance records, and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of this permit, measurement, report or application. Records related to the permittee's sewage sludge use and disposal activities shall be retained for a period of at least five years (or longer as required by 40 CFR Part 503). This period may be extended by request of the Agency or USEPA at any time.

(c) Records of monitoring information shall include:

(1) The date, exact place, and time of sampling or measurements;

(2) The individual(s) who performed the sampling or measurements;

(3) The date(s) analyses were performed;

(4) The individual(s) who performed the analyses;

(5) The analytical techniques or methods used; and

(6) The results of such analyses.

(d) Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit. Where no test procedure under 40 CFR Part 136 has been approved, the permittee must submit to the Agency a test method for approval. The permittee shall calibrate and perform maintenance procedures on all monitoring and analytical instrumentation at intervals to ensure accuracy of measurements.

(11) **Signatory requirement.** All applications, reports or information submitted to the Agency shall be signed and certified.

(a) **Application.** All permit applications shall be signed as follows:

(1) For a corporation: by a principal executive officer of at least the level of vice president or a person or position having overall responsibility for environmental matters for the corporation:

(2) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or

(3) For a municipality, State, Federal, or other public agency: by either a principal executive officer or ranking elected official.

(b) **Reports.** All reports required by permits, or other information requested by the Agency shall be signed by a person described in paragraph (a) or by a duly authorized representative of that person. A person is a duly authorized representative only if:

(1) The authorization is made in writing by a person described in paragraph (a); and

(2) The authorization specifies either an individual or a position responsible for the overall operation of the facility, from which the discharge originates, such as a plant manager, superintendent or person of equivalent responsibility; and

(3) The written authorization is submitted to the Agency.

(c) **Changes of Authorization.** If an authorization under (b) is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of (b) must be submitted to the Agency prior to or together with any reports, information, or applications to be signed by an authorized representative.

(d) **Certification.** Any person signing a document under paragraph (a) or (b) of this section shall make the following certification:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

(12) **Reporting requirements.**

(a) **Planned changes.** The permittee shall give notice to the Agency as soon as possible of any planned physical alterations or additions to the permitted facility.
Notice is required when:

(1) The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source pursuant to 40 CFR 122.29 (b); or

(2) The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements pursuant to 40 CFR 122.42 (a)(1).

(3) The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan.

(b) **Anticipated noncompliance.** The permittee shall give advance notice to the Agency of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

(c) **Transfers.** This permit is not transferable to any person except after notice to the Agency.

(d) **Compliance schedules.** Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date.

(e) **Monitoring reports.** Monitoring results shall be reported at the intervals specified elsewhere in this permit.

(1) Monitoring results must be reported on a Discharge Monitoring Report (DMR).

(2) If the permittee monitors any pollutant more frequently than required by the permit, using test procedures approved under 40 CFR 136 or as specified in the permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR.

(3) Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified by the Agency in the permit.

(f) **Twenty-four hour reporting**. The permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24-hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and time; and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. The following shall be included as information which must be reported within 24-hours:

(1) Any unanticipated bypass which exceeds any effluent limitation in the permit.

(2) Any upset which exceeds any effluent limitation in the permit.

(3) Violation of a maximum daily discharge limitation for any of the pollutants listed by the Agency in the permit or any pollutant which may endanger health or the environment.

The Agency may waive the written report on a case-by-case basis if the oral report has been received within 24-hours.

(g) **Other noncompliance**. The permittee shall report all instances of noncompliance not reported under paragraphs (12) (d), (e), or (f), at the time monitoring reports are submitted. The reports shall contain the information listed in paragraph (12) (f).

(h) **Other information**. Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application, or in any report to the Agency, it shall promptly submit such facts or information.

(13) **Bypass**.

(a) Definitions.

(1) Bypass means the intentional diversion of waste streams from any portion of a treatment facility.

(2) Severe property damage means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

(b) Bypass not exceeding limitations. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs (13)(c) and (13)(d).

(c) Notice.

(1) Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least ten days before the date of the bypass.

(2) Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in paragraph (12)(f) (24-hour notice).

(d) Prohibition of bypass.

(1) Bypass is prohibited, and the Agency may take enforcement action against a permittee for bypass, unless:

(i) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

(ii) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

(iii) The permittee submitted notices as required under paragraph (13)(c).

(2) The Agency may approve an anticipated bypass, after considering its adverse effects, if the Agency determines that it will meet the three conditions listed above in paragraph (13)(d)(1).

(14) **Upset**.

(a) Definition. Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

(b) Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of paragraph (14)(c) are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

(c) Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

(1) An upset occurred and that the permittee can identify the cause(s) of the upset;

(2) The permitted facility was at the time being properly operated; and

(3) The permittee submitted notice of the upset as required in paragraph (12)(f)(2) (24-hour notice).

(4) The permittee complied with any remedial measures required under paragraph (4).

(d) Burden of proof. In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.

(15) **Transfer of permits**. Permits may be transferred by modification or automatic transfer as described below:

(a) Transfers by modification. Except as provided in paragraph (b), a permit may be transferred by the permittee to a new owner or operator only if the permit has been modified or revoked and reissued pursuant to 40 CFR 122.62 (b) (2), or a minor modification made pursuant to 40 CFR 122.63 (d), to identify the new permittee and incorporate such other requirements as may be necessary under the Clean Water Act.

(b) Automatic transfers. As an alternative to transfers under paragraph (a), any NPDES permit may be automatically transferred to a new permittee if:
  (1) The current permittee notifies the Agency at least 30 days in advance of the proposed transfer date;
  (2) The notice includes a written agreement between the existing and new permittees containing a specified date for transfer of permit responsibility, coverage and liability between the existing and new permittees; and
  (3) The Agency does not notify the existing permittee and the proposed new permittee of its intent to modify or revoke and reissue the permit. If this notice is not received, the transfer is effective on the date specified in the agreement.

(16) All manufacturing, commercial, mining, and silvicultural dischargers must notify the Agency as soon as they know or have reason to believe:
  (a) That any activity has occurred or will occur which would result in the discharge of any toxic pollutant identified under Section 307 of the Clean Water Act which is not limited in the permit, if that discharge will exceed the highest of the following notification levels:
    (1) One hundred micrograms per liter (100 ug/l);
    (2) Two hundred micrograms per liter (200 ug/l) for acrolein and acrylonitrile; five hundred micrograms per liter (500 ug/l) for 2,4-dinitrophenol and for 2-methyl-4,6 dinitrophenol; and one milligram per liter (1 mg/l) for antimony.
    (3) Five (5) times the maximum concentration value reported for that pollutant in the NPDES permit application; or
    (4) The level established by the Agency in this permit.
  (b) That they have begun or expect to begin to use or manufacture as an intermediate or final product or byproduct any toxic pollutant which was not reported in the NPDES permit application.

(17) All Publicly Owned Treatment Works (POTWs) must provide adequate notice to the Agency of the following:
  (a) Any new introduction of pollutants into that POTW from an indirect discharge which would be subject to Sections 301 or 306 of the Clean Water Act if it were directly discharging those pollutants; and
  (b) Any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.
  (c) For purposes of this paragraph, adequate notice shall include information on (i) the quality and quantity of effluent introduced into the POTW, and (ii) any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

(18) If the permit is issued to a publicly owned or publicly regulated treatment works, the permittee shall require any industrial user of such treatment works to comply with federal requirements concerning:
  (a) User charges pursuant to Section 204 (b) of the Clean Water Act, and applicable regulations appearing in 40 CFR 35;
  (b) Toxic pollutant effluent standards and pretreatment standards pursuant to Section 307 of the Clean Water Act; and
  (c) Inspection, monitoring and entry pursuant to Section 308 of the Clean Water Act.

(19) If an applicable standard or limitation is promulgated under Section 301(b)(2)(C) and (D), 304(b)(2), or 307(a)(2) and that effluent standard or limitation is more stringent than any effluent limitation in the permit, or controls a pollutant not limited in the permit, the permit shall be promptly modified or revoked, and reissued to conform to that effluent standard or limitation.

(20) Any authorization to construct issued to the permittee pursuant to 35 Ill. Adm. Code 309.154 is hereby incorporated by reference as a condition of this permit.

(21) The permittee shall not make any false statement, representation or certification in any application, record, report, plan or other document submitted to the Agency or the USEPA, or required to be maintained under this permit.

(22) The Clean Water Act provides that any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Clean Water Act is subject to a civil penalty not to exceed $25,000 per day of such violation. Any person who willfully or negligently violates permit conditions implementing Sections 301, 302, 306, 307, 308, 318 or 405 of the Clean Water Act is subject to a fine of not less than $2,500 nor more than $25,000 per day of violation, or by imprisonment for not more than one year, or both.
Additional penalties for violating these sections of the Clean Water Act are identified in 40 CFR 122.41 (a)(2) and (3).

(23) The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than 2 years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than 4 years, or both.

(24) The Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

(25) Collected screening, slurries, sludges, and other solids shall be disposed of in such a manner as to prevent entry of those wastes (or runoff from the wastes) into waters of the State. The proper authorization for such disposal shall be obtained from the Agency and is incorporated as part hereof by reference.

(26) In case of conflict between these standard conditions and any other condition(s) included in this permit, the other condition(s) shall govern.

(27) The permittee shall comply with, in addition to the requirements of the permit, all applicable provisions of 35 Ill. Adm. Code, Subtitle C, Subtitle D, Subtitle E, and all applicable orders of the Board or any court with jurisdiction.

(28) The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit is held invalid, the remaining provisions of this permit shall continue in full force and effect.

Appendix C

East WWTP Effluent Water Quality Summary (2017 – 2021)

East Wastewater Treatment Facility Analysis
WWTP Characterization for 5-Day BOD (2017-2021)

Village of Huntley, Illinois

Month - Year	Existing WWTP eDMR Values										
	Measured Flow				Influent BOD (5-Day)		Effluent BOD (5-Day)				Removal %
	Influent		Effluent		Loading	Concentration	Loading		Concentration		Loading
	Avg (MGD)	Max (MGD)	Avg (MGD)	Max (MGD)	Average (lbs/day)	Average (mg/L)	Average (lbs/day)	Maximum (lbs/day)	Average (mg/L)	Maximum (mg/L)	Average (lbs/day)
Permit Requirement	**1.8**	**N/A**	**1.8**	**N/A**	**N/A**	**N/A**	**Mo. Avg. = 375**	**Daily Max. = 751**	**Mo. Avg. = 10**	**Daily Max. = 20**	**N/A**
Jan-17	1.142	1.507	1.002	1.468	3881	317	21.16	50.5	2.5	4.8	99.5%
Feb-17	1.055	1.218	0.898	1.016	3330	393	25.19	47.62	3.36	6.02	99.2%
Mar-17	1.136	2.382	1.003	2.293	4494	235	24.59	30.01	2.94	3.47	99.5%
Apr-17	1.366	1.916	1.234	1.786	2994	201	27.95	44.83	2.7	3.6	99.1%
May-17	1.214	1.841	1.214	1.841	3961	258	24.01	26.39	2.37	2.78	99.4%
Jun-17	1.192	2.236	1.066	2.09	4532	260	26.3	28.7	2.96	5.72	99.4%
Jul-17	1.646	3.246	1.502	2.96	4419	179	29.59	29.13	2.36	3.05	99.3%
Aug-17	1.131	1.34	0.976	1.163	2066	213	20.5	27.8	2.52	3.67	99.0%
Sep-17	0.987	1.144	0.827	0.968	1792	222	15.95	19.8	2.31	2.92	99.1%
Oct-17	1.237	2.583	1.105	2.529	4957	235	21.52	37.46	2.34	3.8	99.6%
Nov-17	1.11	1.256	0.965	1.097	2525	276	19.45	36.45	2.42	4.05	99.2%
Dec-17	0.99	1.155	0.844	0.945	1576	200	19.74	28.44	2.81	4.37	98.7%
Jan-18	1.05	1.302	0.88	1.216	3134	309	23.75	48.59	3.21	7.45	99.2%
Feb-18	1.202	2.344	1.063	2.208	3407	185	27.08	33.71	3.06	4.47	99.2%
Mar-18	1.101	1.422	0.944	1.218	2509	247	24.78	28.57	3.15	4.08	99.0%
Apr-18	1.095	1.466	0.956	1.356	2737	242	29.71	49.04	3.73	6.53	98.9%
May-18	1.195	1.937	1.087	1.85	3734	242	37.83	62.28	4.18	5.77	99.0%
Jun-18	1.502	3.165	1.415	3.25	10029	370	40.45	41.41	3.43	5.18	99.6%
Jul-18	1.168	1.541	1.033	1.479	3441	279	30.73	45.07	3.57	5.82	99.1%
Aug-18	1.141	1.478	0.983	1.324	4870	441	30.74	48.99	3.75	5.93	99.4%
Sep-18	1.37	3.12	1.23	3.15	6778	258	33.27	41.18	3.23	5.52	99.5%
Oct-18	1.21	1.64	1.1	1.6	4417	331	31	78.17	3.38	9.22	99.3%
Nov-18	1.12	1.41	0.98	1.26	2743	261	28.99	82.19	3.55	9.05	98.9%
Dec-18	1.2	1.88	1.06	1.86	4126	266	29.56	28.22	3.33	4	99.3%
Jan-19	1.12	1.6	0.98	1.49	3467	279	24.08	35.88	2.96	4.12	99.3%
Feb-19	1.34	2.24	1.19	2.1	4151	237	33.07	38.54	3.32	3.97	99.2%
Mar-19	1.16	1.64	1.02	1.54	2697	210	26.7	39.69	3.15	4.72	99.0%
Apr-19	1.13	2.04	1	1.97	4814	293	25.18	37.64	3.01	3.88	99.5%
May-19	1.55	2.49	1.46	2.42	4602	228	37.39	46.48	3.07	4.15	99.2%
Jun-19	1.27	2.34	1.19	2.22	4277	231	29.27	42.75	2.95	3.98	99.3%
Jul-19	1.12	1.45	1.02	1.63	3657	269	26.93	35.47	3.15	4.7	99.3%
Aug-19	0.96	1.14	0.83	1.06	2687	304	21.75	31.05	3.14	4.87	99.2%
Sep-19	1.29	2.56	1.19	2.45	6436	315	44.53	80.32	4.5	7.77	99.3%
Oct-19	1.23	1.86	1.13	1.78	3682	248	30.64	62.72	3.26	5.3	99.2%
Nov-19	1.15	1.5	1.02	1.42	2416	204	26.29	35.51	3.09	4.02	98.9%
Dec-19	1.02	1.34	0.93	1.32	2620	238.0	21.64	26.68	2.8	3.75	99.2%
Jan-20	1.11	1.5	1.02	1.43	3041	255.0	24.1	36.76	2.84	4.25	99.2%
Feb-20	1.03	1.32	0.93	1.2	2379	237.75	26.69	26.27	3.43	4.03	98.9%
Mar-20	1.22	2.36	1.12	2.37	4931	249.49	25.46	61.1	2.73	3.85	99.5%
Apr-20	1.22	3.46	1.14	3.42	6960	244.0	48.37	195.45	5.1	15.1	99.3%
May-20	1.81	3.64	1.74	4.13	6069	176.19	41.54	171.69	2.86	4.98	99.3%
Jun-20	1.1	1.38	1.02	1.32	2301	209.0	30.7	57.35	3.6	7.67	98.7%
Jul-20	0.99	1.22	0.89	1.1	1780	194.0	23.12	48.56	3.11	6.03	98.7%
Aug-20	0.88	0.98	0.77	0.92	2298	299.56	22.88	38.68	3.55	6.2	99.0%
Sep-20	1.03	1.46	0.92	1.4	2288	196.0	25.16	43.94	3.28	6.08	98.9%
Oct-20	0.93	1.22	0.81	1.12	2120	227.0	20.23	28.76	2.98	4.82	99.0%
Nov-20	0.95	1.26	0.83	1.2	2482	248.0	21.04	29.45	3.05	4.33	99.2%
Dec-20	0.98	1.17	0.87	1.11	2129	230.0	22.18	38.33	3.07	4.9	99.0%
Jan-21	0.95	1.1	0.88	1.05	2110	241.0	19.50	41.45	2.65	4.73	99.1%
Feb-21	0.96	1.2	0.88	1.21	2462	244.0	17.88	20.22	2.44	2.88	99.3%
Mar-21	1.17	1.59	1.13	1.61	3326	247.67	29.34	44.21	2.12	3.73	99.1%
Apr-21	1.04	1.29	0.97	1.28	1698	159.08	22.81	33.96	2.83	3.62	98.7%
May-21	0.89	1.08	0.83	1.02	2365	278.0	20.1	29.93	2.9	3.85	99.2%
Jun-21	0.89	1.514	0.862	1.487	2939	237.0	25.1	33.3	3.5	5.1	99.1%
Jul-21	0.878	1.225	0.854	1.217	2136	272.0	26.5	39.6	3.4	4.3	98.8%
Aug-21	0.971	1.834	0.911	1.743	2102	253.1	29.7	51.2	3.3	4.2	98.6%
Sep-21	0.800	1.045	0.770	0.989	2667	358.0	28.3	67.3	4.1	9.1	98.9%
Oct-21	0.923	1.278	0.857	1.215	1947	263.5	19.7	29.1	2.8	3.8	99.0%
Nov-21	0.944	1.066	0.831	1.000	2643	323.8	17.7	20.8	2.5	2.8	99.3%
Dec-21	0.976	1.150	0.864	1.098	1726	214.5	22.2	31.2	3.2	4.2	98.7%
Average	1.126	1.718	1.017	1.649	3414	256	26.69	45.43	3.12	5.02	99.1%
Maximum	1.810	3.640	1.740	4.130	10029	441	48.37	195.45	5.10	15.10	99.6%
Minimum	0.800	0.980	0.770	0.920	1576	159	15.95	19.80	2.12	2.78	98.6%

-- Represents non reported or inconsistent value on eDMR.

* Average Effluent Loading was reported as higher than the Maximum Loading in July 2017, December 2018, and February 2020.

Black Text: data obtained from Discharge Monitoring Reports; Blue Text: data obtained from Waterly website

East Wastewater Treatment Facility Analysis
WWTP Characterization for TSS (2017-2021)
Village of Huntley, Illinois

Month - Year	Existing WWTP eDMR Values								
	Measured Flow		Influent TSS		Effluent TSS				Removal %
	Influent	Effluent	Loading	Concentration	Loading		Concentration		Loading
	Average (MGD)	Average (MGD)	Average (lbs/day)	Average (mg/L)	Average (lbs/day)	Maximum (lbs/day)	Average (mg/L)	Maximum (mg/L)	Average (lbs/day)
Permit Requirement	**1.8**	**1.8**	**N/A**	**N/A**	**Mo. Avg. = 450**	**Daily Max. = 901**	**Mo. Avg. = 12**	**Daily Max. = 24**	**N/A**
Jan-17	1.142	1.002	3518	421	17.04	61.22	2	5	99.5%
Feb-17	1.055	0.898	2629	351	13.41	31.79	1.79	4	99.5%
Mar-17	1.136	1.003	1890	226	14.16	42.37	1.69	5	99.3%
Apr-17	1.366	1.234	2254	219	17.5	39.71	1.7	4.5	99.2%
May-17	1.214	1.214	2278	225	15.18	25.35	1.5	2.5	99.3%
Jun-17	1.192	1.066	3921	441	22.23	47.29	2.5	5	99.4%
Jul-17	1.646	1.502	1766	141	20.87	29.65	1.67	3	98.8%
Aug-17	1.131	0.976	2906	357	15.6	52.2	1.9	5.5	99.5%
Sep-17	0.987	0.827	1745	253	14.42	47.16	2.09	6.5	99.2%
Oct-17	1.237	1.105	1705	185	14.97	31.47	1.63	3.5	99.1%
Nov-17	1.11	0.965	1771	220	15.43	22.39	1.92	3	99.1%
Dec-17	0.99	0.844	1464	208	13.49	20.74	1.92	3	99.1%
Jan-18	1.05	0.88	2180	297	20.24	48.36	2.73	6.5	99.1%
Feb-18	1.202	1.063	1950	220	26.19	69.14	2.95	5	98.7%
Mar-18	1.101	0.944	1630	207	27.26	38.48	3.46	5.5	98.3%
Apr-18	1.095	0.956	1611	202	48.44	51.97	6.08	8	97.0%
May-18	1.195	1.087	2321	256	75.28	83.47	8.31	18.5	96.8%
Jun-18	1.502	1.415	2573	218	34.5	71.18	2.92	6.5	98.7%
Jul-18	1.168	1.033	2524	293	30.81	62.38	3.58	8	98.8%
Aug-18	1.141	0.983	2738	334	30.76	66.49	3.75	7.5	98.9%
Sep-18	1.37	1.23	2390	233	24.87	47.39	2.42	6	99.0%
Oct-18	1.21	1.1	2330	254	25.24	62.3	2.75	7.5	98.9%
Nov-18	1.12	0.98	1676	205	28.56	144.3	3.5	17	98.3%
Dec-18	1.2	1.06	2175	246	35.82	43.63	4.04	6	98.4%
Jan-19	1.12	0.98	1684	206	32.99	45.89	4.05	6	98.0%
Feb-19	1.34	1.19	1638	165	26.99	61.05	2.71	6	98.4%
Mar-19	1.16	1.02	1795	211	28.38	68.89	3.35	7	98.4%
Apr-19	1.13	1	2060	247	25.76	42.78	3.08	5	98.7%
May-19	1.55	1.46	3580	294	48.7	97.83	4	8.5	98.6%
Jun-19	1.27	1.19	1965	198	34.35	166.82	3.46	10.5	98.3%
Jul-19	1.12	1.02	1667	196	11.89	28.12	1.39	3	99.3%
Aug-19	0.96	0.83	1717	248	14.12	40.37	2	5.5	99.2%
Sep-19	1.29	1.19	1598	161	20.63	62.47	2.08	5	98.7%
Oct-19	1.23	1.13	1659	176	11.35	17.75	1.21	2	99.3%
Nov-19	1.15	1.02	1940	228	30.42	61.88	3.58	7	98.4%
Dec-19	1.02	0.93	1955	252.0	36.92	53.36	4.77	7.5	98.1%
Jan-20	1.11	1.02	2467	290.0	43.1	66.37	5.07	7.5	98.3%
Feb-20	1.03	0.93	1877	242.0	35.95	59.43	4.62	7.0	98.1%
Mar-20	1.22	1.12	4474	479.0	47.7	81.95	5.12	8.5	98.9%
Apr-20	1.22	1.14	2358	248.0	49.92	89.32	5.27	10.0	97.9%
May-20	1.81	1.74	2844	196.0	63.1	71.86	4.35	8.0	97.8%
Jun-20	1.1	1.02	1421	167.0	41.95	54.64	4.92	7.0	97.0%
Jul-20	0.99	0.89	987	133.0	36.37	68.41	4.89	8.5	96.3%
Aug-20	0.88	0.77	2293	357.0	28.75	58.71	4.46	9.5	98.7%
Sep-20	1.03	0.92	1673	218.0	31.32	51.77	4.08	8.0	98.1%
Oct-20	0.93	0.81	1567	232.0	24.59	73.21	3.63	10.5	98.4%
Nov-20	0.95	0.83	1814	262.0	30.55	93.82	4.42	12.5	98.3%
Dec-20	0.98	0.87	1509	208.0	25.78	43.03	3.57	5.5	98.3%
Jan-21	0.95	0.88	1622	221.0	32.53	73.03	4.42	10.5	98.0%
Feb-21	0.96	0.88	2260	308.0	46.68	49.35	6.31	7.5	97.9%
Mar-21	1.17	1.13	2318	246.0	49.85	70.86	5.30	8.0	97.8%
Apr-21	1.040	0.970	1782	208.0	21.16	36.28	2.62	5.0	98.8%
May-21	0.890	0.830	2399	310.0	35.53	46.89	5.12	6.0	98.5%
Jun-21	0.890	0.862	1876	250.0	43.0	46.0	6.0	7.0	97.7%
Jul-21	0.878	0.854	2256	292.0	44.0	64.0	6.0	9.0	98.0%
Aug-21	0.971	0.911	2328	260	48	61	6	9	97.9%
Sep-21	0.800	0.770	2469	338	35	65	5	10	98.6%
Oct-21	0.923	0.857	2388	345	36	61	5	8	98.5%
Nov-21	0.944	0.831	1851	228	14	22	2	3	99.2%
Dec-21	0.976	0.864	3011	356	24	35	4	6	99.2%
Average	1.126	1.017	2151	253	30.2	57.2	3.6	7.0	98.5%
Maximum	1.810	1.740	4474	479	75.3	166.8	8.3	18.5	99.5%
Minimum	0.800	0.770	987	133	11.4	17.8	1.2	2.0	96.3%

-- Represents non reported or inconsistent value on eDMR.

Black Text: data obtained from Discharge Monitoring Reports; Blue Text: data obtained from Waterly website

East Wastewater Treatment Facility Analysis
WWTP Characterization for NH_3-N (2017-2021)
Village of Huntley, Illinois

Month - Year	Existing WWTP eDMR Values													
	Measured Flow		Effluent NH_3-N											
	Influent	Effluent	Loading						Concentration					
	Average (MGD)	Average (MGD)	Average (lbs/day)		Maximum (lbs/day)		Weekly Avg. (lbs/day)		Average (mg/L)		Maximum (mg/L)		Weekly Avg. (mg/L)	
Permit Requirement	1.8	1.8	Monthly	Permit Limit Varies	Daily	Permit Limit Varies	Weekly	Permit Limit Varies	Monthly	Permit Limit Varies	Daily	Permit Limit Varies	Weekly	Permit Limit Varies
Jan-17	1.142	1.002	0.66	53.0	0.77	188.0			0.08	1.4	0.09	5.0		
Feb-17	1.055	0.898	0.57	53.0	0.69	188.0			0.08	1.4	0.1	5.0		
Mar-17	1.136	1.003	--	--	--	--	0.69	143.0	--	--	--	--	0.09	3.8
Apr-17	1.366	1.234	1.17	41.0	2.34	176.0	0.9	143.0	0.1	1.1	0.3	4.7	0.1	3.8
May-17	1.214	1.214	1.58	41.0	5.16	176.0	1.63	143.0	0.16	1.1	0.6	4.7	0.14	3.8
Jun-17	1.192	1.066	0.79	41.0	1.85	184.0	6.7	124.0	0.09	1.1	0.2	4.9	0.9	3.3
Jul-17	1.646	1.502	1.89	41.0	4.12	184.0	2.1	124.0	0.15	1.1	0.49	4.9	0.16	3.3
Aug-17	1.131	0.976	0.65	41.0	0.73	184.0	0.62	124.0	0.08	1.1	0.09	4.9	0.08	3.3
Sep-17	0.987	0.827	0.98	41.0	5.85	176.0	0.59	143.0	0.1	1.1	0.9	4.7	0.09	3.8
Oct-17	1.237	1.105	0.78	41.0	0.89	176.0	0.5	143.0	0.09	1.1	0.13	4.7	0.08	3.8
Nov-17	1.11	0.965	0.63	53.0	0.79	188.0			0.08	1.4	0.09	5.0		
Dec-17	0.99	0.844	0.53	53.0	0.66	188.0			0.07	1.4	0.09	5.0		
Jan-18	1.05	0.88	20.24	53.0	11.88	188.0			0.45	1.4	2	5.0		
Feb-18	1.202	1.063	0.97	53.0	2.93	188.0			0.11	1.4	0.4	5.0		
Mar-18	1.101	0.944	--	--	--	--	27.26	143.0	--	--	--	--	0.2	3.8
Apr-18	1.095	0.956	4.61	41.0	19.52	176.0	5.15	143.0	0.58	1.1	2.6	4.7	0.694	3.8
May-18	1.195	1.087	1.27	41.0	3.54	176.0	1.35	143.0	0.14	1.1	0.4	4.7	0.15	3.8
Jun-18	1.502	1.415	1.79	41.0	3.98	184.0	1.6	124.0	0.15	1.1	0.49	4.9	0.2	3.3
Jul-18	1.168	1.033	1.36	41.0	4.19	184.0	1.6	124.0	0.16	1.1	0.5	4.9	0.2	3.3
Aug-18	1.141	0.983	3.07	41.0	10.6	184.0	3	124.0	0.37	1.1	1.31	4.9	0.38	3.3
Sep-18	1.37	1.23	2.7	41.0	12.91	176.0	2	143.0	0.26	1.1	1.73	4.7	0.2	3.8
Oct-18	1.21	1.1	0.98	41.0	3.41	176.0	1	143.0	0.11	1.1	0.37	4.7	0.1	3.8
Nov-18	1.12	0.98	1.49	53.0	5.49	188.0			0.18	1.4	0.7	5.0		
Dec-18	1.2	1.06	2.2	53.0	9.71	188.0			0.25	1.4	1.4	5.0		
Jan-19	1.12	0.98	1.53	53.0	7.2	188.0			0.19	1.4	0.99	5.0		
Feb-19	1.34	1.19	1.19	53.0	3.89	188.0			0.12	1.4	0.4	5.0		
Mar-19	1.16	1.02	--	--	--	--	0.6	143.0	--	--	--	--	0.08	3.8
Apr-19	1.13	1	3.04	41.0	17.78	176.0	3.33	143.0	0.36	1.1	2.2	4.7	0.37	3.8
May-19	1.55	1.46	1.52	41.0	8.06	176.0	2.13	143.0	0.12	1.1	0.7	4.7	0.16	3.8
Jun-19	1.27	1.19	0.74	41.0	0.69	184.0	0.94	124.0	0.08	1.1	0.09	4.9	0.07	3.3
Jul-19	1.12	1.02	0.66	41.0	0.87	184.0	0.77	124.0	0.08	1.1	0.1	4.9	0.08	3.3
Aug-19	0.96	0.83	0.62	41.0	0.8	184.0	0.58	124.0	0.09	1.1	0.13	4.9	0.09	3.3
Sep-19	1.29	1.19	4.62	41.0	38.85	176.0	5.66	143.0	0.47	1.1	3.1	4.7	0.51	3.8
Oct-19	1.23	1.13	1.42	41.0	8.25	176.0	1.12	143.0	0.15	1.1	1.11	4.7	0.14	3.8
Nov-19	1.15	1.02	3.59	53.0	10.52	188.0			0.42	1.4	1.4	5.0		
Dec-19	1.02	0.93	2.68	53.0	20.96	188.0			0.35	1.4	2.4	5.0		
Jan-20	1.11	1.02	0.69	53.0	1.07	188.0			0.08	1.4	0.12	5.0		
Feb-20	1.03	0.93	0.93	53.0	3.30	188.0			0.12	1.4	0.47	5.0		
Mar-20	1.22	1.12	--	--	--	--	3.1	143.0	--	--	--	--	0.27	3.8
Apr-20	1.22	1.14	0.72	41.0	0.75	176.0	3.12	143.0	0.08	1.1	0.1	4.7	0.36	3.8
May-20	1.81	1.74	1.57	41.0	7.89	176.0	1.11	143.0	0.11	1.1	0.49	4.7	0.08	3.8
Jun-20	1.1	1.02	0.79	41.0	1.35	184.0	1.11	124.0	0.09	1.1	0.17	4.9	0.11	3.3
Jul-20	0.99	0.89	1.39	41.0	3.68	184.0	1.01	124.0	0.19	1.1	0.5	4.9	0.15	3.3
Aug-20	0.88	0.77	1.02	41.0	2.39	184.0	1.37	124.0	0.16	1.1	0.41	4.9	0.21	3.3
Sep-20	1.03	0.92	1.06	41.0	7.96	176.0	1.36	143.0	0.14	1.1	0.89	4.7	0.18	3.8
Oct-20	0.93	0.81	0.51	41.0	0.56	176.0	0.49	143.0	0.08	1.1	0.09	4.7	0.759	3.8
Nov-20	0.95	0.83	0.51	53.0	0.49	188.0			0.07	1.4	0.08	5.0		
Dec-20	0.98	0.87	0.54	53.0	0.57	188.0			0.08	1.4	0.08	5.0		
Jan-21	0.95	0.88	0.56	53.0	0.63	188.0			0.08	1.4	0.08	5.0		
Feb-21	0.96	0.88	0.55	53.0	0.70	188.0			0.08	1.4	0.08	5.0		
Mar-21	1.17	1.13	--	--	--	--	2.16	143.0	--	--	--	--	0.22	3.8
Apr-21	1.04	0.97	0.75	41.0	1.13	176.0	0.43	124.0	0.09	1.1	0.16	4.7	0.08	3.3
May-21	0.89	0.83	0.85	41.0	1.55	176.0	0.63	124.0	0.12	1.1	0.20	4.7	0.09	3.3
Jun-21	0.89	0.862	0.57	41.0	0.67	176.0	0.57	105.0	0.08	1.1	0.1	4.7	0.08	2.8
Jul-21	0.878	0.854	0.56	41.0	0.57	176.0	0.57	105.0	0.08	1.1	0.08	4.7	0.08	2.8
Aug-21	0.971	0.911	0.70	41.0	0.85	184.0	--	124.0	0.08	1.1	0.10	4.9	0.08	3.3
Sep-21	0.800	0.770	4.70	41.0	16.66	184.0	--	169.0	0.65	1.1	2.02	4.9	0.78	4.5
Oct-21	0.923	0.857	1.51	41.0	4.47	184.0	--	169.0	0.23	1.1	0.70	4.9	0.08	4.5
Nov-21	0.944	0.831	0.54	53.0	0.59	188.0	--		0.08	1.4	0.08	5.0	0.08	
Dec-21	0.976	0.864	0.67	53.0	1.36	188.0	--		0.10	1.4	0.20	5.0	0.08	
Average	1.126	1.017	1.713		5.256		2.401		0.166		0.633		0.215	
Maximum	1.810	1.740	20.240		38.850		27.260		0.650		3.100		0.900	
Minimum	0.800	0.770	0.510		0.490		0.430		0.070		0.080		0.070	

-- Represents non reported or inconsistent value on eDMR.

* Average Effluent Loading was reported as higher than the Maximum Loading in January 2018, June 2019, and November 2020.

Black Text: data obtained from Discharge Monitoring Reports; Blue Text: data obtained from Waterly website

East Wastewater Treatment Facility Analysis
WWTP Characterization for Barium (2017-2021)

Village of Huntley, Illinois

Month - Year	Existing WWTP eDMR Values					
	Measured Flow		Effluent Barium			
	Influent	Effluent	Loading		Concentration	
	Average (MGD)	Average (MGD)	Average (lbs/day)	Maximum (lbs/day)	Average (mg/L)	Maximum (mg/L)
Permit Requirement	**1.8**	**1.8**	**Mo. Avg. = 75**	**Daily Max. = 150**	**Mo. Avg. = 2**	**Daily Max. = 4**
Jan-17	1.142	1.002	13.9	14.7	1.76	1.77
Feb-17	1.055	0.898	13.3	13.5	1.81	1.81
Mar-17	1.136	1.003	14.6	15.1	1.75	1.75
Apr-17	1.366	1.234	18.7	19.5	1.82	1.82
May-17	1.214	1.214	19.7	29.9	1.95	1.95
Jun-17	1.192	1.066	16	16.1	1.81	1.81
Jul-17	1.646	1.502	18	21.1	1.89	2.08
Aug-17	1.131	0.976	14.3	18.5	1.76	1.91
Sep-17	0.987	0.827	12.1	13.3	1.94	1.94
Oct-17	1.237	1.105	13.3	17.7	1.93	1.93
Nov-17	1.11	0.965	12.4	14.1	1.55	1.55
Dec-17	0.99	0.844	12.4	12.8	1.83	1.83
Jan-18	1.05	0.88	12.07	14.14	1.91	1.91
Feb-18	1.202	1.063	13.46	15.24	1.72	1.94
Mar-18	1.101	0.944	13.7	19.1	1.75	1.89
Apr-18	1.095	0.956	15.9	16	2	2.1
May-18	1.195	1.087	16.4	20.4	1.81	2.04
Jun-18	1.502	1.415	18.6	26.1	1.58	2.01
Jul-18	1.168	1.033	12.3	15	1.43	1.55
Aug-18	1.141	0.983	15	15.4	1.89	1.98
Sep-18	1.37	1.23	10.2	15.5	1	1.16
Oct-18	1.21	1.1	16.1	17.7	1.94	1.94
Nov-18	1.12	0.98	13.7	16.4	1.68	1.78
Dec-18	1.2	1.06	11	21.6	1.25	1.4
Jan-19	1.12	0.98	11.4	20.5	1.4	1.4
Feb-19	1.34	1.19	12.4	19.3	1.25	1.4
Mar-19	1.16	1.02	10.8	13.6	1.6	1.6
Apr-19	1.13	1	4.5	4.9	0.59	0.59
May-19	1.55	1.46	6.8	5.1	0.42	0.42
Jun-19	1.27	1.19	7.9	8	0.8	0.8
Jul-19	1.12	1.02	13.81	15.31	1.8	1.8
Aug-19	0.96	0.83	12.8	13.1	1.9	1.9
Sep-19	1.29	1.19	14.6	18.8	1.9	2.2
Oct-19	1.23	1.13	12.3	12.9	1.2	1.2
Nov-19	1.15	1.02	13.4	14.2	1.4	1.4
Dec-19	1.02	0.93	10.8	11.55	1.4	1.4
Jan-20	1.11	1.02	11.79	11.9	1.4	1.4
Feb-20	1.03	0.93	10.0	12.0	1.3	1.3
Mar-20	1.22	1.12	14.9	31.6	1.6	1.6
Apr-20	1.22	1.14	9.0	10.22	0.95	0.95
May-20	1.81	1.74	11.2	17.4	1.2	1.2
Jun-20	1.1	1.02	10.2	11.6	1.2	1.2
Jul-20	0.99	0.89	14.1	18.9	1.9	2.5
Aug-20	0.88	0.77	12.57	12.84	2.0	2.0
Sep-20	1.03	0.92	14.5	16.2	1.9	2.4
Oct-20	0.93	0.81	11.4	11.7	1.7	1.7
Nov-20	0.95	0.83	9.6	9.6	1.4	1.4
Dec-20	0.98	0.87	9.3	10.8	1.5	1.5
Jan-21	0.95	0.88	0	0	0	0
Feb-21	0.96	0.88	--	--	--	--
Mar-21	1.17	1.13	--	--	--	--
Apr-21	1.04	0.97	--	--	--	--
May-21	0.89	0.83	--	--	--	--
Jun-21	0.89	0.862	--	--	--	--
Jul-21	0.878	0.854	--	--	--	--
Aug-21	0.971	0.911	--	--	--	--
Sep-21	0.8	0.77	--	--	--	--
Oct-21	0.923	0.857	--	--	--	--
Nov-21	0.944	0.831	--	--	--	--
Dec-21	0.976	0.864	--	--	--	--
Average	1.126	1.017	12.86	15.64	1.57	1.65
Maximum	1.810	1.740	19.70	31.60	2.00	2.50
Minimum	0.800	0.770	4.50	4.90	0.42	0.42

-- Represents non reported or inconsistent value on eDMR.

* Average Effluent Loading was reported as higher than the Maximum Loading in May 2019.

Black Text: data obtained from Discharge Monitoring Reports; Blue Text: data obtained from Waterly website

East Wastewater Treatment Facility Analysis
WWTP Characterization for Phosphorus (2017-2021)
Village of Huntley, Illinois

Month - Year	Existing WWTP eDMR Values				
	Measured Flow		Effluent Phosphorus		
	Influent	Effluent	Loading	Concentration	
	Average (MGD)	Average (MGD)	Average (lbs/day)	Average (mg/L)	Maximum (mg/L)
Permit Requirement	**1.8**	**1.8**	**Mo. Avg. = 38**	**Mo. Avg. = 1**	**Daily Max. = ?**
Jan-17	1.142	1.002	0	0	--
Feb-17	1.055	0.898	0	0	--
Mar-17	1.136	1.003	0	0	--
Apr-17	1.366	1.234	0	0	--
May-17	1.214	1.214	0	0	--
Jun-17	1.192	1.066	0	0	--
Jul-17	1.646	1.502	0	0	--
Aug-17	1.131	0.976	0	0	--
Sep-17	0.987	0.827	0	0	--
Oct-17	1.237	1.105	0	0	--
Nov-17	1.11	0.965	0	0	--
Dec-17	0.99	0.844	0	0	--
Jan-18	1.05	0.88	0	0	--
Feb-18	1.202	1.063	0	0	--
Mar-18	1.101	0.944	0	0	--
Apr-18	1.095	0.956	0	0	--
May-18	1.195	1.087	0	0	--
Jun-18	1.502	1.415	0	0	--
Jul-18	1.168	1.033	0	0	--
Aug-18	1.141	0.983	--	0.3	0.5
Sep-18	1.37	1.23	--	0.36	0.83
Oct-18	1.21	1.1	--	0.32	0.41
Nov-18	1.12	0.98	6.01	0.74	--
Dec-18	1.2	1.06	2.72	0.2	--
Jan-19	1.12	0.98	1.65	0.2	--
Feb-19	1.34	1.19	1.66	0.14	--
Mar-19	1.16	1.02	1.28	0.15	--
Apr-19	1.13	1	5.9	0.21	--
May-19	1.55	1.46	2.81	0.19	--
Jun-19	1.27	1.19	3.9	0.39	--
Jul-19	1.12	1.02	3.04	0.31	--
Aug-19	0.96	0.83	6.35	0.92	--
Sep-19	1.29	1.19	12.36	0.54	--
Oct-19	1.23	1.13	10.06	0.98	--
Nov-19	1.15	1.02	3.78	0.44	--
Dec-19	1.02	0.93	2.88	0.37	--
Jan-20	1.11	1.02	3.75	0.44	--
Feb-20	1.03	0.93	2.08	0.27	--
Mar-20	1.22	1.12	2.27	0.24	--
Apr-20	1.22	1.14	2.3	0.24	--
May-20	1.81	1.74	2.55	0.23	--
Jun-20	1.1	1.02	5.21	0.4	--
Jul-20	0.99	0.89	7.39	0.62	--
Aug-20	0.88	0.77	5.78	0.9	--
Sep-20	1.03	0.92	1.31	0.12	--
Oct-20	0.93	0.81	0.13	0.02	--
Nov-20	0.95	0.83	0.51	0.04	--
Dec-20	0.98	0.87	2.02	0.28	--
Jan-21	0.95	0.88	1.31	0.11	--
Feb-21	0.96	0.88	2.11	0.29	--
Mar-21	1.17	1.13	2.27	0.3	--
Apr-21	1.04	0.97	1.73	0.21	--
May-21	0.89	0.83	5.19	0.51	--
Jun-21	0.89	0.862	3.73	0.52	--
Jul-21	0.878	0.854	3.0	0.42	--
Aug-21	0.971	0.911	2	0.1914	0.2671
Sep-21	0.8	0.77	5	0.7941	1.0489
Oct-21	0.923	0.857	3	0.4737	0.7231
Nov-21	0.944	0.831	1	0.1710	0.2085
Dec-21	0.976	0.864	1	0.1388	0.1759
Average	1.126	1.017	2.30	0.68	0.52
Maximum	1.810	1.740	12.36	2.00	1.05
Minimum	0.800	0.770	0.00	0.00	0.18

-- Represents non reported or inconsistent value on eDMR.

Black Text: data obtained from Discharge Monitoring Reports; Blue Text: data obtained from Waterly website

East Wastewater Treatment Facility Analysis
WWTP Characterization for Radium in Biosolids (2017-2021)

Village of Huntley, Illinois

Quarter - Year	Date of Sample	Radium-226		Radium-228	
		Value (pCi/g)	Margin of Error (pCi/g)	Value (pCi/g)	Margin of Error (pCi/g)
1st Quarter, 2018	01/11/18	27.291	3.778	23.305	3.417
3rd Quarter, 2018	07/19/18	23.325	2.789	20.893	2.653
1st Quarter, 2019	01/08/19	14.349	2.001	16.170	2.472
1st Quarter, 2020	01/16/20	16.458	2.341	16.953	2.674
2nd Quarter, 2021	04/06/21	26.95	3.803	18.696	2.916
	Average	21.67	2.94	19.20	2.83
	Maximum	27.29	3.80	23.31	3.42
	Minimum	14.35	2.00	16.17	2.47

Appendix D

West WWTP Effluent Water Quality Summary (2017 – 2021)

West Wastewater Treatment Facility Analysis
WWTP Characterization for 5-Day BOD (2017-2021)
Village of Huntley, Illinois

Month - Year	Existing WWTP eDMR Values										
	Measured Flow				Influent BOD (5-Day)		Effluent BOD (5-Day)				Removal %
	Influent		Effluent		Loading	Concentration	Loading		Concentration		Loading
	Avg (MGD)	Max (MGD)	Avg (MGD)	Max (MGD)	Average (lbs/day)	Average (mg/L)	Average (lbs/day)	Maximum (lbs/day)	Average (mg/L)	Maximum (mg/L)	Average (lbs/day)
Permit Requirement	**2.6**	**N/A**	**2.6**	**N/A**	**N/A**	**N/A**	**Mo. Avg. = 542**	**Daily Max. = 1084**	**Mo. Avg. = 10**	**Daily Max. = 20**	**N/A**
Jan-17	1.068	1.397	1.008	1.398	3253	279	26.34	36.37	3.13	4.93	99.2%
Feb-17	1.05	1.12	0.919	1.037	2102	243	20.89	24.89	2.73	3.45	99.0%
Mar-17	1.113	1.977	0.963	1.761	3965	270	22.37	33.51	2.78	4.05	99.4%
Apr-17	1.194	1.791	1.085	1.455	2937	242	24.49	30.72	2.71	3.82	99.2%
May-17	1.349	2.46	1.1	1.491	3581	288	23.65	28.49	2.58	3.43	99.3%
Jun-17	1.24	1.671	1.088	1.627	3430	252.81	26.37	38.45	2.91	4.73	99.2%
Jul-17	1.468	2.018	1.26	1.841	3270	213	27.84	34.15	2.65	3.53	99.1%
Aug-17	1.192	1.398	0.976	1.127	2331	248	22.43	30.79	2.76	4.02	99.0%
Sep-17	1.108	1.319	0.897	1.035	2374	275	20.3	32.8	2.7	3.8	99.1%
Oct-17	1.223	2.06	1.055	2.563	5493	257	24.43	34.98	2.79	4.5	99.6%
Nov-17	1.318	1.359	1.013	1.14	2424	255	25.08	49.82	2.97	5.82	99.0%
Dec-17	1.071	1.218	0.941	1.111	2492	269	23.51	28.33	2.99	3.73	99.1%
Jan-18	1.105	1.365	1.041	2.057	5541	323	23.95	31.57	2.76	4.18	99.6%
Feb-18	1.049	1.576	1.049	1.576	3233	246	30.14	66.81	3.44	5.08	99.1%
Mar-18	1.135	1.268	0.975	1.121	2328	249	22.63	32.73	2.78	4.05	99.0%
Apr-18	1.141	1.436	0.996	1.25	2304	221	21.91	29.55	2.64	3.18	99.0%
May-18	1.227	1.728	1.044	1.542	2829	220	27.11	63.83	3.11	7.83	99.0%
Jun-18	1.458	2.351	1.279	2.303	4245	221	28.78	31.67	2.7	3.77	99.3%
Jul-18	1.291	1.56	1.083	1.38	2843	247	25.74	47.76	2.85	4.47	99.1%
Aug-18	1.203	1.408	1.08	1.679	2773	198	23.89	43.88	2.65	3.9	99.1%
Sep-18	1.319	2.352	1.134	2.243	4490	240	25.68	28.99	2.72	3.62	99.4%
Oct-18	1.29	1.53	1.16	1.59	3461	261	25.83	31.03	2.67	3.42	99.3%
Nov-18	1.19	1.42	1.19	1.42	3375	285	26.49	35.4	2.88	4.12	99.2%
Dec-18	1.26	1.74	1.13	1.58	3400	258	24.09	28.89	2.55	3.25	99.3%
Jan-19	1.15	1.45	1.03	1.36	2994	264	24.51	48.68	2.85	5.52	99.2%
Feb-19	1.32	1.75	1.15	1.6	2736	205	27.22	42.64	2.84	3.68	99.0%
Mar-19	1.18	1.37	1.06	1.3	2483	229	16.24	41.01	2.98	3.95	99.3%
Apr-19	1.23	1.83	1.04	1.59	2931	221	28.21	46.09	3.27	5.45	99.0%
May-19	1.47	1.89	1.27	1.67	2326	167	32.5	69.51	3.07	5.98	98.6%
Jun-19	1.35	1.8	1.13	1.54	2633	205	25.6	33.71	2.73	3.92	99.0%
Jul-19	1.23	1.51	1.01	1.19	1618	163	25.8	35.2	3.06	4.38	98.4%
Aug-19	1.18	1.35	1	1.49	2771	223	23.87	32.83	2.87	3.92	99.1%
Sep-19	1.3	1.75	1.04	1.41	2070	176	24.62	34.78	2.85	4.15	98.8%
Oct-19	1.3	1.64	1.03	1.4	2382	204	27.18	40.25	3.17	4.38	98.9%
Nov-19	1.28	1.45	1.29	1.550	3632	281	24.5	54.4	2.91	4.2	99.3%
Dec-19	1.23	1.48	1.38	1.68	4091	292	35.74	57.59	3.1	4.78	99.1%
Jan-20	1.24	1.38	1.13	1.56	3604	277.0	27.1	45.35	2.88	3.85	99.2%
Feb-20	1.23	1.43	0.92	1.05	3363	384.0	22.89	28.43	2.98	3.72	99.3%
Mar-20	1.32	1.99	1.41	2.16	6611	367.0	38.34	73.6	3.26	6.3	99.4%
Apr-20	1.31	2.22	1.52	2.59	5919	274.0	34.59	44.28	2.73	3.6	99.4%
May-20	1.61	2.57	1.3	2.1	5832	333.0	36.22	84.95	3.35	4.85	99.4%
Jun-20	1.36	1.63	0.95	1.12	3269	350.0	23.52	30.2	2.95	4.1	99.3%
Jul-20	1.33	1.97	1.12	1.46	3957	325.0	30.87	33.95	3.32	4.52	99.2%
Aug-20	1.22	1.36	1.06	1.17	6021	617.0	28.18	31.15	3.2	3.83	99.5%
Sep-20	1.36	1.86	1.16	1.6	4150	311.0	30.19	58.35	3.13	4.37	99.3%
Oct-20	1.18	1.47	1.04	1.27	4004	378.0	27.94	37.16	3.22	4.15	99.3%
Nov-20	1.18	1.5	1.05	1.38	4880	424.0	26.84	32.78	3.06	3.3	99.4%
Dec-20	1.33	2.25	1.07	1.21	3249	322.0	25.97	30.57	2.91	2.33	99.2%
Jan-21	1.05	1.18	1.05	1.17	2869	294	28.42	43.8	3.36	5.1	99.0%
Feb-21	1.06	1.23	1.06	1.22	2584	254	39.56	48.74	4.47	5.73	98.5%
Mar-21	1.15	1.47	1.19	1.45	2887	238.7	29.47	36.22	3.0	3.42	99.0%
Apr-21	1.05	1.18	1.1	1.26	3569	339.63	21.11	23.43	2.3	2.43	99.4%
May-21	1.02	1.08	1.05	1.16	2159	223.13	30.97	41.97	3.53	4.42	98.6%
Jun-21	1.069	1.475	1.16	1.56	3706	284.83	34.23	35.85	2.66	3.65	99.1%
Jul-21	1.058	1.171	1.138	1.259	2909	277	27.0	35.0	2.9	3.9	99.1%
Aug-21	1.106	1.548	1.175	1.69	2387	250.0	33	40	3.5	4.2	98.6%
Sep-21	1.025	1.112	1.149	1.24	2185	248.3	24	26	2.4	2.6	98.9%
Oct-21	1.053	1.249	1.098	1.334	1717	192.8	20	27	2.0	2.6	98.8%
Nov-21	1.001	1.083	1.089	1.749	2062	237.3	28	40	2.8	3.8	98.6%
Dec-21	1.030	1.169	1.027	1.162	2162	255.8	23	27	2.6	3.0	98.9%
Average	1.210	1.589	1.099	1.501	3287	269	26.7	39.5	2.9	4.1	99.1%
Maximum	1.610	2.570	1.520	2.590	6611	617	39.6	85.0	4.5	7.8	99.6%
Minimum	1.001	1.080	0.897	1.035	1618	163	16.2	23.4	2.0	2.3	98.4%

-- Represents non reported or inconsistent value on eDMR.

* Average Effluent Concentration was reported as higher than the Maximum in December 2020.

Black Text: data obtained from Discharge Monitoring Reports; Blue Text: data obtained from Waterly website

West Wastewater Treatment Facility Analysis
WWTP Characterization for TSS (2017-2021)
Village of Huntley, Illinois

Month - Year	Existing WWTP eDMR Values								
	Measured Flow		Influent TSS		Effluent TSS				Removal %
	Influent	Effluent	Loading	Concentration	Loading		Concentration		Loading
	Average (MGD)	Average (MGD)	Average (lbs/day)	Average (mg/L)	Average (lbs/day)	Maximum (lbs/day)	Average (mg/L)	Maximum (mg/L)	Average (lbs/day)
Permit Requirement	**2.6**	**2.6**	**N/A**	**N/A**	**Mo. Avg. = 651**	**Daily Max. = 1301**	**Mo. Avg. = 12**	**Daily Max. = 24**	**N/A**
Jan-17	1.068	1.008	2388	284	16.81	33.43	2	6	99.3%
Feb-17	1.05	0.919	1778	232	17.87	49.09	2.33	6	99.0%
Mar-17	1.113	0.963	2771	345	20.95	62.05	2.6	7.5	--
Apr-17	1.194	1.085	1647	182	16.97	41.7	1.87	4	99.0%
May-17	1.349	1.1	2257	246	36.69	121.72	4	15	98.4%
Jun-17	1.24	1.088	2151	237	23.03	42.78	2.54	4.5	98.9%
Jul-17	1.468	1.26	2753	262	22.64	41.7	2.15	5	99.2%
Aug-17	1.192	0.976	2149	264	17.98	40.12	2.2	5	99.2%
Sep-17	1.108	0.897	1908	255	10.93	34.53	1.46	4	99.4%
Oct-17	1.223	1.055	2270	258	20.98	42.75	2.38	5.5	99.1%
Nov-17	1.318	1.013	2425	287	21.12	32.99	2.5	4	99.1%
Dec-17	1.071	0.941	2904	370	17.81	35.32	2.27	4.5	99.4%
Jan-18	1.105	1.041	2353	271	16.44	22.27	1.89	3	99.3%
Feb-18	1.049	1.049	2555	292	24.06	51.77	2.75	6.5	99.1%
Mar-18	1.135	0.975	1935	238	12.82	23.37	1.58	2.5	99.3%
Apr-18	1.141	0.996	1620	195	11.42	23.21	1.37	2.5	99.3%
May-18	1.227	1.044	1785	205	17.42	48.25	2	5	99.0%
Jun-18	1.458	1.279	2528	237	21.77	62.76	2.04	7	99.1%
Jul-18	1.291	1.083	1969	218	15.97	50.37	1.77	5.5	99.2%
Aug-18	1.203	1.08	1648	183	13.86	38.63	1.54	4	99.2%
Sep-18	1.319	1.134	1958	207	11.82	20.66	1.25	2.5	99.4%
Oct-18	1.29	1.16	2128	220	12.77	32.61	1.32	3.5	99.4%
Nov-18	1.19	1.19	3553	358	11.88	28.56	1.29	2.5	99.7%
Dec-18	1.26	1.13	1461	155	9.45	21.81	1	2.5	99.4%
Jan-19	1.15	1.03	1538	179	11.92	19.42	1.38	2	99.2%
Feb-19	1.32	1.15	1621	169	18.8	28.29	1.96	4	98.8%
Mar-19	1.18	1.06	1052	119	26.24	27.38	1.58	3.5	97.5%
Apr-19	1.23	1.04	1579	182	12.63	28.49	1.46	3.5	99.2%
May-19	1.47	1.27	1525	144	19.13	58.5	1.81	6	98.7%
Jun-19	1.35	1.13	1715	182	14.07	23.12	1.5	2.5	99.2%
Jul-19	1.23	1.01	1036	123	13.63	49.04	1.62	5.5	98.7%
Aug-19	1.18	1	1451	174	12.17	18.97	1.43	2.5	99.2%
Sep-19	1.3	1.04	1058	122	13.83	17.79	1.6	2.5	98.7%
Oct-19	1.3	1.03	1220	142	13.86	27.55	1.62	3	98.9%
Nov-19	1.28	1.29	3529	328	12.97	41.09	1.54	3.5	99.6%
Dec-19	1.23	1.38	2244	195	17.78	38.63	1.54	3.5	99.2%
Jan-20	1.24	1.13	1206	128.0	20.29	58.9	2.15	5.0	98.3%
Feb-20	1.23	0.92	1604	209.0	12.18	40.16	1.58	5.5	99.2%
Mar-20	1.32	1.41	3751	319.0	14.02	28.53	1.19	2.0	99.6%
Apr-20	1.31	1.52	3423	270.0	22.87	67.45	1.81	5.0	99.3%
May-20	1.61	1.3	3112	287.0	22.03	26.29	2.04	3.5	99.3%
Jun-20	1.36	0.95	1973	249.0	17.15	29.4	2.15	4.5	99.1%
Jul-20	1.33	1.12	2513	269.0	18.29	40.11	1.96	5.0	99.3%
Aug-20	1.22	1.06	4977	563.0	39.68	69.61	4.5	7.5	99.2%
Sep-20	1.36	1.16	4005	414.0	18.35	60.13	1.9	4.5	99.5%
Oct-20	1.18	1.04	4033	465.0	20.6	26.02	2.37	3.0	99.5%
Nov-20	1.18	1.05	1839	210.0	9.84	16.47	1.12	2.0	99.5%
Dec-20	1.33	1.07	2570	288.0	15.12	27.24	1.7	3.0	99.4%
Jan-21	1.05	1.05	2172	248	17.47	22.33	2.0	2.5	99.2%
Feb-21	1.06	1.06	1856	210	4.77	6.84	3.5	8	99.7%
Mar-21	1.15	1.19	2640	266	20.83	37.1	2.1	3.5	99.2%
Apr-21	1.05	1.1	2156	235	12.61	18.15	1.37	2.0	99.4%
May-21	1.02	1.05	1445	165	31.81	61.77	3.63	6.5	97.8%
Jun-21	1.069	1.16	4760	492	22.9	29.47	2.38	3.0	99.5%
Jul-21	1.058	1.138	4461	470	18.9	38.0	2.0	4.0	99.6%
Aug-21	1.106	1.175	1910	200	47	83	5	8	97.5%
Sep-21	1.025	1.149	895	102	29	47	3	5	96.8%
Oct-21	1.053	1.098	857	98	17	26	2	3	98.0%
Nov-21	1.001	1.089	1197	138	18	24	2	2	98.5%
Dec-21	1.03	1.027	3223	388	21	29	2	3	99.3%
Average	1.210	1.099	2251	246	18.4	38.2	2.0	4.4	99.1%
Maximum	1.610	1.520	4977	563	47.0	121.7	5.0	15.0	99.7%
Minimum	1.001	0.897	857	98	4.8	6.8	1.0	2.0	96.8%

-- Represents non reported or inconsistent value on eDMR.

Black Text: data obtained from Discharge Monitoring Reports; Blue Text: data obtained from Waterly website

West Wastewater Treatment Facility Analysis
WWTP Characterization for NH_3-N (2017-2021)
Village of Huntley, Illinois

Month - Year	Existing WWTP eDMR Values													
	Measured Flow		Effluent NH_3-N											
	Influent	Effluent	Loading						Concentration					
	Average (MGD)	Average (MGD)	Average (lbs/day)		Maximum (lbs/day)		Weekly Avg. (lbs/day)		Average (mg/L)		Maximum (mg/L)		Weekly Avg. (mg/L)	
Permit Requirement	2.6	2.6	Monthly	Permit Limit Varies	Daily	Permit Limit Varies	Weekly	Permit Limit Varies	Monthly	Permit Limit Varies	Daily	Permit Limit Varies	Weekly	Permit Limit Varies
Jan-17	1.068	1.008	0.61	81.0	0.89	276.0			0.07	1.5	0.09	5.1		
Feb-17	1.05	0.919	0.59	81.0	0.68	276.0			0.08	1.5	0.09	5.1		
Mar-17	1.113	0.963	0.64	81.0	0.79	276.0	0.69	244.0	0.08	1.5	0.1	5.1	0.09	4.5
Apr-17	1.194	1.085	1.19	65.0	6.74	276.0	1.4	244.0	0.1	1.2	0.7	5.1	0.1	4.5
May-17	1.349	1.1	0.7	65.0	0.73	276.0	0.76	244.0	0.08	1.2	0.09	5.1	0.08	4.5
Jun-17	1.24	1.088	1.51	65.0	8.69	276.0	2.19	190.0	0.17	1.2	1.04	5.1	0.23	3.5
Jul-17	1.468	1.26	0.87	65.0	0.9	276.0	1	190.0	0.08	1.2	0.1	5.1	0.08	3.5
Aug-17	1.192	0.976	0.65	65.0	0.74	276.0	0.65	190.0	0.08	1.2	0.09	5.1	0.08	3.5
Sep-17	1.108	0.897	0.6	65.0	0.64	276.0	0.59	244.0	0.08	1.2	0.09	5.1	0.08	4.5
Oct-17	1.223	1.055	0.68	65.0	0.73	276.0	0.72	244.0	0.08	1.2	0.09	5.1	0.09	4.5
Nov-17	1.318	1.013	1.8	81.0	11.23	276.0			0.21	1.5	1.38	5.1		
Dec-17	1.071	0.941	4.92	81.0	17.97	276.0			0.63	1.5	2.29	5.1		
Jan-18	1.105	1.041	1.74	81.0	4.72	276.0			0.2	1.5	0.63	5.1		
Feb-18	1.049	1.049	1.27	81.0	8.02	276.0			0.15	1.5	0.61	5.1		
Mar-18	1.135	0.975	3	81.0	7.67	276.0	4.71	244.0	0.37	1.5	1	5.1	0.6	4.5
Apr-18	1.141	0.996	4.31	65.0	13.09	276.0	3.6	244.0	0.52	1.2	1.41	5.1	0.47	4.5
May-18	1.227	1.044	5.88	65.0	28.73	276.0	8.41	244.0	0.68	1.2	2.9	5.1	0.88	4.5
Jun-18	1.458	1.279	1.92	65.0	17.31	276.0	3	190.0	0.18	1.2	1.01	5.1	0.34	3.5
Jul-18	1.291	1.083	1.37	65.0	9.39	276.0	0.86	190.0	0.15	1.2	0.98	5.1	0.1	3.5
Aug-18	1.203	1.08	1.89	65.0	7.17	276.0	2.83	190.0	0.21	1.2	0.8	5.1	0.27	3.5
Sep-18	1.319	1.134	0.81	65.0	0.088	276.0	0.78	244.0	0.09	1.2	0.1	5.1	0.09	4.5
Oct-18	1.29	1.16	0.87	65.0	1.19	276.0	0.96	244.0	0.09	1.2	0.14	5.1	0.09	4.5
Nov-18	1.19	1.19	0.95	81.0	2.53	276.0			0.1	1.5	0.29	5.1		
Dec-18	1.26	1.13	1.05	81.0	5.6	276.0			0.11	1.5	0.44	5.1		
Jan-19	1.15	1.03	1.01	81.0	4.09	276.0			0.12	1.5	0.47	5.1		
Feb-19	1.32	1.15	1.08	81.0	4.73	276.0			0.11	1.5	0.46	5.1		
Mar-19	1.18	1.06	1.27	81.0	6.6	276.0	1.59	244.0	0.14	1.5	0.85	5.1	0.17	4.5
Apr-19	1.23	1.04	0.79	65.0	1.18	276.0	0.8	244.0	0.09	1.2	0.15	5.1	0.09	4.5
May-19	1.47	1.27	0.89	65.0	0.9	276.0	0.82	244.0	0.09	1.2	0.1	5.1	0.08	4.5
Jun-19	1.35	1.13	0.77	65.0	0.77	276.0	0.9	190.0	0.08	1.2	0.09	5.1	0.08	3.5
Jul-19	1.23	1.01	0.76	65.0	1.2	276.0	0.73	190.0	0.09	1.2	0.14	5.1	0.09	3.5
Aug-19	1.18	1	2.51	65.0	11.75	276.0	2.3	190.0	0.3	1.2	1.54	5.1	0.26	3.5
Sep-19	1.3	1.04	0.72	65.0	0.89	276.0	0.76	244.0	0.08	1.2	0.11	5.1	0.08	4.5
Oct-19	1.3	1.03	0.74	65.0	0.92	276.0	0.72	244.0	0.09	1.2	0.11	5.1	0.08	4.5
Nov-19	1.28	1.29	1.01	81.0	6.6	276.0			0.12	1.5	0.51	5.1		
Dec-19	1.23	1.38	1.39	81.0	6.99	276.0			0.12	1.5	0.5	5.1		
Jan-20	1.24	1.13	1.55	81.0	14.47	276.0			0.17	1.5	1.22	5.1		
Feb-20	1.23	0.92	1.32	81.0	9.23	276.0			0.17	1.5	1.12	5.1		
Mar-20	1.32	1.41	1.75	81.0	10.51	276.0	2.24	244.0	0.15	1.5	0.90	5.1	0.24	4.5
Apr-20	1.31	1.52	1.06	65.0	1.13	276.0	1.0	244.0	0.08	1.2	0.09	5.1	0.08	4.5
May-20	1.61	1.3	0.97	65.0	1.42	276.0	0.93	244.0	0.09	1.2	0.2	5.1	0.1	4.5
Jun-20	1.36	0.95	0.65	65.0	0.69	276.0	0.61	190.0	0.08	1.2	0.09	5.1	0.08	3.5
Jul-20	1.33	1.12	0.76	65.0	0.69	276.0	0.76	190.0	0.08	1.2	0.09	5.1	0.08	3.5
Aug-20	1.22	1.06	4.92	65.0	18.38	255.0	4.11	190.0	0.85	1.2	1.98	4.7	0.46	3.5
Sep-20	1.36	1.16	6.06	65.0	22.13	255.0	8.47	206.0	0.63	1.2	2.3	4.7	0.77	3.8
Oct-20	1.18	1.04	2.08	65.0	5.88	255.0	2.15	206.0	0.24	1.2	0.7	4.7	0.24	3.8
Nov-20	1.18	1.05	0.72	81.0	0.89	276.0			0.08	1.5	0.09	5.1		
Dec-20	1.33	1.07	2.62	81.0	8.52	276.0			0.3	1.5	0.9	5.1		
Jan-21	1.05	1.05	3.34	81.0	6.26	276.0			0.38	1.5	0.77	5.1		
Feb-21	1.06	1.06	4.77	81.0	6.84	276.0			0.54	1.5	0.8	5.1		
Mar-21	1.15	1.19	1.22	81.0	2.05	276.0	1.95	206.0	0.12	1.5	0.2	4.7	0.18	3.8
Apr-21	1.05	1.1	1.65	65.0	4.57	255.0	1.8	206.0	0.18	1.2	0.46	4.7	0.21	3.8
May-21	1.02	1.05	0.7	65.0	0.86	255.0	0.76	206.0	0.08	1.2	0.09	4.7	0.08	3.8
Jun-21	1.069	1.16	0.84	65.0	0.88	255.0	0.87	190.0	0.09	1.2	0.09	4.7	0.09	3.5
Jul-21	1.058	1.138	0.82	65.0	0.87	255.0	0.82	190.0	0.09	1.2	0.1	4.7	0.08	3.5
Aug-21	1.106	1.175	0.81	65.0	0.87	276.0	--	190.0	0.09	1.2	0.09	5.1	0.09	3.5
Sep-21	1.025	1.149	0.90	65.0	1.05	276.0	--	244.0	0.09	1.2	0.11	5.1	0.09	4.5
Oct-21	1.053	1.098	0.88	65.0	0.90	276.0	--	244.0	0.09	1.2	0.10	5.1	0.09	4.5
Nov-21	1.001	1.089	2.88	81.0	8.95	276.0			0.28	1.5	0.85	5.1	0.28	
Dec-21	1.03	1.027	3.15	81.0	8.72	276.0			0.36	1.5	1.04	5.1	0.40	
Average	1.210	1.099	1.653		5.660		1.844		0.189		0.598		0.196	
Maximum	1.610	1.520	6.060		28.730		8.470		0.850		2.900		0.880	
Minimum	1.001	0.897	0.590		0.088		0.590		0.070		0.090		0.080	

-- Represents non reported or inconsistent value on eDMR.

Black Text: data obtained from Discharge Monitoring Reports; Blue Text: data obtained from Waterly website

West Wastewater Treatment Facility Analysis
WWTP Characterization for Barium (2017-2021)

Village of Huntley, Illinois

Month - Year	Existing WWTP eDMR Values					
	Measured Flow		Effluent Barium			
	Influent	Effluent	Loading		Concentration	
	Average (MGD)	Average (MGD)	Average (lbs/day)	Maximum (lbs/day)	Average (mg/L)	Maximum (mg/L)
Permit Requirement	**2.6**	**2.6**	**Mo. Avg. = 108**	**Daily Max. = 217**	**Mo. Avg. = 2**	**Daily Max. = 4**
Jan-17	1.068	1.008	10.59	14.7	1.26	1.43
Feb-17	1.05	0.919	13.4	14.1	1.75	1.84
Mar-17	1.113	0.963	14.5	16.6	1.81	1.89
Apr-17	1.194	1.085	14.7	16.2	1.62	1.9
May-17	1.349	1.1	14.2	25.6	1.55	2.9
Jun-17	1.24	1.088	14.6	19.2	1.61	1.62
Jul-17	1.468	1.26	19.9	19.5	1.9	2.34
Aug-17	1.192	0.976	13.9	16	1.71	1.89
Sep-17	1.108	0.897	11.2	12.5	1.5	1.56
Oct-17	1.223	1.055	14.7	15.5	1.68	1.93
Nov-17	1.318	1.013	11.8	19.4	1.4	2.05
Dec-17	1.071	0.941	12.3	16.1	1.58	1.74
Jan-18	1.105	1.041	14.4	14.6	1.67	1.79
Feb-18	1.049	1.049	15.6	14.7	1.69	1.97
Mar-18	1.135	0.975	15.2	17.7	1.87	1.92
Apr-18	1.141	0.996	14.6	14.7	1.76	1.86
May-18	1.227	1.044	17.1	18.3	1.97	2.5
Jun-18	1.458	1.279	16.4	16.5	1.55	1.56
Jul-18	1.291	1.083	13.2	14.2	1.58	1.7
Aug-18	1.203	1.08	17.1	27	1.9	1.93
Sep-18	1.319	1.134	17.9	28.6	1.9	2.13
Oct-18	1.29	1.16	17.5	21.9	1.81	2.42
Nov-18	1.19	1.19	16.5	16.6	1.81	2.1
Dec-18	1.26	1.13	11.3	13.9	1.2	1.3
Jan-19	1.15	1.03	13.4	20.3	1.57	2.2
Feb-19	1.32	1.15	17.7	28	1.85	2.1
Mar-19	1.18	1.06	11.2	17.9	1.27	1.9
Apr-19	1.23	1.04	9.5	10.1	1.1	1.2
May-19	1.47	1.27	17.26	18	1.7	1.8
Jun-19	1.35	1.13	18.8	28	2	2.9
Jul-19	1.23	1.01	16	19.2	1.9	2.4
Aug-19	1.18	1	16.6	21.4	2	2.4
Sep-19	1.3	1.04	10.8	12.8	1.25	1.5
Oct-19	1.3	1.03	11.1	14.7	1.3	1.8
Nov-19	1.28	1.29	16.9	20.6	1.59	1.8
Dec-19	1.23	1.38	19.5	26.7	1.7	2.1
Jan-20	1.24	1.13	17.4	18.8	2.0	2.2
Feb-20	1.23	0.92	15.3	21.7	2.0	2.8
Mar-20	1.32	1.41	16.4	22.8	1.4	1.9
Apr-20	1.31	1.52	23.4	25.6	1.85	1.9
May-20	1.61	1.3	21.41	17.26	1.975	2.3
Jun-20	1.36	0.95	12.6	15.7	1.6	2.3
Jul-20	1.33	1.12	17.7	23.0	1.9	2.4
Aug-20	1.22	1.06	--	--	--	--
Sep-20	1.36	1.16	--	--	--	--
Oct-20	1.18	1.04	--	--	--	--
Nov-20	1.18	1.05	--	--	--	--
Dec-20	1.33	1.07	--	--	--	--
Jan-21	1.05	1.05	--	--	--	--
Feb-21	1.06	1.06	--	--	--	--
Mar-21	1.15	1.19	--	--	--	--
Apr-21	1.05	1.1	--	--	--	--
May-21	1.02	1.05	--	--	--	--
Jun-21	1.069	1.16	--	--	--	--
Jul-21	1.058	1.138	--	--	--	--
Aug-21	1.106	1.175	--	--	--	--
Sep-21	1.025	1.149	--	--	--	--
Oct-21	1.053	1.098	--	--	--	--
Nov-21	1.001	1.089	--	--	--	--
Dec-21	1.03	1.027	--	--	--	--
Average	1.210	1.099	15.25	18.76	1.68	2.00
Maximum	1.610	1.520	23.40	28.60	2.00	2.90
Minimum	1.001	0.897	9.50	10.10	1.10	1.20

-- Represents non reported or inconsistent value on eDMR.

* Average Loading was reported as higher than the Maximum Loading in July 2017, February 2018 and May 2020.

Black Text: data obtained from Discharge Monitoring Reports; Blue Text: data obtained from Waterly website

West Wastewater Treatment Facility Analysis
WWTP Characterization for Phosphorus (2017-2021)
Village of Huntley, Illinois

Month - Year	Existing WWTP eDMR Values					
	Measured Flow		Influent Phosphorus		Effluent Phosphorus	
	Influent	Effluent			Loading	Concentration
	Average (MGD)	Average (MGD)	Daily Average (mg/L)	Daily Max (mg/L)	Average (lbs/day)	Average (mg/L)
Permit Requirement	**2.6**	**2.6**			**Mo. Avg. = 54**	**Mo. Avg. = 1**
Jan-17	1.068	1.008	--	--	2.58	0.31
Feb-17	1.05	0.919	--	--	3.06	0.21
Mar-17	1.113	0.963	--	--	3.5	0.25
Apr-17	1.194	1.085	--	--	2.42	0.27
May-17	1.349	1.1	--	--	6.97	0.33
Jun-17	1.24	1.088	--	--	3.87	0.23
Jul-17	1.468	1.26	--	--	2.63	0.22
Aug-17	1.192	0.976	--	--	5	0.31
Sep-17	1.108	0.897	--	--	4.2	0.4
Oct-17	1.223	1.055	--	--	6.41	0.37
Nov-17	1.318	1.013	--	--	3.04	0.16
Dec-17	1.071	0.941	--	--	1.23	0.16
Jan-18	1.105	1.041	--	--	0.25	0.61
Feb-18	1.049	1.049	--	--	2.74	0.31
Mar-18	1.135	0.975	--	--	3.24	0.25
Apr-18	1.141	0.996	--	--	1.8	0.22
May-18	1.227	1.044	--	--	7.03	0.31
Jun-18	1.458	1.279	--	--	5.61	0.31
Jul-18	1.291	1.083	--	--	4.67	0.4
Aug-18	1.203	1.08	--	--	4.56	0.34
Sep-18	1.319	1.134	--	--	5.2	0.55
Oct-18	1.29	1.16	--	--	3.23	0.33
Nov-18	1.19	1.19	--	--	5.01	0.39
Dec-18	1.26	1.13	--	--	3.59	0.28
Jan-19	1.15	1.03	--	--	2.13	0.25
Feb-19	1.32	1.15	--	--	5.43	0.37
Mar-19	1.18	1.06	--	--	1.62	0.18
Apr-19	1.23	1.04	--	--	5.65	0.22
May-19	1.47	1.27	--	--	4.88	0.2
Jun-19	1.35	1.13	--	--	1.69	0.15
Jul-19	1.23	1.01	--	--	11.44	0.49
Aug-19	1.18	1	--	--	7.81	0.51
Sep-19	1.3	1.04	--	--	1.24	0.13
Oct-19	1.3	1.03	--	--	2	0.13
Nov-19	1.28	1.29	--	--	0.92	0.11
Dec-19	1.23	1.38	--	--	0.97	0.08
Jan-20	1.24	1.13	--	--	1.27	0.13
Feb-20	1.23	0.92	--	--	1.65	0.15
Mar-20	1.32	1.41	--	--	2.44	0.15
Apr-20	1.31	1.52	--	--	2.05	0.16
May-20	1.61	1.3	--	--	1.63	0.15
Jun-20	1.36	0.95	--	--	2.06	0.14
Jul-20	1.33	1.12	--	--	5.02	0.16
Aug-20	1.22	1.06	9.8	10.76	31.8	0.85
Sep-20	1.36	1.16	10.39	12.25	3.45	0.36
Oct-20	1.18	1.04	9.76	11.0	4.85	0.56
Nov-20	1.18	1.05	10.39	12.47	2.18	0.18
Dec-20	1.33	1.07	11.81	13.5	1.38	0.16
Jan-21	1.05	1.05	11.63	15.4	3.63	0.42
Feb-21	1.06	1.06	12.93	13.67	2.51	0.24
Mar-21	1.15	1.19	12.13	14.02	2.9	0.28
Apr-21	1.05	1.1	13.41	16.3	1.24	0.14
May-21	1.02	1.05	11.04	11.7	2.78	0.3
Jun-21	1.069	1.16	12.12	14.9	4.51	0.47
Jul-21	1.058	1.138	5.6	7.6	6.0	0.6
Aug-21	1.106	1.175	4.6556	5.6026	7	0.6938
Sep-21	1.025	1.149	4.7479	5.228	8	0.8495
Oct-21	1.053	1.098	5.0342	5.8306	6	0.5586
Nov-21	1.001	1.089	5.0440	5.5049	3	0.2932
Dec-21	1.03	1.027	6.68143	8.9577	1	0.1029
Average	1.210	1.099	9.245	10.864	4.10	0.31
Maximum	1.610	1.520	13.410	16.300	31.80	0.85
Minimum	1.001	0.897	4.656	5.228	0.25	0.08

-- Represents non reported or inconsistent value on eDMR.

Black Text: data obtained from Discharge Monitoring Reports; Blue Text: data obtained from Waterly website

West Wastewater Treatment Facility Analysis
WWTP Characterization for Radium in Biosolids (2017-2021)
Village of Huntley, Illinois

Quarter - Year	Date of Sample	Radium-226		Radium-228	
		Value (pCi/g)	Margin of Error (pCi/g)	Value (pCi/g)	Margin of Error (pCi/g)
1st Quarter, 2018	01/11/18	29.413	4.117	21.207	3.244
1st Quarter, 2019	01/08/19	24.421	3.401	17.800	2.619
1st Quarter, 2020	01/16/20	39.379	5.467	24.084	3.443
Average		31.07	4.33	21.03	3.10
Maximum		39.38	5.47	24.08	3.44
Minimum		24.42	3.40	17.80	2.62

Appendix E

Potential Water Savings from Water Conservation and Efficiency

POTENTIAL ESTIMATED WATER SAVINGS FROM WATER CONSERVATION AND EFFICIENCY

Village of Huntley, IL

		2021	
	Village of Huntley 2050 CT Water Demand Estimate	1,787	MG
(a)	2050 Daily CT Water Demand Estimate	4.90	MGD
	Outdoor Water Use		
(b)	Water Supply Spent on Outdoor Use	17.3%	
(c)	Outdoor Water Wasted	50%	
(d)	Assumed Reduction of Outdoor Waste	25%	
(e)	New Landscape Water Waste Reduction	5%	
	All Customers - Water Saved (a x b x c x d) =	**0.106**	**MGD**
	New Landscape - Water Saved (a x b x c x e) =	**0.021**	**MGD**
	Utility Water (System Losses)		
(f)	Water Supply Loss from Unidentified Losses	10.6%	
(g)	Assumed Reduction of Unidentified Losses	50%	
	System Loses - Water Saved (a x f x g) =	**0.260**	**MGD**
	Indoor Residential		
(h)	Population (1994)	3,764	
(i)	Assumed People per Household (1994)	3	
(j)	No. of Households (1994)	1,255	
(k)	Assumed pre-1994 Flush Rate	3.5	gal/flush
(l)	Assumed HET Flush Rate	1.28	gal/flush
(m)	Assumed Flushes per Person per Day	5.1	
(n)	Assumed Percent Household Upgrade by 2050 for HET	30%	
(o)	Water Savings per Household per Year for HEWM	4,200	gal
(p)	Assumed Percent Household Upgrade by 2050 for HEWM	10%	
(q)	Water Savings per Household per Day for 4 Retrofits	22	gal
(r)	Assumed Percent household upgrade by 2050 for Retrofits	25%	
	HET - Water Saved ((k - l) x m x h x n) =	**0.013**	**MGD**
	HEWM - Water Saved (o x j x p) =	**0.001**	**MGD**
	Retrofits - Water Saved (j x q x r) =	**0.007**	**MGD**
	Commercial, Industrial, and Institutional		
(s)	Reduction of CII Accounts Based on No. of Employees	13.5%	
(t)	Percent of Daily Demand (Non-Residential)	16.6%	
(u)	Assumed Percent Employee Participation	50%	
	Commercial - Water Saved (a x s x t x u) =	**0.055**	**MGD**

TOTAL ESTIMATED SAVINGS =	**0.463**	**MGD**
LESS RESOURCE INTENSIVE DEMAND (2050) =	**4.433**	**MGD**
PERCENT REDUCTION =	**9.0%**	

Notes:

🟩	*Values calculated from Village Data*
(c)	*Per EPA*
(o)	*From California Memorandum of Understanding*

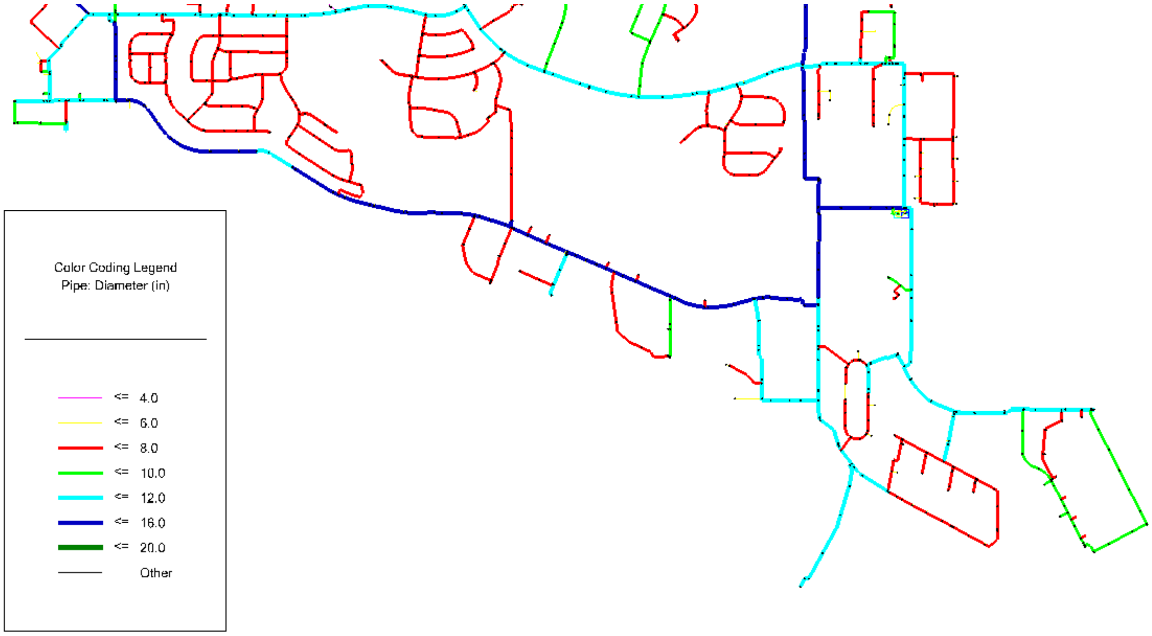
HET = High Efficiency Toilets; HEWM = High Efficiency Washing Machines

Appendix F

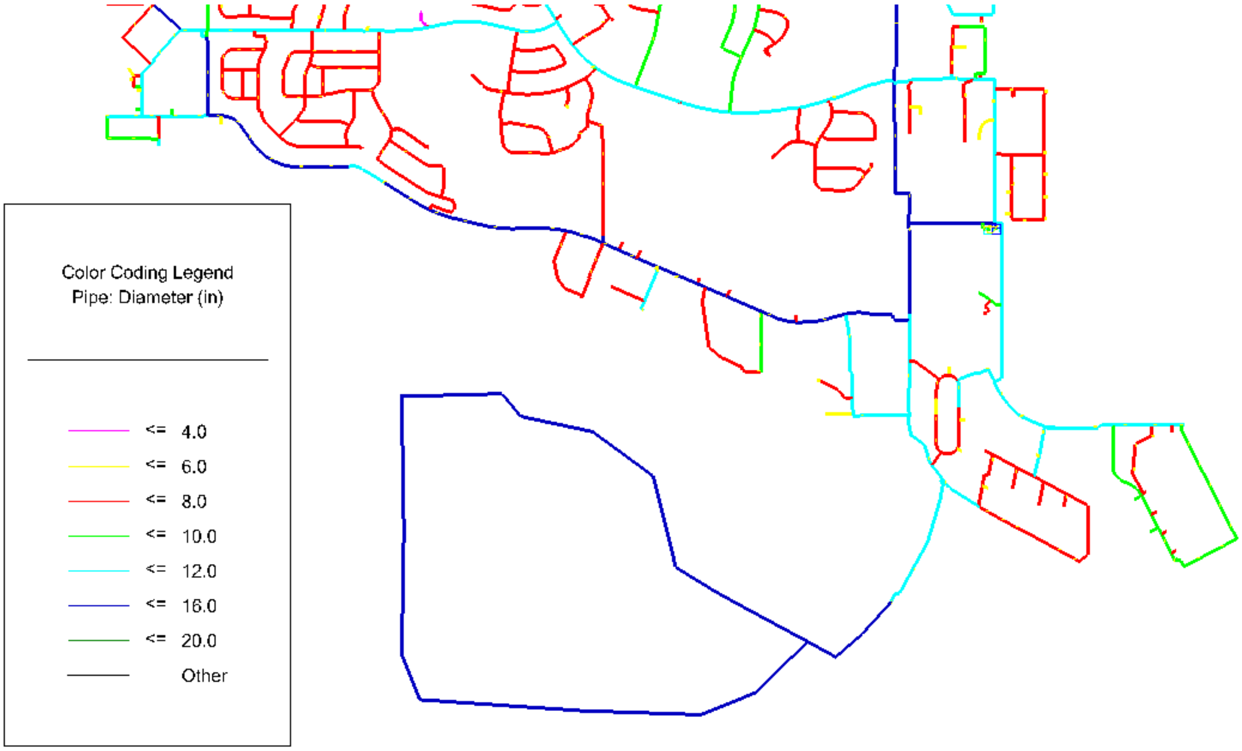
Water Model Screenshots – Analysis of Future Improvements South of Tollway

Appendix F-A: Future Development Overview

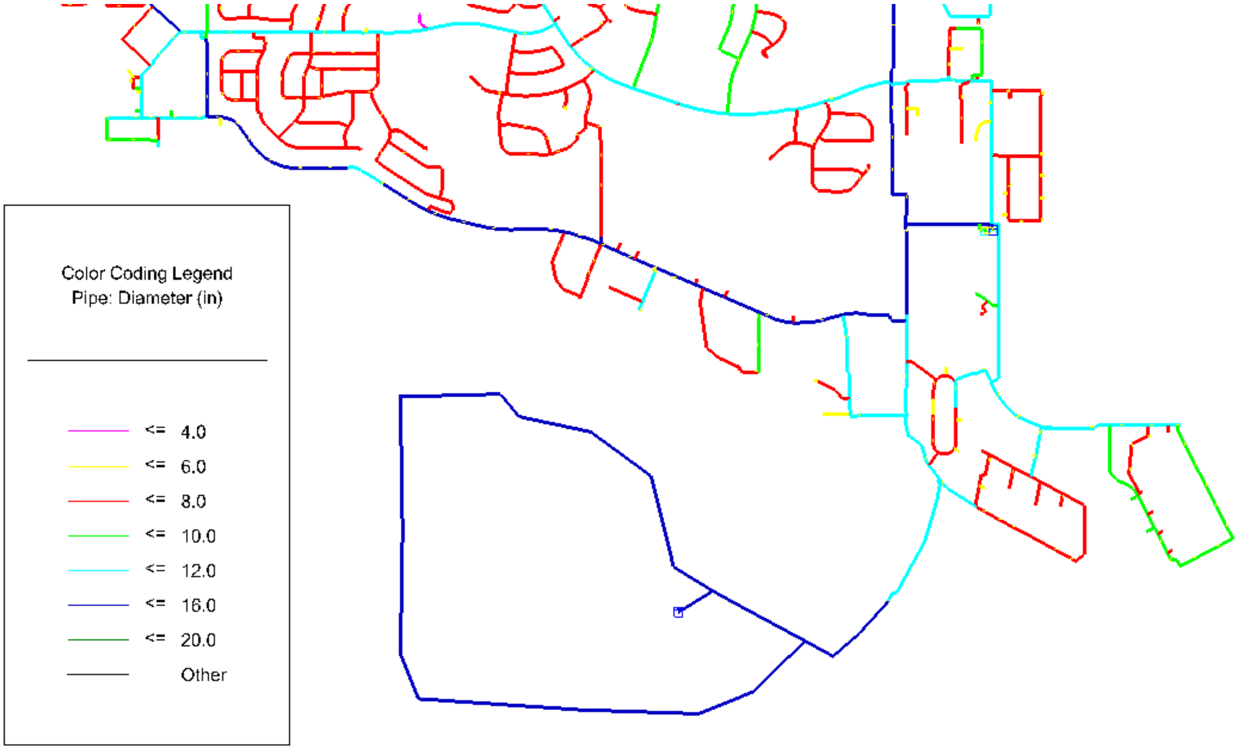
F-A-0: Existing System Overview - 12” Stub Across I-90



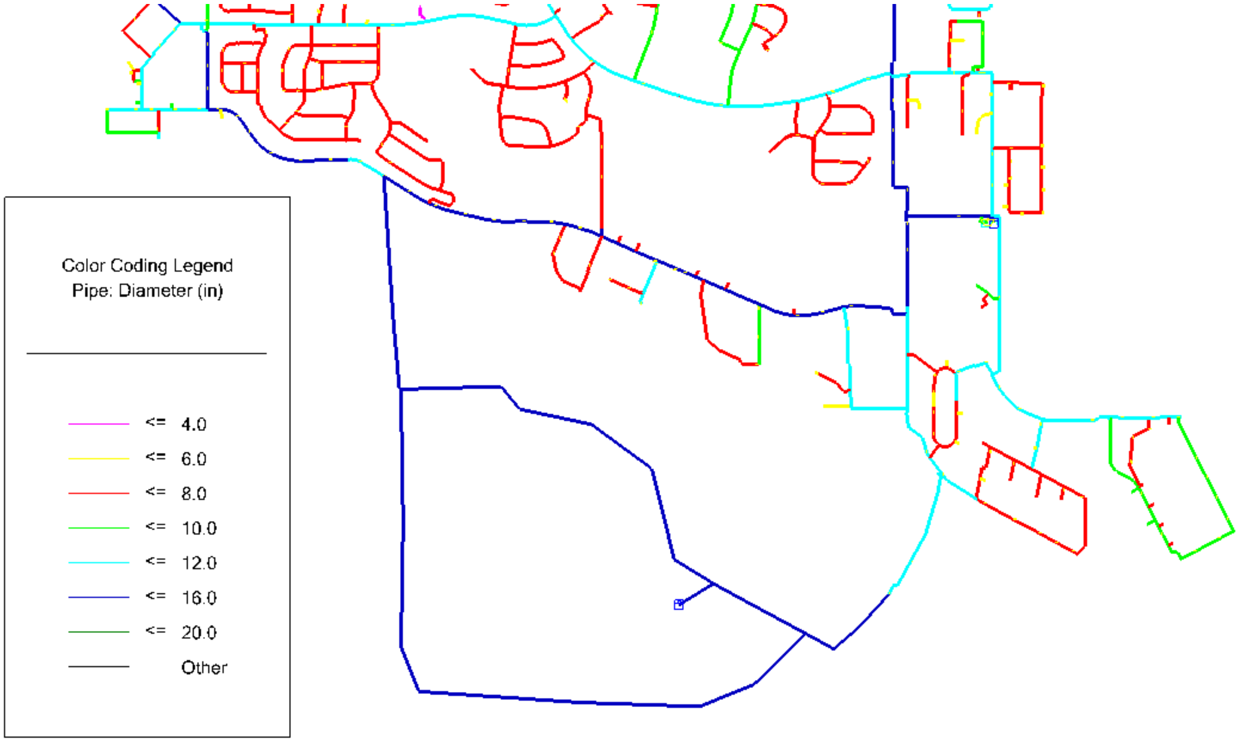
F-A-1: Future System Overview – Scenario 1: Future Development WM (no add’l I-90 crossing or EWST)



F-A-2: Future System Overview – Scenario 2: Additional EWST (no additional I-90 crossing)

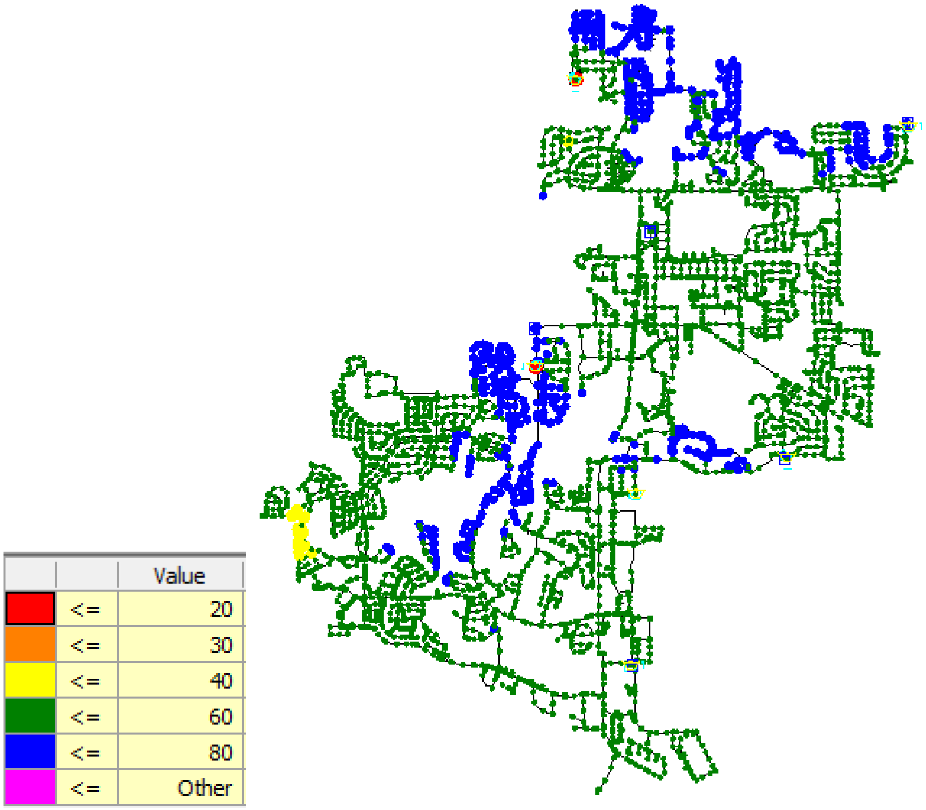


F-A-3: Future System Overview – Scenario 3: Add'l EWST & West I-90 Crossing (16" – at Sandwald Road)



Appendix F-B: Water System Pressure Maps – Max Day Demand (MDD)

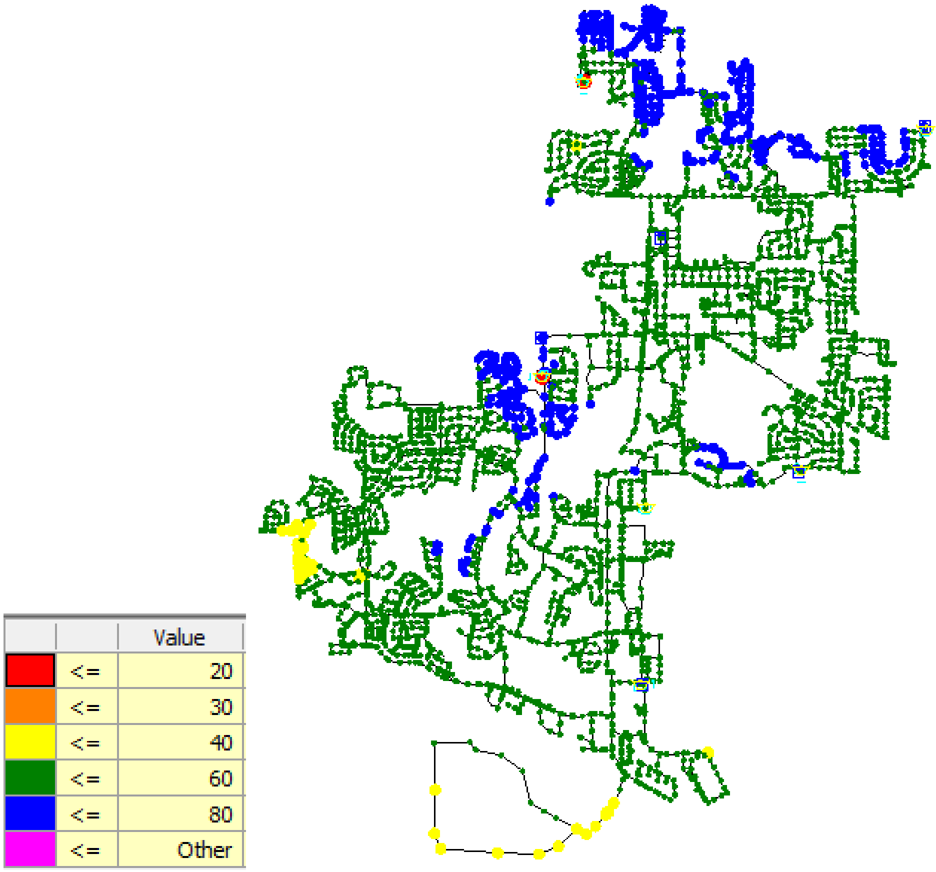
F-B-0: Pressure Map – Tank Levels at 50%, Pumps On – MDD – Existing System

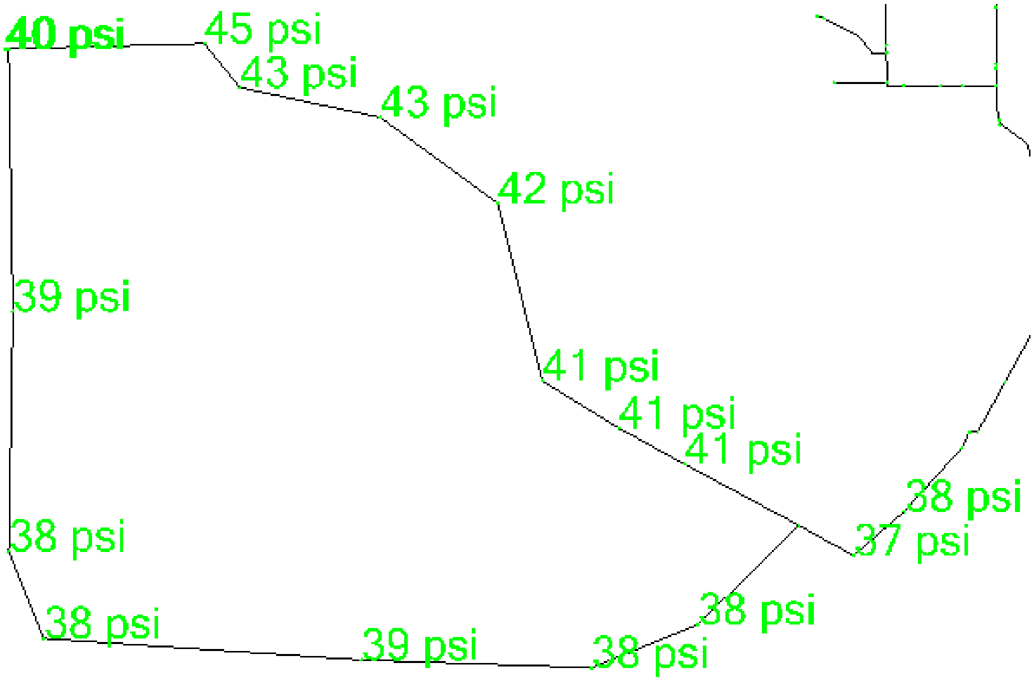


		Value
🟥	<=	20
🟧	<=	30
🟨	<=	40
🟩	<=	60
🟦	<=	80
🟪	<=	Other

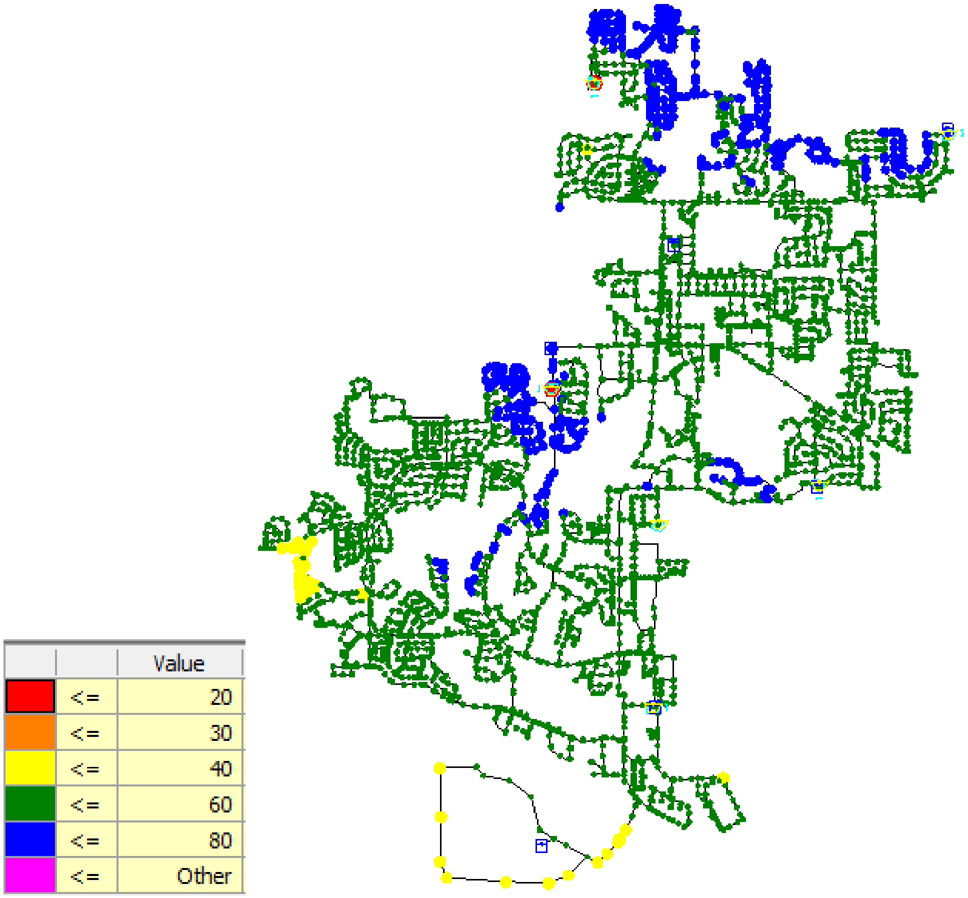
F-B-1: Pressure Map – Tank Levels at 50%, Pumps On – MDD – Future Scenario 1

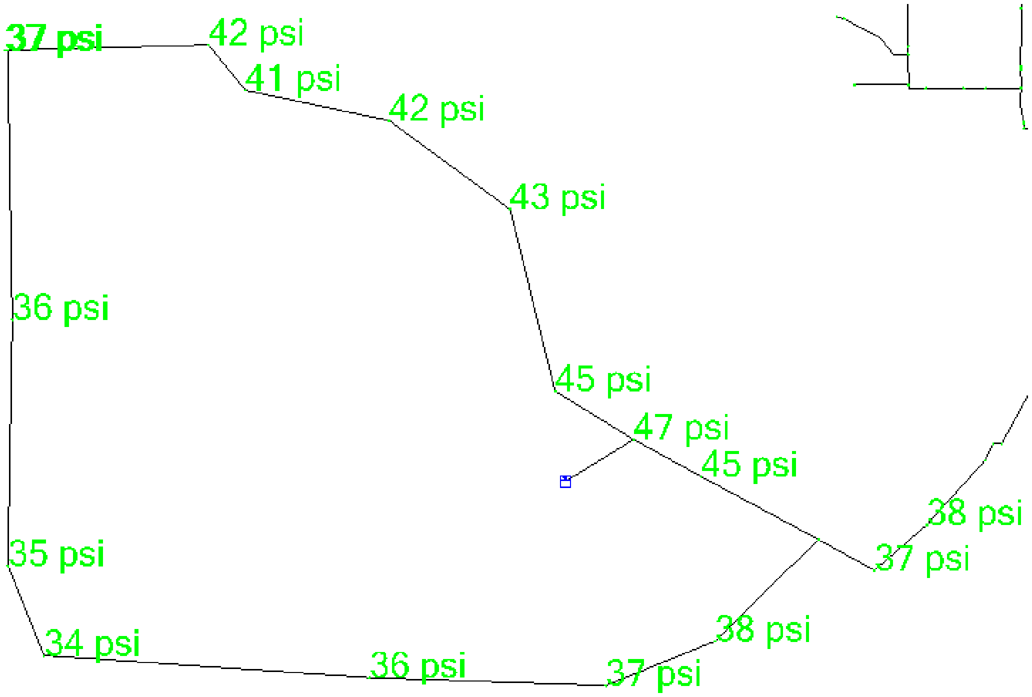
Break Point – 12,000 P.E.





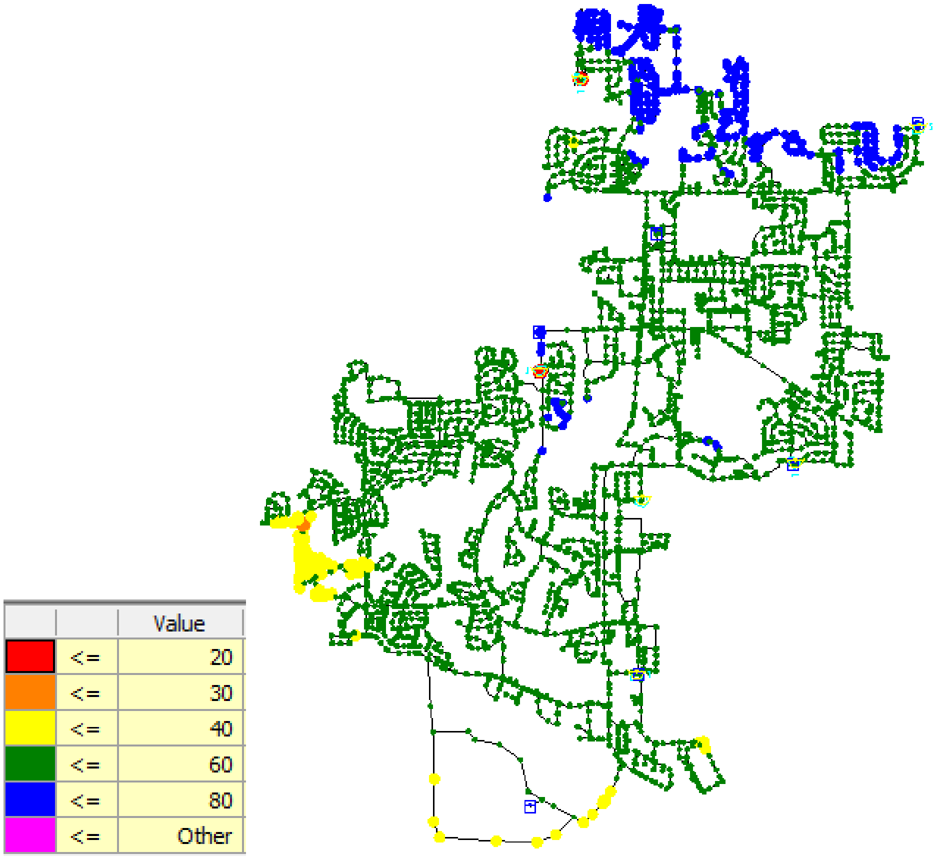
F-B-2: Pressure Map – Tank Levels at 50%, Pumps On – MDD – Future Scenario 2 – 80,000 P.E.

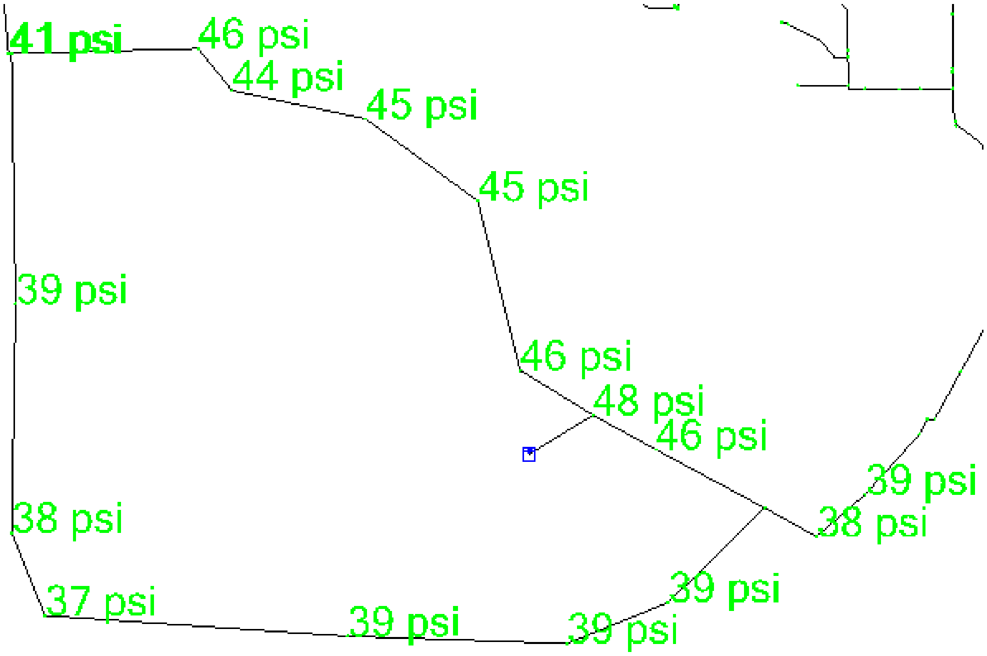




F-B-3: Pressure Map – Tank Levels at 50%, Pumps On – MDD – Future Scenario 3

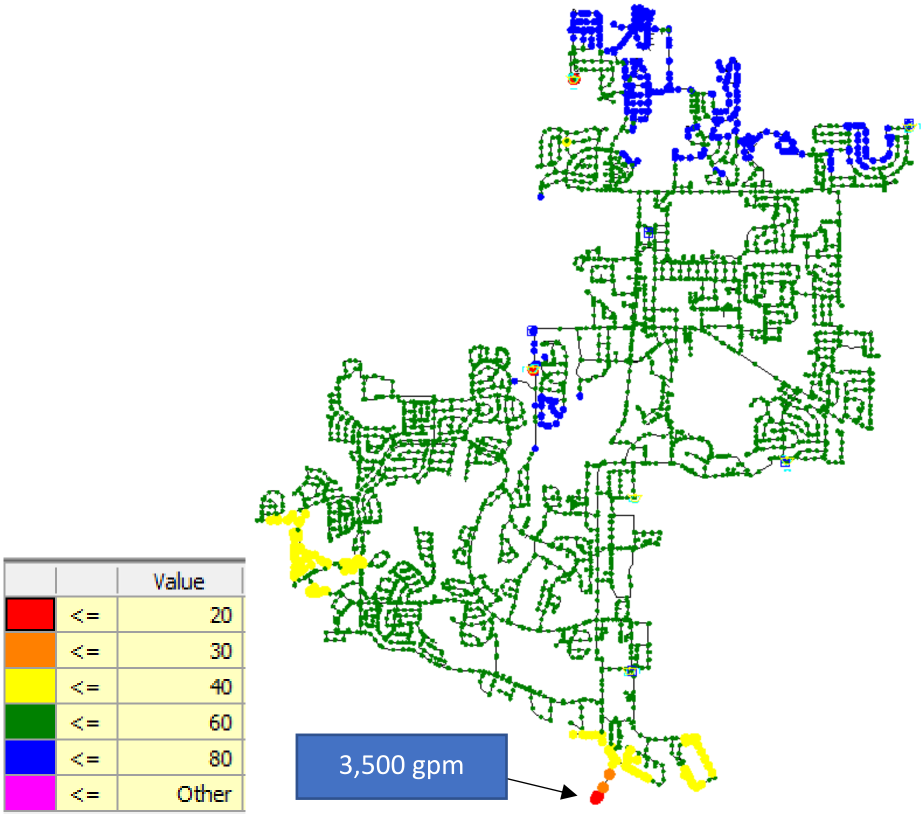
Break Point 80,000 P.E.



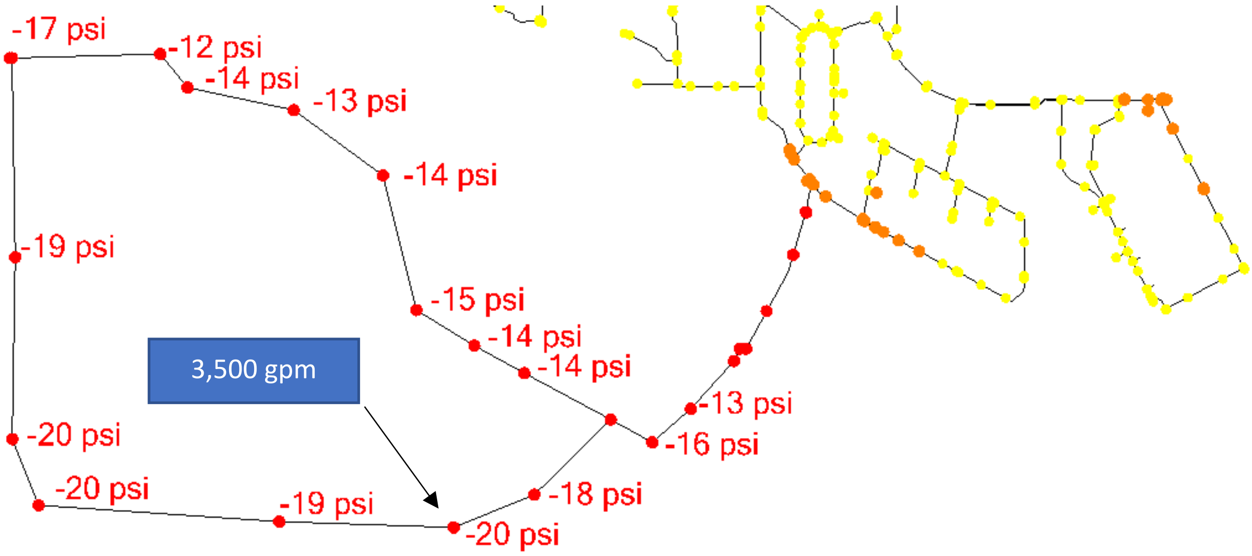


Appendix F-C: Water System Pressure Maps – Max Day Demand (MDD) + Fire Flow

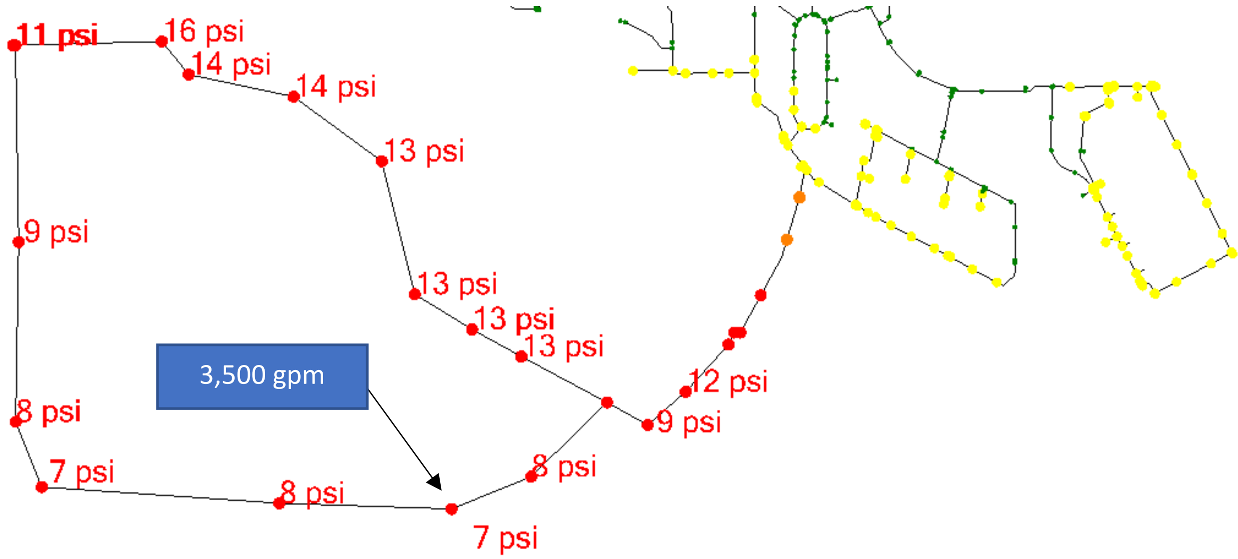
F-C-0: Pressure Map – Tank Levels at 50%, Pumps On – MDD + Fire Flow (3,500 gpm) – Existing System



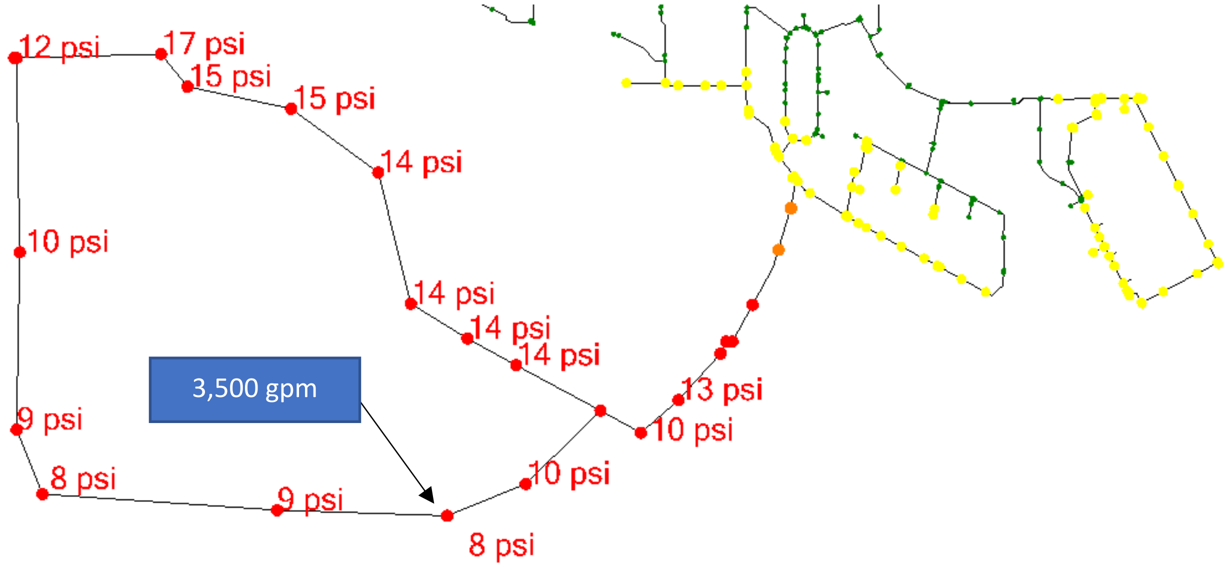
F-C-1-i: Pressure Map – Tank Levels at 50%, Pumps On – MDD + Fire Flow (3,500 gpm) – Future Scenario 1 – 12,000 P.E.



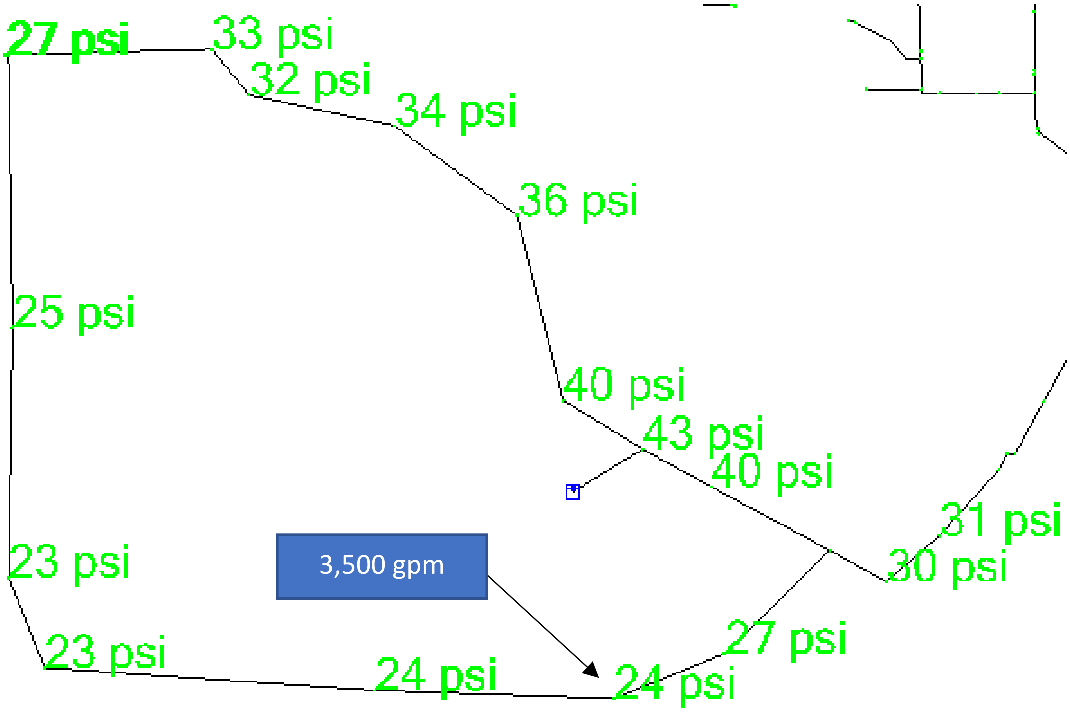
F-C-1-ii: Pressure Map – Tank Levels at 50%, Pumps On – MDD + Fire Flow (3,500 gpm) – Future Scenario 1 – 1,000 P.E.



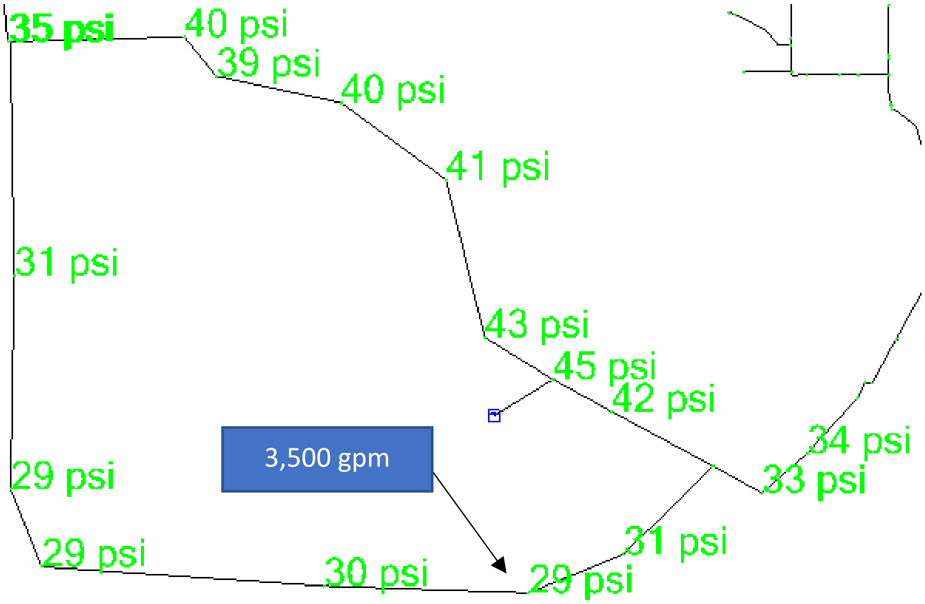
F-C-1-iii: Pressure Map – Tank Levels at 50%, Pumps On – MDD + Fire Flow (3,500 gpm) – Future Scenario 1 – 500 P.E.



F-C-2: Pressure Map – Tank Levels at 50%, Pumps On – MDD + Fire Flow (3,500 gpm) – Future Scenario 2 – 80,000 P.E.

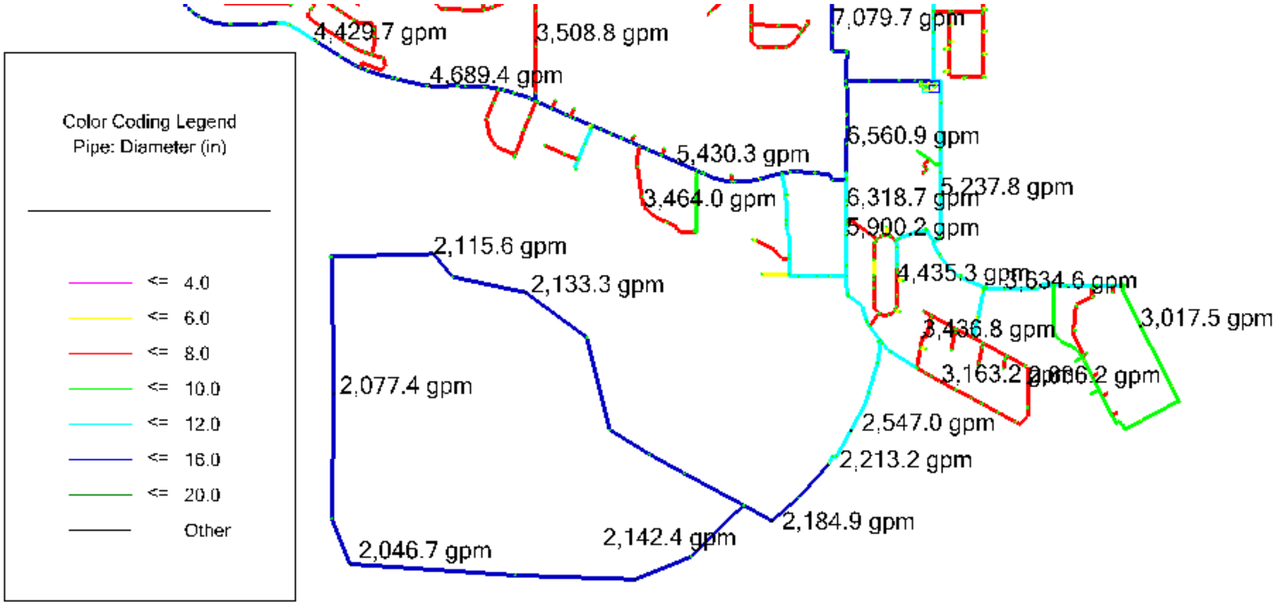


F-C-3: Pressure Map – Tank Levels at 50%, Pumps On – MDD + Fire Flow (3,500 gpm) – Future Scenario 3 – 80,000 P.E.

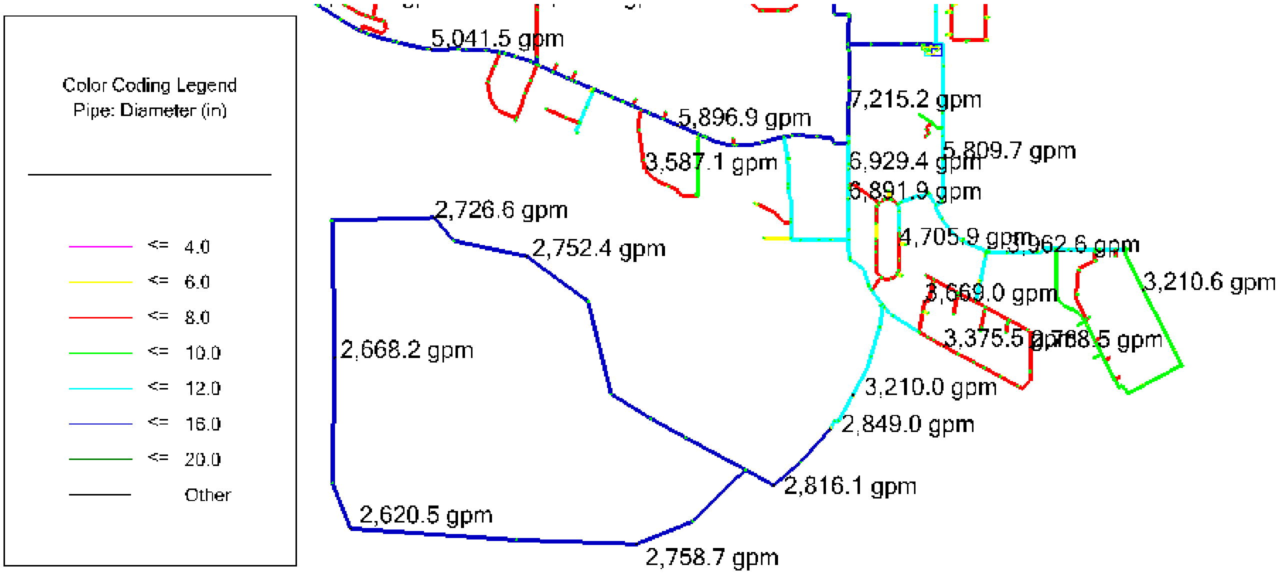


Appendix F-D: AFF at Select Junctions at Different Additional P.E.

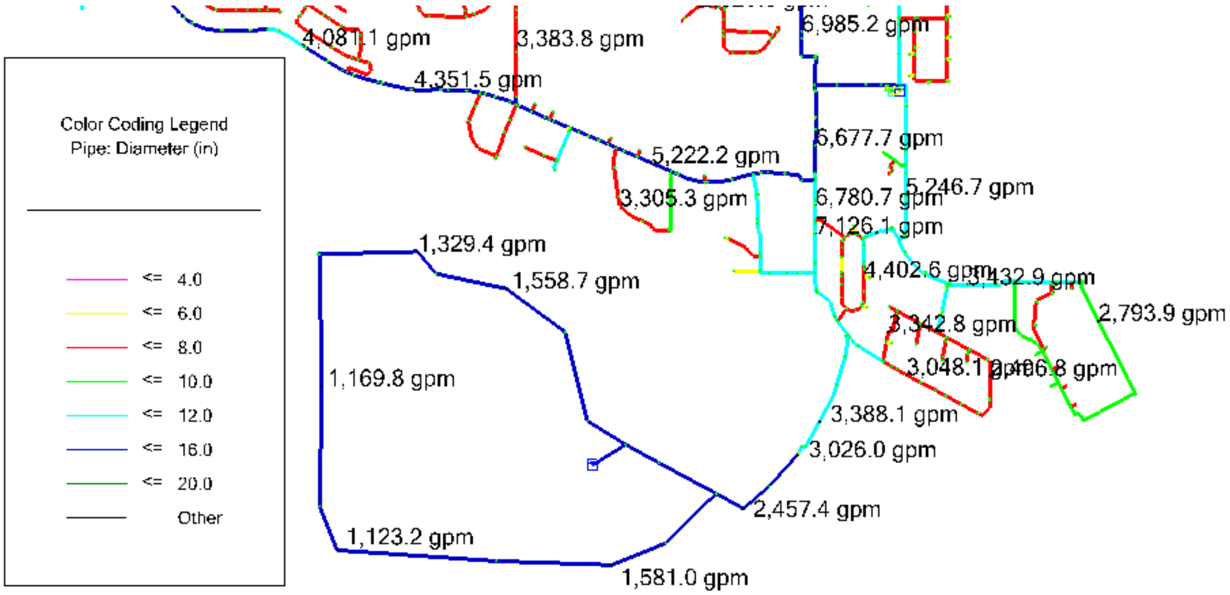
F-D-1-i: AFF – Tank Levels at 50%, Pumps On – MDD – Future Scenario 1 – 6,000 P.E.



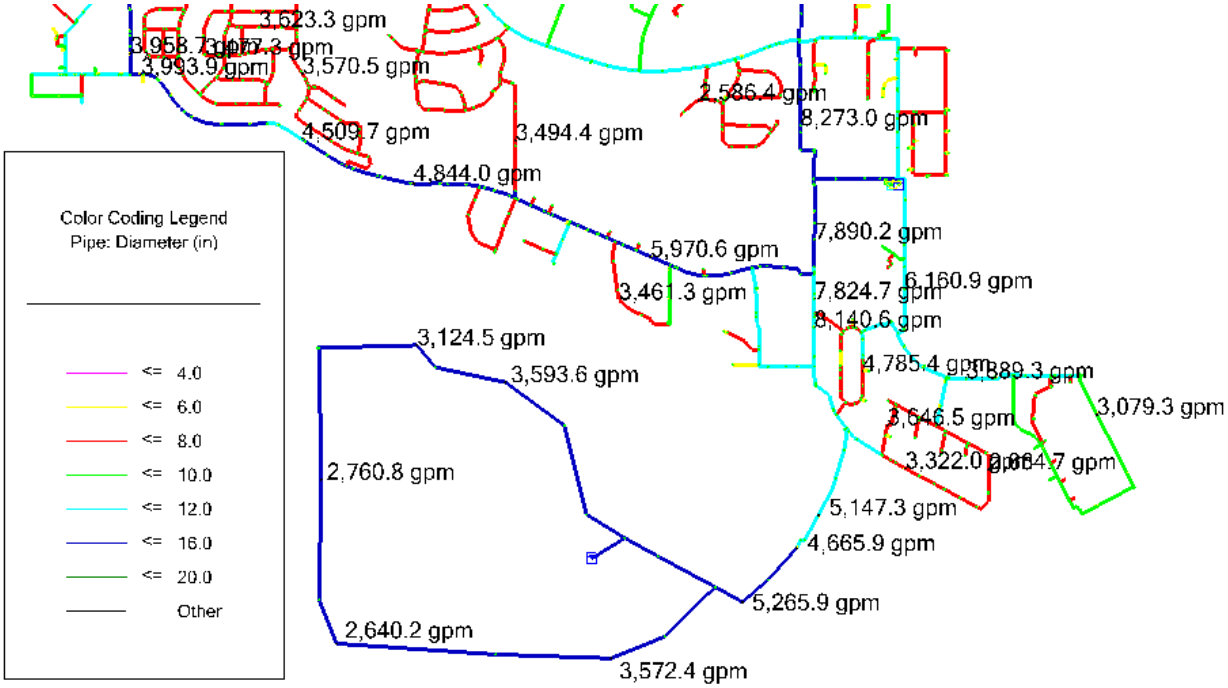
F-D-1-ii: AFF – Tank Levels at 50%, Pumps On – MDD – Future Scenario 1 – 1,000 P.E.



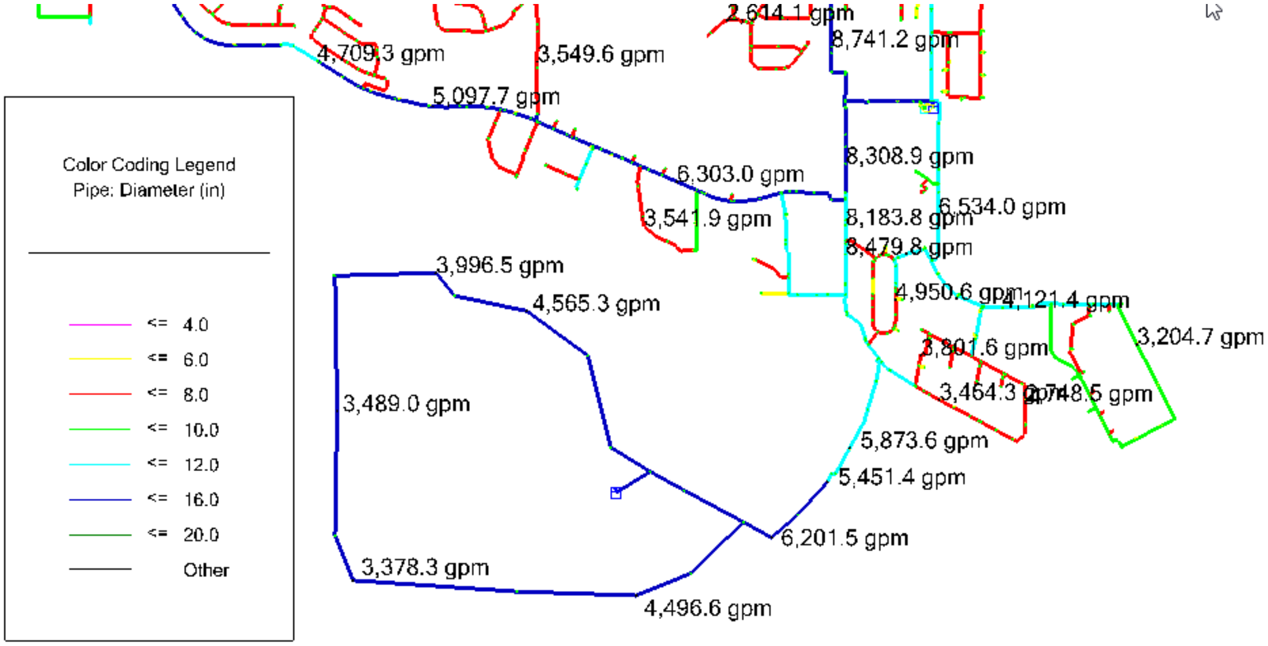
F-D-2-i: AFF – Tank Levels at 50%, Pumps On – MDD – Future Scenario 2 – 100,000 P.E.



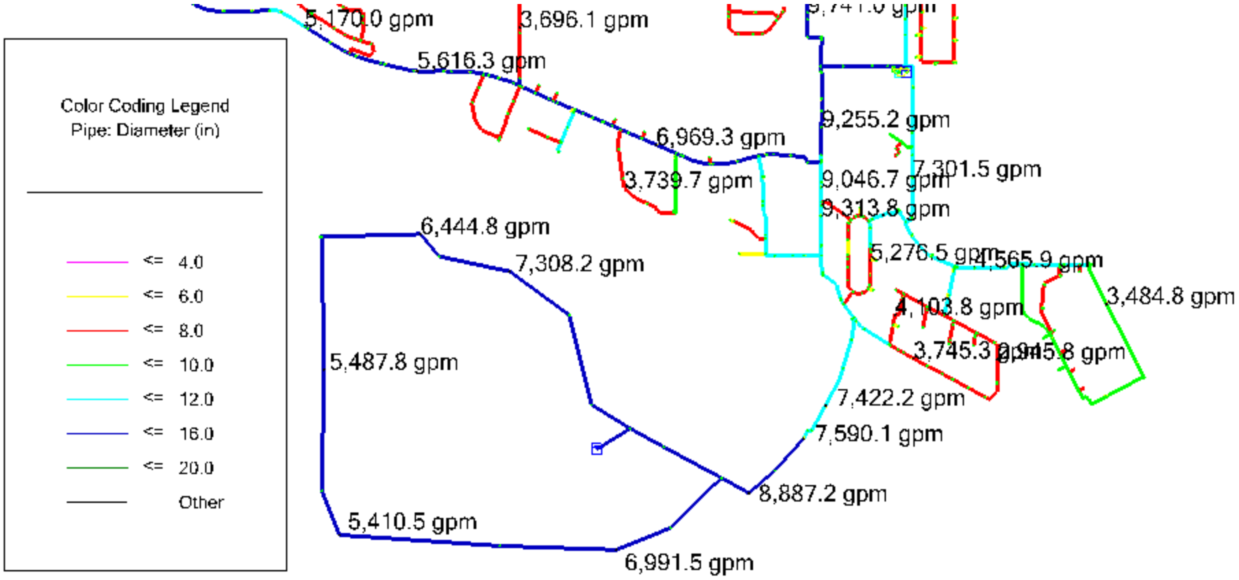
F-D-2-ii: AFF – Tank Levels at 50%, Pumps On – MDD – Future Scenario 2 – 80,000 P.E.



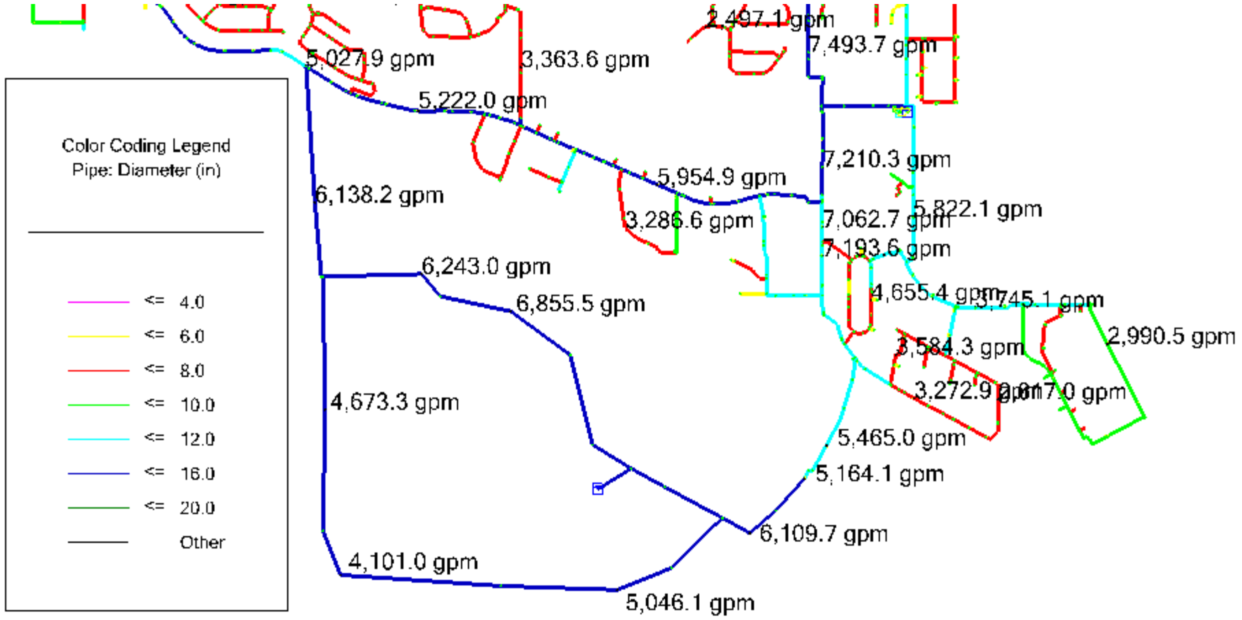
F-D-2-iii: AFF – Tank Levels at 50%, Pumps On – MDD – Future Scenario 2 – 70,000 P.E.



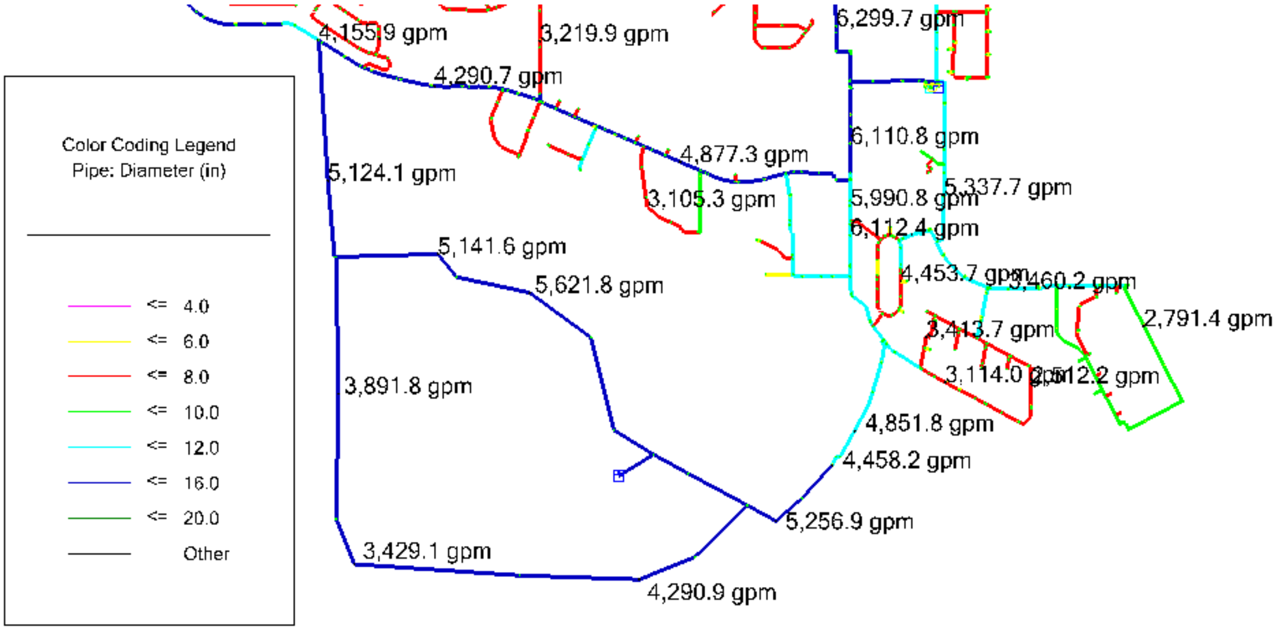
F-D-2-iv: AFF – Tank Levels at 50%, Pumps On – MDD – Future Scenario 2 – 40,000 P.E.



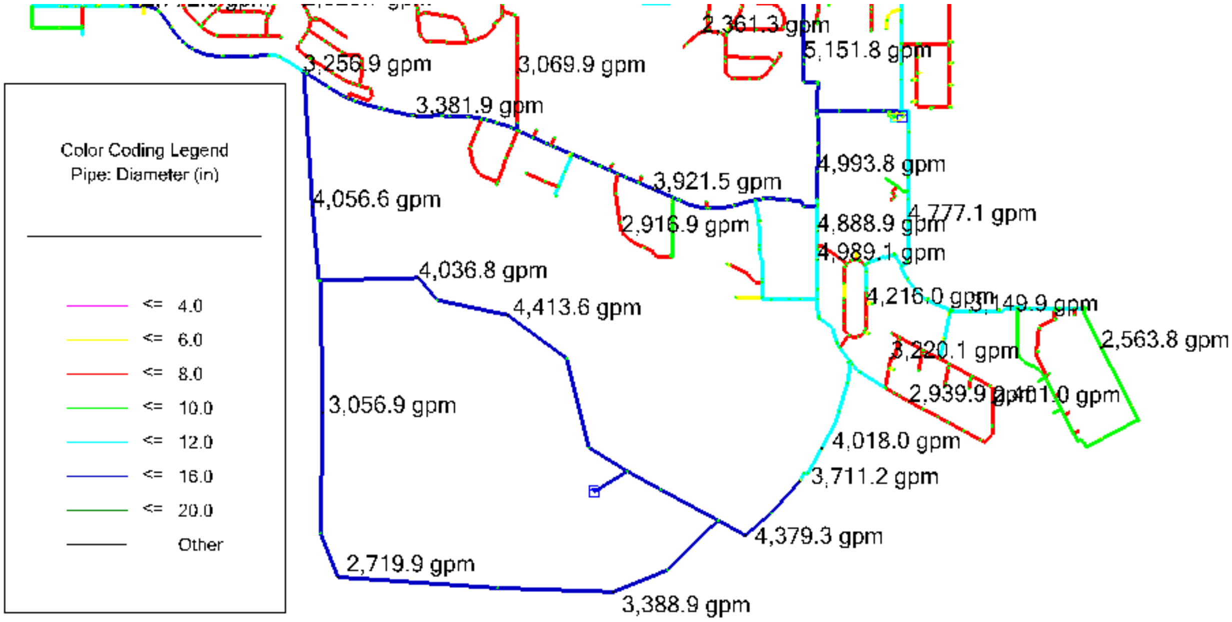
F-D-3-i: AFF – Tank Levels at 50%, Pumps On – MDD – Future Scenario 3 – 80,000 P.E.



F-D-3-ii: AFF – Tank Levels at 50%, Pumps On – MDD – Future Scenario 3 – 90,000 P.E.

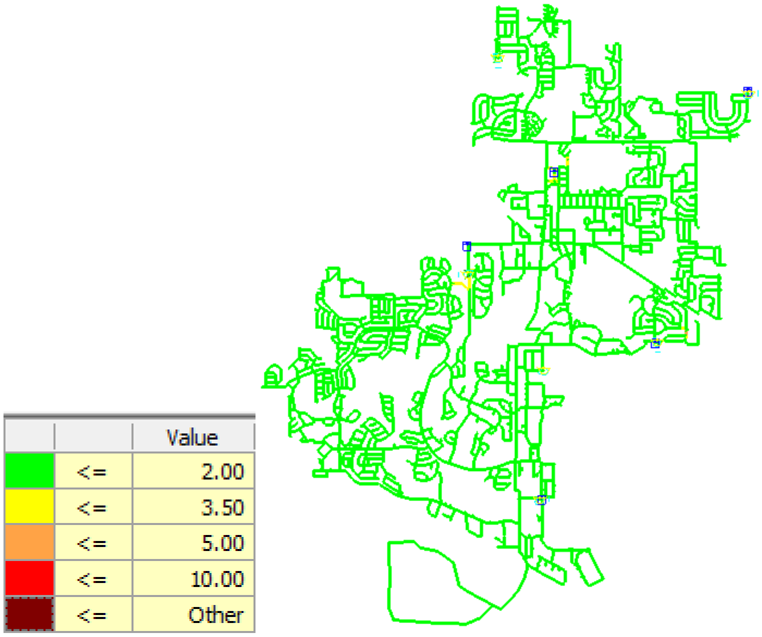


F-D-3-iii: AFF – Tank Levels at 50%, Pumps On – MDD – Future Scenario 3 – 100,000 P.E.

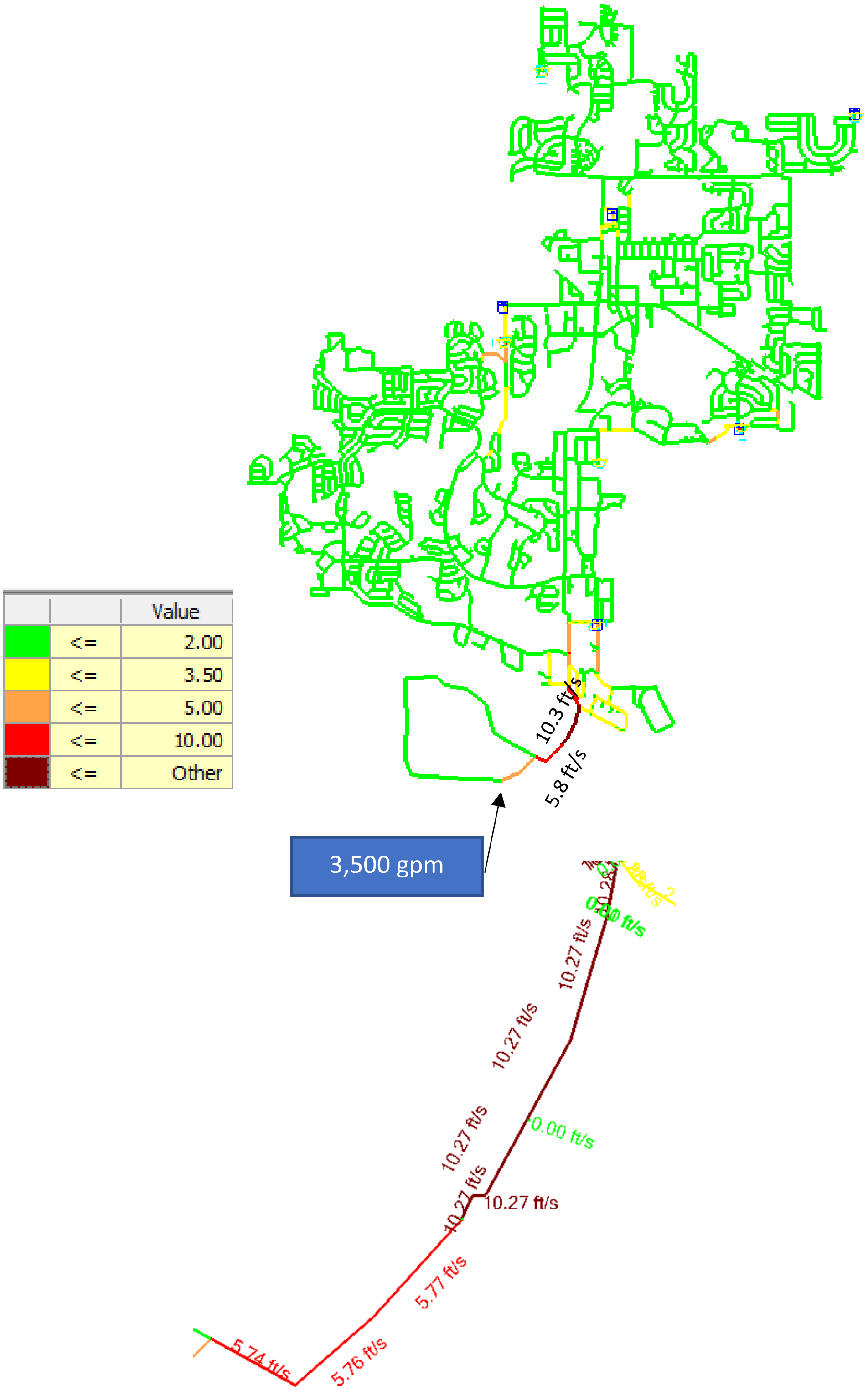


Appendix F-E: Pipe Velocities with 3,500 gpm Fire Flow in Future Development

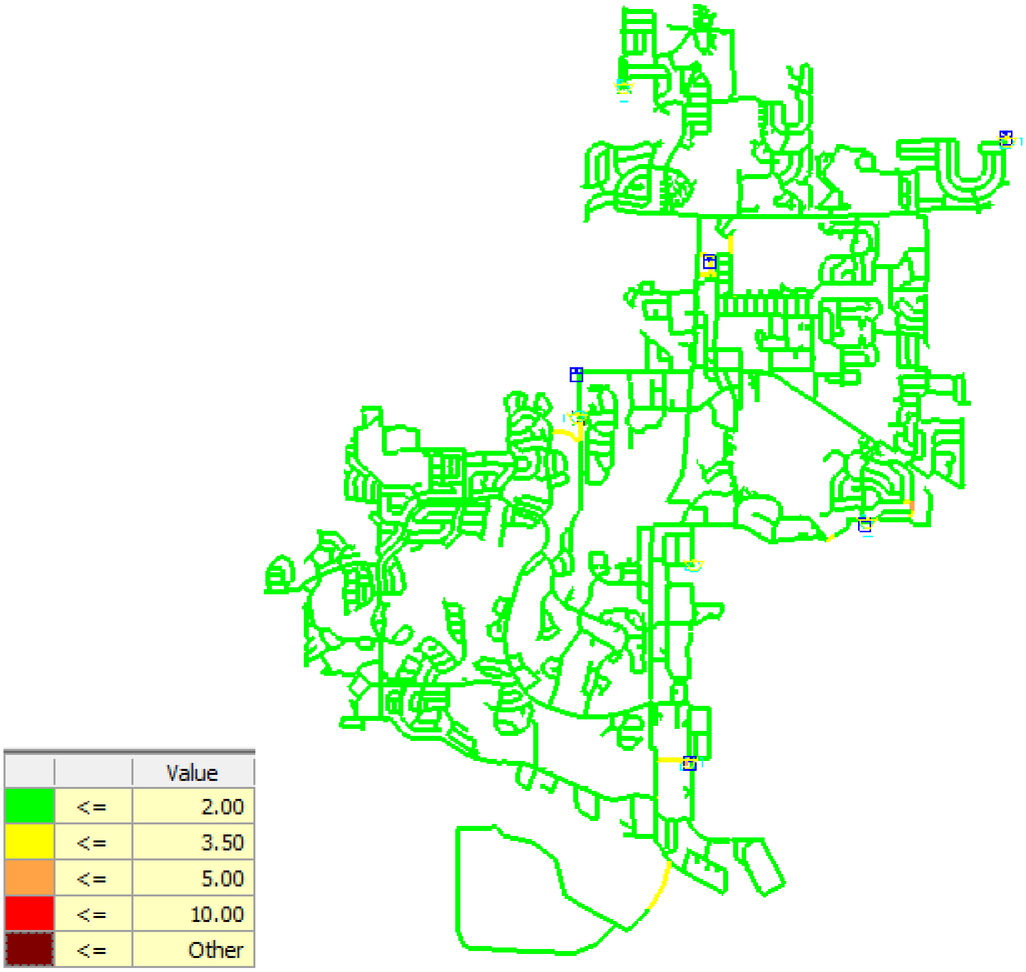
F-E-1-i: Pipe Velocity Map – Tank Levels at 50%, Pumps On – 1,000 P.E. – MDD – Future Scenario 1



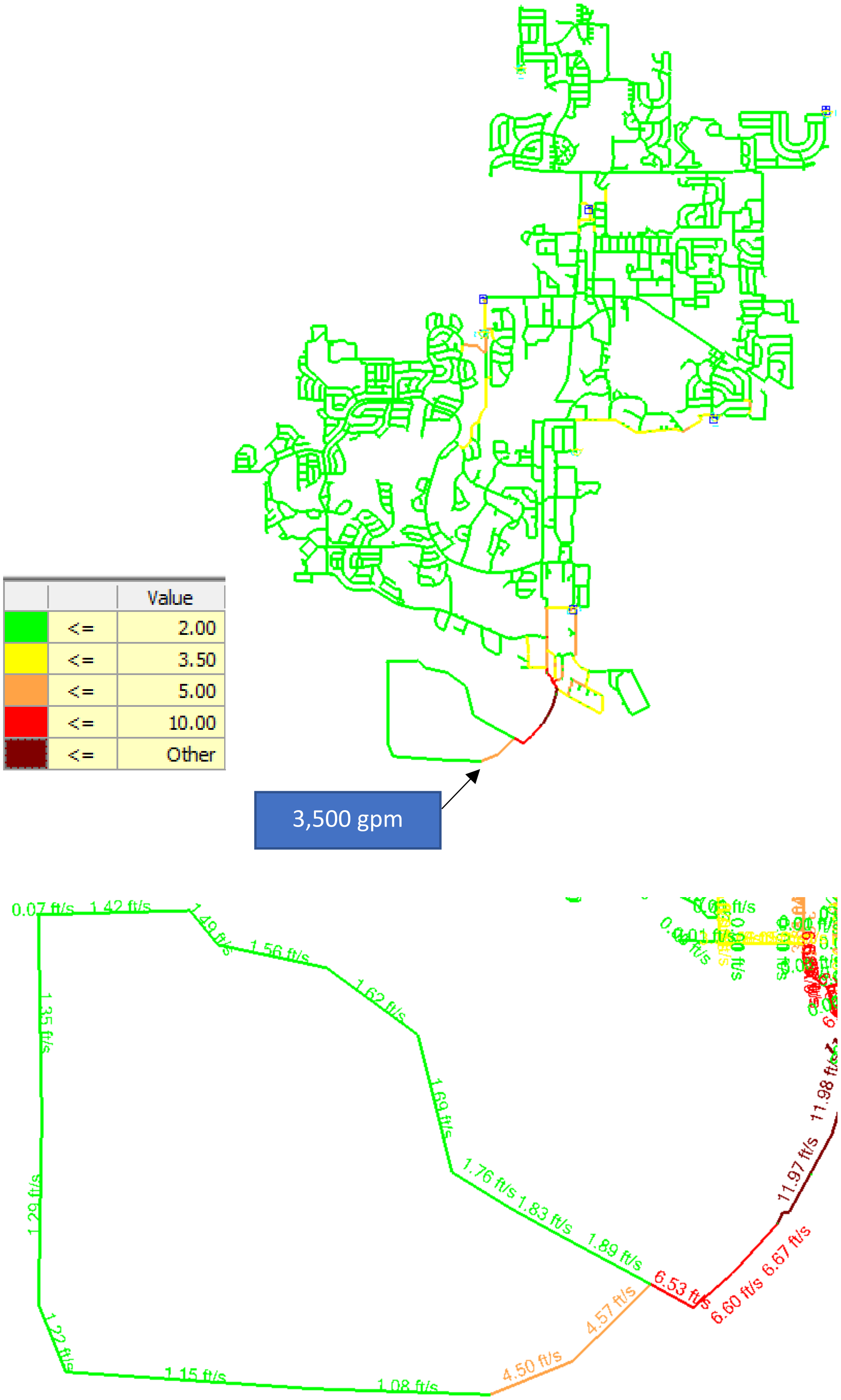
F-E-1-ii: Pipe Velocity Map – Tank Levels at 50%, Pumps On – 1,000 P.E.– MDD + 3,500 gpm Demand – Future Scenario 1



F-E-1-iii: Pipe Velocity Map – Tank Levels at 50%, Pumps On – 6,000 P.E. – MDD – Future Scenario 1

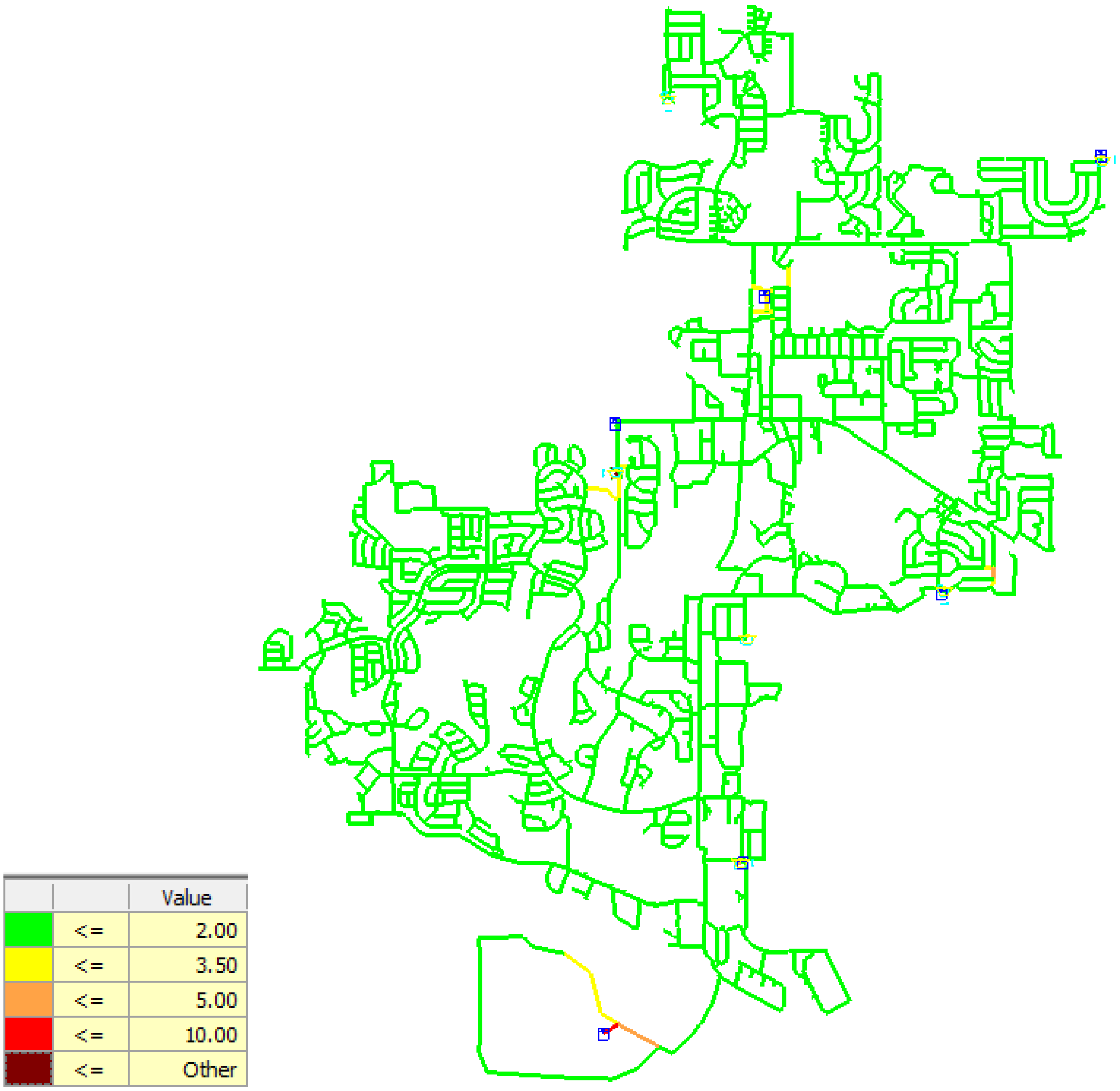


F-E-1-iv: Pipe Velocity Map – Tank Levels at 50%, Pumps On – 6,000 P.E. – MDD + 3,500 gpm Demand – Future Scenario 1



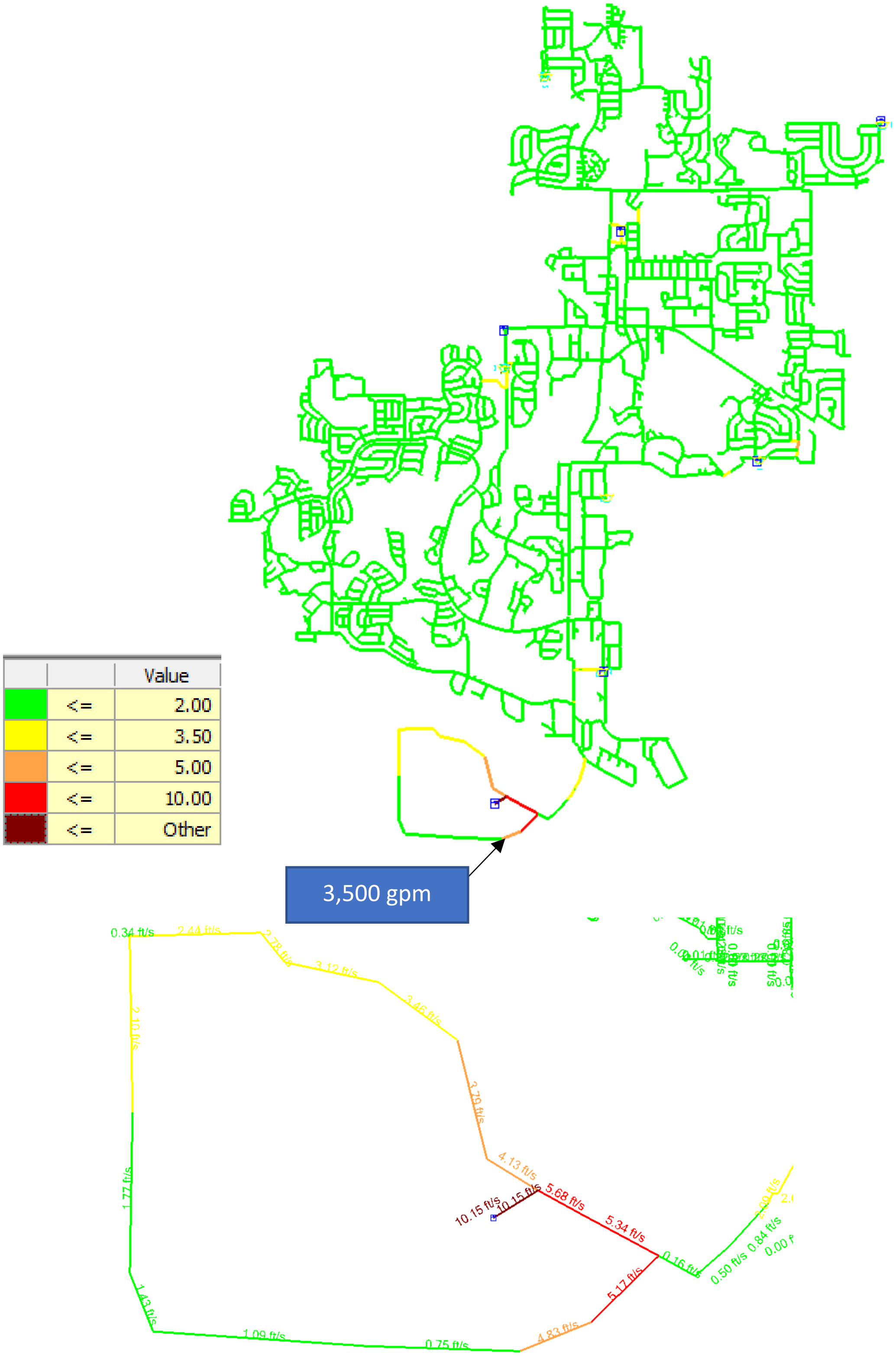
		Value
🟩	<=	2.00
🟨	<=	3.50
🟧	<=	5.00
🟥	<=	10.00
🟫	<=	Other

F-E-2-i: Pipe Velocity Map – Tank Levels at 50%, Pumps On – 30,000 P.E. – MDD – Future Scenario 2

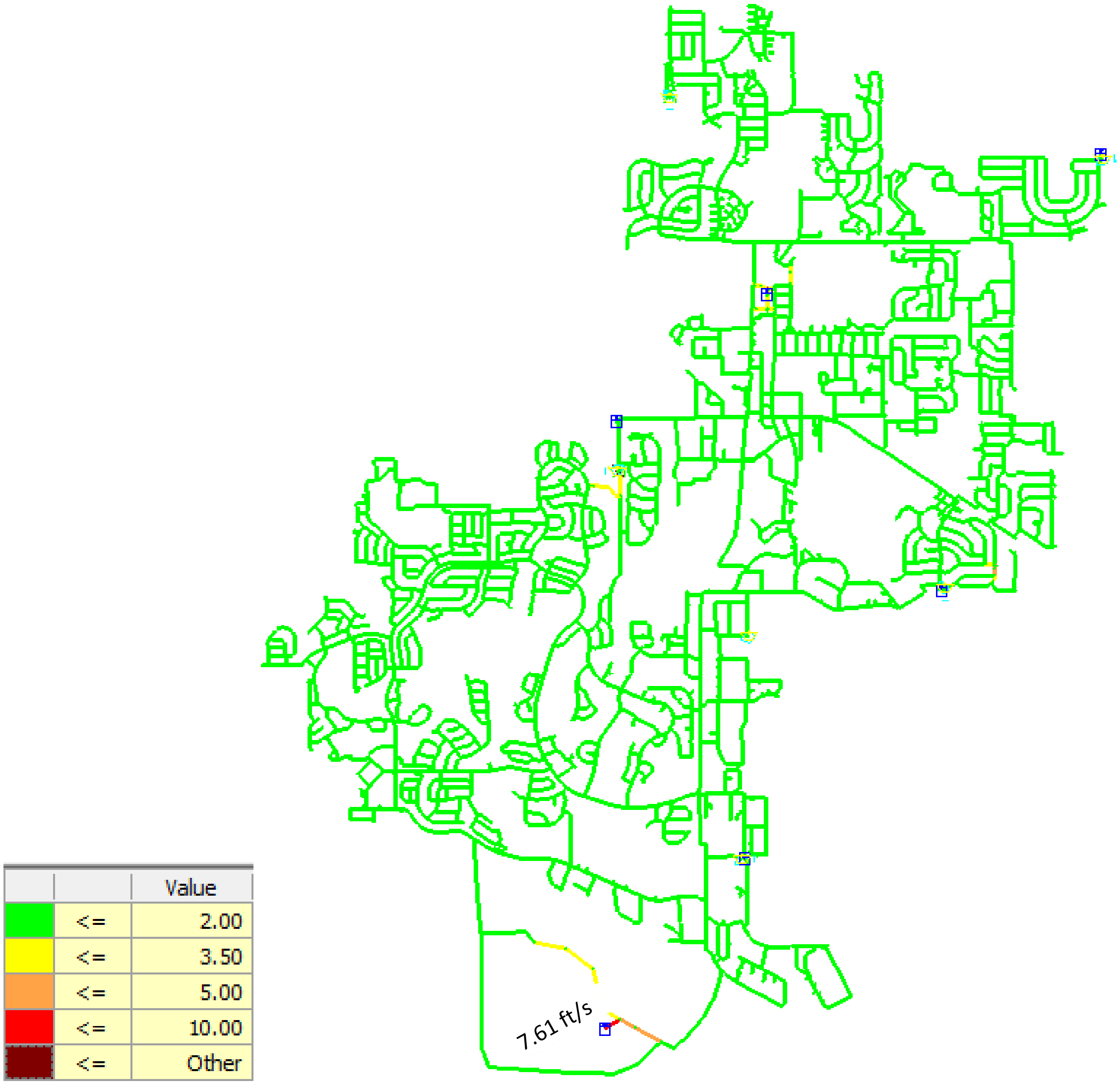


		Value
🟩	<=	2.00
🟨	<=	3.50
🟧	<=	5.00
🟥	<=	10.00
🟫	<=	Other

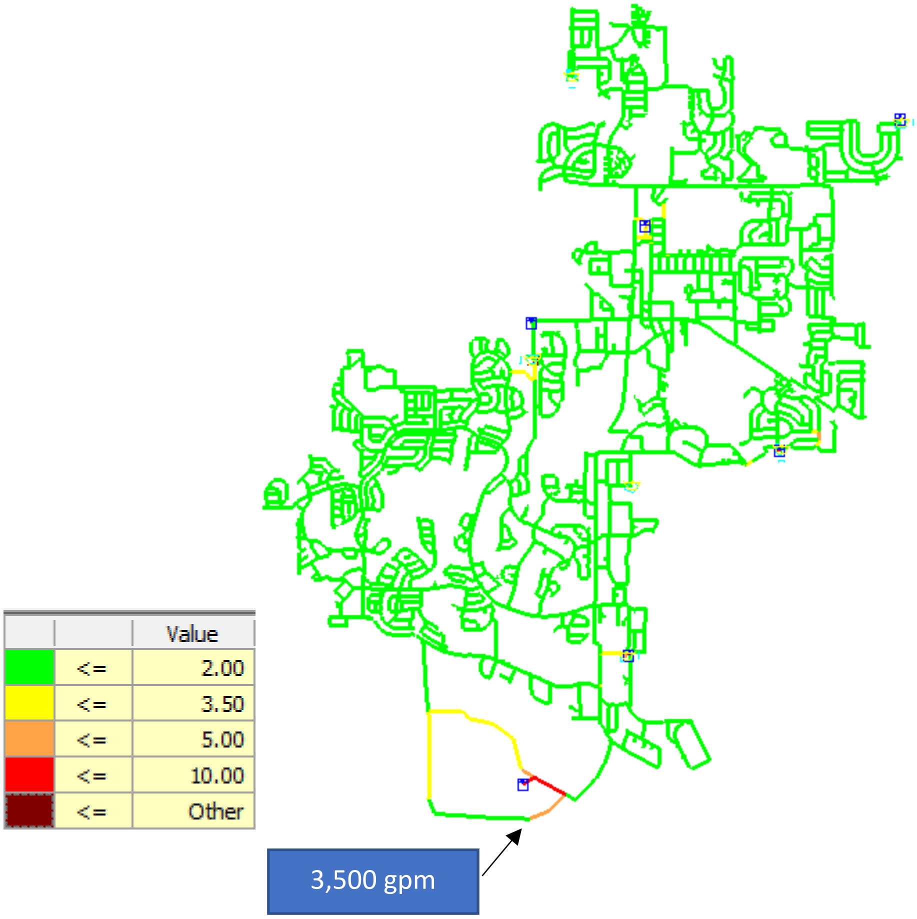
F-E-2-ii: Pipe Velocity Map – Tank Levels at 50%, Pumps On – 30,000 P.E. – MDD + 3,500 gpm Demand – Future Scenario 2

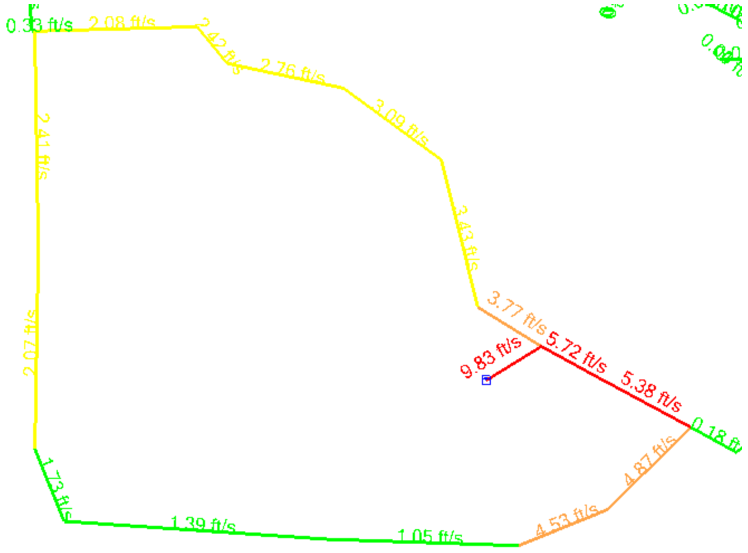


F-E-3-i: Pipe Velocity Map – Tank Levels at 50%, Pumps On – 30,000 P.E. – MDD – Future Scenario 3



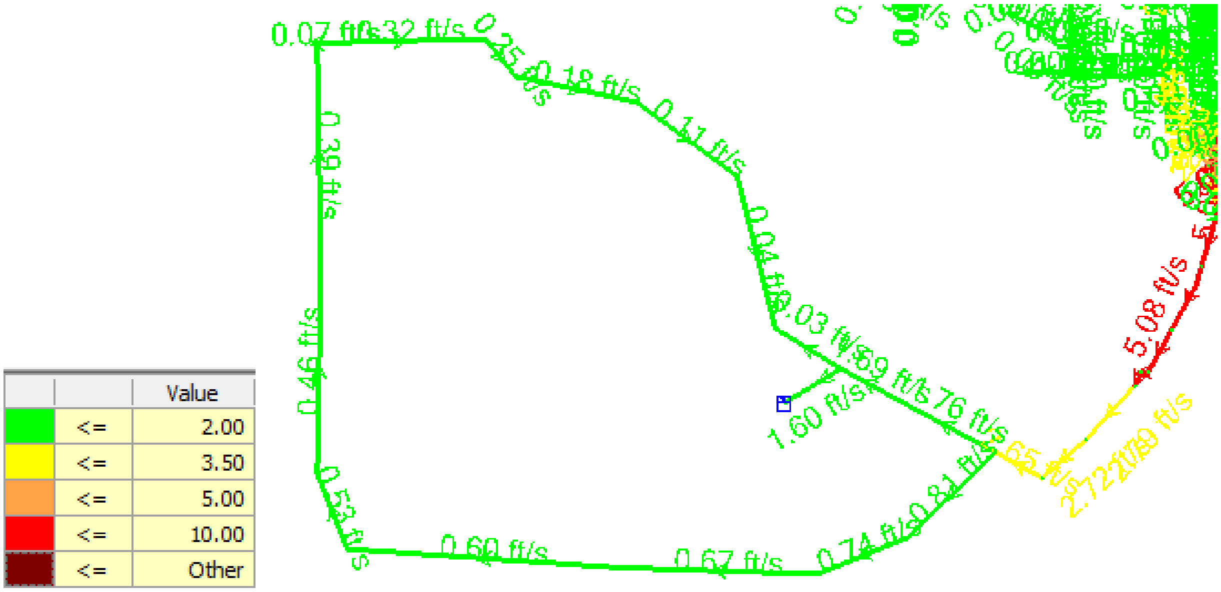
F-E-3-ii: Pipe Velocity Map – Tank Levels at 50%, Pumps On – 30,000 P.E. – MDD + 3,500 gpm Demand – Future Scenario 3



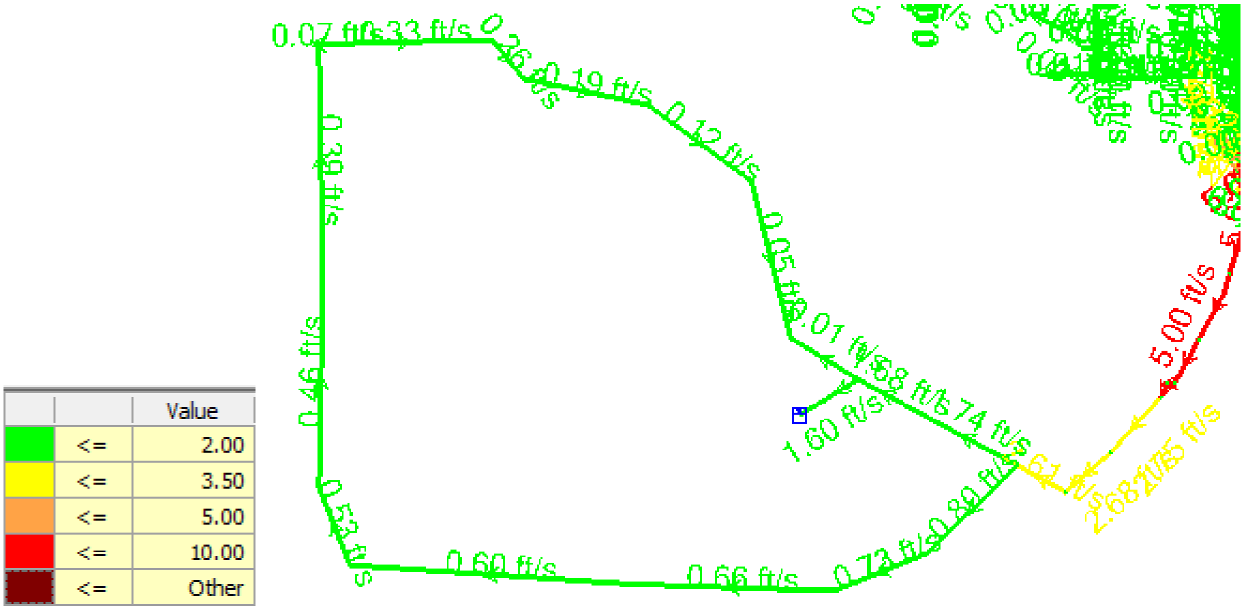


Appendix F-F: Pipe Velocities – Filling Tank No. 6 (1,000 gpm)

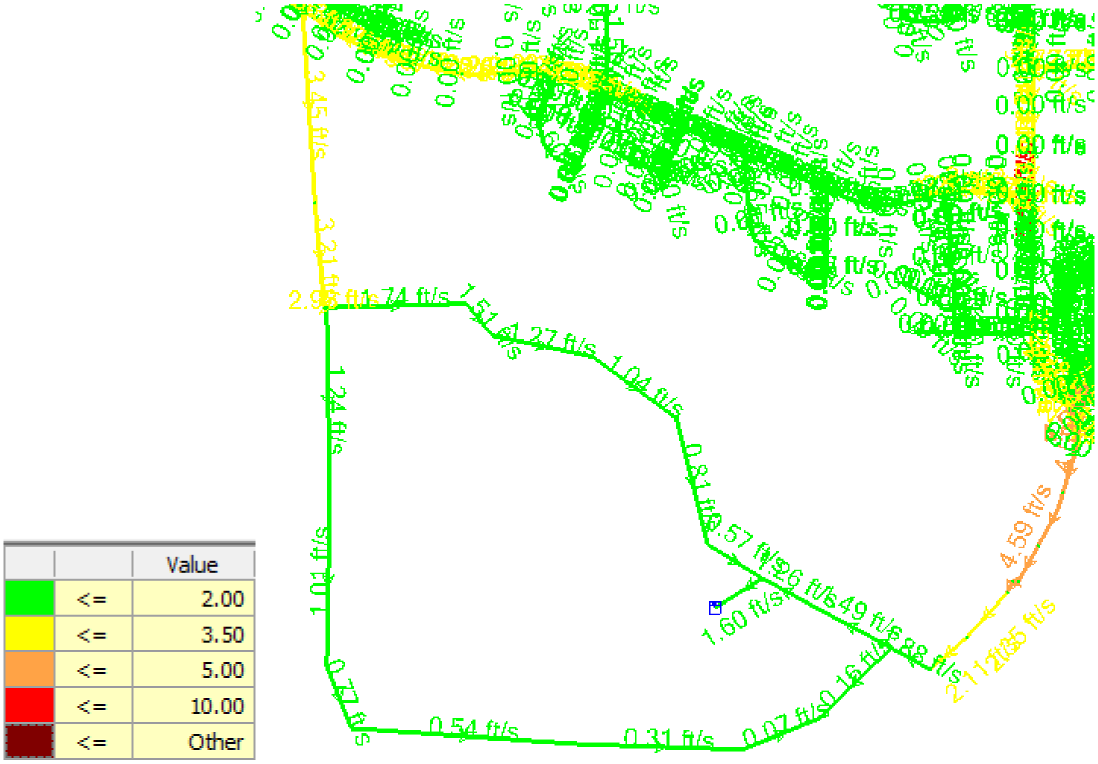
F-F-2-i: Pipe Velocity Map – Tank Levels at 50%, Pumps On – Tanks Filling (1,000 gpm) - 12,000 P.E. – ADD – Future Scenario 2



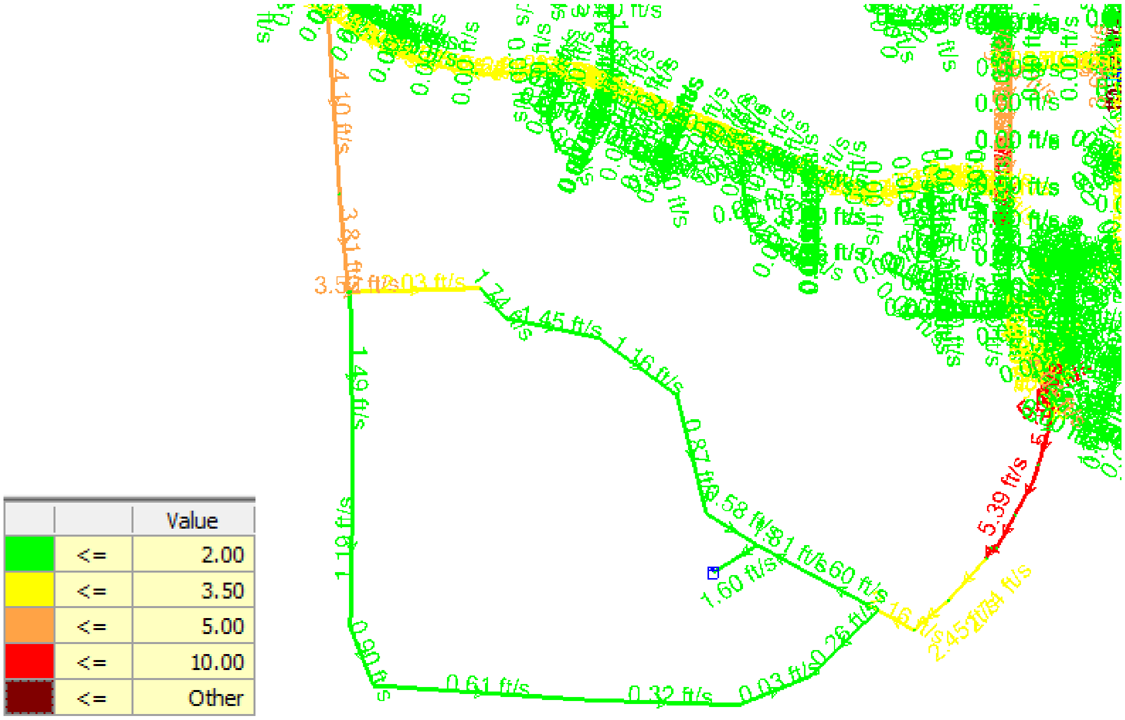
F-F-2-ii: Pipe Velocity Map – Tank Levels at 50%, Pumps On – Tanks Filling (1,000 gpm) - 6,000 P.E. – MDD – Future Scenario 2



F-F-3-i: Pipe Velocity Map – Tank Levels at 50%, Pumps On – Tanks Filling (1,000 gpm) - 40,000 P.E. – ADD – Future Scenario 3



F-F-3-ii: Pipe Velocity Map – Tank Levels at 50%, Pumps On – Tanks Filling (1,000 gpm) - 50,000 P.E. – ADD – Future Scenario 3



Appendix G

Detailed Cost Estimates –

Water Supply, Treatment, Storage, and Distribution

Wastewater Treatment and Southern Service Area Collection

Water Works System:

Water Supply, Treatment, Storage, and Distribution

ENGINEER'S ESTIMATE OF PROBABLE CONSTRUCTION COST
Well No. 13 & Well No. 13 Water Treatment Plant
Village of Huntley, IL

ITEM NO.	ITEM	AMOUNT
1	1,000 GPM IRONTON GALESVILLE WELL (24X18)	
	Construction (Casing, Hole, Grout, Etc.)	$2,500,000
	Development (Disinfection, Testing, Etc.)	
	Equipment (Pump/Motor, Pitless Adapter, Etc.)	
2	TREATMENT BUILDING, EQUIPMENT AND ELECTRICAL	
	Water Treatment Plant Building (Approximately 2,500 SF)	$1,140,000
	Forced Draft Aerator	$125,000
	Clearwell	
	High Service Pumps	$65,000
	Cation Exchange Treatment Equipment (3 - 8 FT Diameter Units)	$1,200,000
	Brine Pump & Piping	$5,000
	Brine Tank	
	Miscellaneous Piping and Meters	$100,000
	Chemical Feed Equipment	$100,000
	Power Distribution	$570,000
	Controls and Instrumentation	$103,000
	SCADA Integration	$35,000
	Emergency Generator	$307,000
3	SITE WORK	
	Yard Piping (Water Main & Sanitary and Storm Sewer)	$150,000
	Paving	$30,000
	Fencing	$40,000
	Restoration & Landscaping	$50,000
	SUB-TOTAL	$6,520,000
	CONTINGENCY (10%)	$652,000
	TOTAL ESTIMATED COST OF CONSTRUCTION	**$7,172,000**
	DESIGN AND CONSTRUCTION ENGINEERING (18%)	$1,291,000
	3 PHASE, 480 V ELECTRIC SERVICE TO SITE	$30,000
	LAND ACQUISITION (Assumed Portion of New Development)	$0
	SOIL & MATERIAL TESTING	$30,000
	TOTAL ESTIMATED COST OF PROJECT	**$8,523,000**

Notes:

All values are based on 2022 construction costs.

Assumes Well No. 13 constructed at the Well No. 13 WTP site.

Estimate does not include air scrubbing equipment for aerator exhaust.

ENGINEER'S ESTIMATE OF PROBABLE CONSTRUCTION COST
Well No. 14 & Well No. 14 Water Treatment Plant
Village of Huntley, IL

ITEM NO.	ITEM	AMOUNT
1	1,000 GPM IRONTON GALESVILLE WELL (26X22 FOR POTENTIAL DEEPENING)	
	Construction (Casing, Hole, Grout, Etc.)	$2,900,000
	Development (Disinfection, Testing, Etc.)	
	Equipment (Pump/Motor, Pitless Adapter, Etc.)	
2	TREATMENT BUILDING, EQUIPMENT AND ELECTRICAL	
	Water Treatment Plant Building (Approximately 2,500 SF)	$1,140,000
	Forced Draft Aerator	$125,000
	Clearwell	
	High Service Pumps	$65,000
	Cation Exchange Treatment Equipment (3 - 8 FT Diameter Units)	$1,200,000
	Brine Pump & Piping	$5,000
	Brine Tank	
	Miscellaneous Piping and Meters	$100,000
	Chemical Feed Equipment	$100,000
	Power Distribution	$570,000
	Controls and Instrumentation	$103,000
	SCADA Integration	$35,000
	Emergency Generator	$307,000
3	SITE WORK	
	Yard Piping (Water Main & Sanitary and Storm Sewer)	$150,000
	Paving	$30,000
	Fencing	$40,000
	Restoration & Landscaping	$50,000
	SUB-TOTAL	$6,920,000
	CONTINGENCY (10%)	$692,000
	TOTAL ESTIMATED COST OF CONSTRUCTION	**$7,612,000**
	DESIGN AND CONSTRUCTION ENGINEERING (18%)	$1,370,000
	3 PHASE, 480 V ELECTRIC SERVICE TO SITE	$30,000
	LAND ACQUISITION	$150,000
	SOIL & MATERIAL TESTING	$30,000
	TOTAL ESTIMATED COST OF PROJECT	**$9,192,000**

Notes:

All values are based on 2022 construction costs.

Assumes Well No. 14 constructed at the Well No. 14 WTP site.

Estimate does not include air scrubbing equipment for aerator exhaust.

ENGINEER'S ESTIMATE OF PROBABLE CONSTRUCTION COST
Well No. 15 & Well No. 15 Water Treatment Plant
(Building Sized For Well No. 18 Inclusion)
Village of Huntley, IL

ITEM NO.	ITEM	AMOUNT
1	1,000 GPM IRONTON GALESVILLE WELL (24X18)	
	Construction (Casing, Hole, Grout, Etc.)	$2,500,000
	Development (Disinfection, Testing, Etc.)	
	Equipment (Pump/Motor, Pitless Adapter, Etc.)	
2	TREATMENT BUILDING, EQUIPMENT AND ELECTRICAL	
	Water Treatment Plant Building (Approximately 3,500 SF)	$1,666,000
	Forced Draft Aerator	$125,000
	Clearwell	
	High Service Pumps	$65,000
	Cation Exchange Treatment Equipment (3 - 8 FT Diameter Units)	$1,200,000
	Brine Pump & Piping	$5,000
	Brine Tank	
	Miscellaneous Piping and Meters	$100,000
	Chemical Feed Equipment	$100,000
	Power Distribution	$570,000
	Controls and Instrumentation	$103,000
	SCADA Integration	$35,000
	Emergency Generator	$307,000
3	SITE WORK	
	Yard Piping (Water Main & Sanitary and Storm Sewer)	$150,000
	Paving	$30,000
	Fencing	$40,000
	Restoration & Landscaping	$50,000
	SUB-TOTAL	$7,046,000
	CONTINGENCY (10%)	$705,000
	TOTAL ESTIMATED COST OF CONSTRUCTION	**$7,751,000**
	DESIGN AND CONSTRUCTION ENGINEERING (18%)	$1,395,000
	3 PHASE, 480 V ELECTRIC SERVICE TO SITE	$30,000
	LAND ACQUISITION (Assumed Portion of New Development)	$0
	SOIL & MATERIAL TESTING	$30,000
	TOTAL ESTIMATED COST OF PROJECT	**$9,206,000**

Notes:

All values are based on 2022 construction costs.

Assumes Well No. 15 constructed at the Well No. 15 WTP site.

Assumes Well No. 18 will be routed to the WTP in the future. The building, clear well and brine tank are sized for the future total capacity of the WTP.

Estimate does not include air scrubbing equipment for aerator exhaust.

ENGINEER'S ESTIMATE OF PROBABLE CONSTRUCTION COST

Well No. 16 & Well No. 16 Water Treatment Plant

Village of Huntley, IL

ITEM NO.	ITEM	AMOUNT
1	1,000 GPM IRONTON GALESVILLE WELL (24X18)	
	Construction (Casing, Hole, Grout, Etc.)	$2,500,000
	Development (Disinfection, Testing, Etc.)	
	Equipment (Pump/Motor, Pitless Adapter, Etc.)	
2	TREATMENT BUILDING, EQUIPMENT AND ELECTRICAL	
	Water Treatment Plant Building (Approximately 3,500 SF)	$1,140,000
	Forced Draft Aerator	$125,000
	Clearwell	
	High Service Pumps	$65,000
	Cation Exchange Treatment Equipment (3 - 8 FT Diameter Units)	$1,200,000
	Brine Pump & Piping	$5,000
	Brine Tank	
	Miscellaneous Piping and Meters	$100,000
	Chemical Feed Equipment	$100,000
	Power Distribution	$570,000
	Controls and Instrumentation	$103,000
	SCADA Integration	$35,000
	Emergency Generator	$307,000
3	SITE WORK	
	Yard Piping (Water Main & Sanitary and Storm Sewer)	$150,000
	Paving	$30,000
	Fencing	$40,000
	Restoration & Landscaping	$50,000
	SUB-TOTAL	$6,520,000
	CONTINGENCY (10%)	$652,000
	TOTAL ESTIMATED COST OF CONSTRUCTION	**$7,172,000**
	DESIGN AND CONSTRUCTION ENGINEERING (18%)	$1,291,000
	3 PHASE, 480 V ELECTRIC SERVICE TO SITE	$30,000
	LAND ACQUISITION (Assumed Portion of Village's Property)	$0
	SOIL & MATERIAL TESTING	$30,000
	TOTAL ESTIMATED COST OF PROJECT	**$8,523,000**

Notes:

All values are based on 2022 construction costs.

Assumes Well No. 16 constructed at the Well No. 16 WTP site.

Estimate does not include air scrubbing equipment for aerator exhaust.

ENGINEER'S ESTIMATE OF PROBABLE CONSTRUCTION COST
Well No. 17 & Well No. 17 Water Treatment Plant
Village of Huntley, IL

ITEM NO.	ITEM	AMOUNT
1	1,000 GPM IRONTON GALESVILLE WELL (26X22 FOR POTENTIAL DEEPENING)	
	Construction (Casing, Hole, Grout, Etc.)	$2,900,000
	Development (Disinfection, Testing, Etc.)	
	Equipment (Pump/Motor, Pitless Adapter, Etc.)	
2	TREATMENT BUILDING, EQUIPMENT AND ELECTRICAL	
	Water Treatment Plant Building (Approximately 2,500 SF)	$1,140,000
	Forced Draft Aerator	$125,000
	Clearwell	
	High Service Pumps	$65,000
	Cation Exchange Treatment Equipment (3 - 8 FT Diameter Units)	$1,200,000
	Brine Pump & Piping	$5,000
	Brine Tank	
	Miscellaneous Piping and Meters	$100,000
	Chemical Feed Equipment	$100,000
	Power Distribution	$570,000
	Controls and Instrumentation	$103,000
	SCADA Integration	$35,000
	Emergency Generator	$307,000
3	SITE WORK	
	Yard Piping (Water Main & Sanitary and Storm Sewer)	$150,000
	Paving	$30,000
	Fencing	$40,000
	Restoration & Landscaping	$50,000
	SUB-TOTAL	$6,920,000
	CONTINGENCY (10%)	$692,000
	TOTAL ESTIMATED COST OF CONSTRUCTION	**$7,612,000**
	DESIGN AND CONSTRUCTION ENGINEERING (18%)	$1,370,000
	3 PHASE, 480 V ELECTRIC SERVICE TO SITE	$30,000
	LAND ACQUISITION	$150,000
	SOIL & MATERIAL TESTING	$30,000
	TOTAL ESTIMATED COST OF PROJECT	**$9,192,000**

Notes:

All values are based on 2022 construction costs.

Assumes Well No. 17 constructed at the Well No. 17 WTP site.

Estimate does not include air scrubbing equipment for aerator exhaust.

ENGINEER'S ESTIMATE OF PROBABLE CONSTRUCTION COST
Well No. 18 & Wells No. 15 & 18 Water Treatment Plant Expansion
Village of Huntley, IL

ITEM NO.	ITEM	AMOUNT
1	1,000 GPM IRONTON GALESVILLE WELL (24X18)	
	Construction (Casing, Hole, Grout, Etc.)	$2,500,000
	Development (Disinfection, Testing, Etc.)	
	Equipment (Pump/Motor, Pitless Adapter, Etc.)	
	Electrical Gear & Enclosure	$662,000
	Yard Piping (Water Main)	$50,000
	Paving	$15,000
	Fencing	$20,000
	Restoration & Landscaping	$25,000
	Raw Water Main (6,000 LF)	$1,403,000
	Generator	$184,000
	SCADA Integration	$20,000
2	TREATMENT BUILDING, EQUIPMENT AND ELECTRICAL	
	Water Treatment Plant Building (Incl. In Well No. 15 WTP Construction)	$0
	Forced Draft Aerator	$125,000
	Clearwell (Included in Well No. 15 WTP Construction)	
	High Service Pumps	$32,250
	Cation Exchange Treatment Equipment (2 - 8 FT Diameter Units)	$800,000
	Brine Pump & Piping (Included in Well No. 15 WTP Construction)	$0
	Brine Tank (Included in Well No. 15 WTP Construction)	$0
	Miscellaneous Piping and Meters	$0
	Chemical Feed Equipment	$100,000
	Power Distribution	$50,000
	Controls and Instrumentation	$40,000
	SCADA Integration	$20,000
	Emergency Generator (Included in Well No. 15WTP Construction)	$0
	SUB-TOTAL	$6,046,000
	CONTINGENCY (10%)	$605,000
	TOTAL ESTIMATED COST OF CONSTRUCTION	**$6,651,000**
	DESIGN AND CONSTRUCTION ENGINEERING (18%)	$1,197,000
	3 PHASE, 480 V ELECTRIC SERVICE TO SITE	$30,000
	LAND ACQUISITION (Assumed Portion of New Development)	$0
	SOIL & MATERIAL TESTING	$5,000
	TOTAL ESTIMATED COST OF PROJECT	**$7,883,000**

Notes:

All values are based on 2022 construction costs.
Estimate does not include air scrubbing equipment for aerator exhaust.

ENGINEER'S ESTIMATE OF PROBABLE CONSTRUCTION COST
EWST No. 6 (1.5 MG Waterspheroid)
Village of Huntley, McHenry & Kane Cos., IL

ITEM NO.	ITEM	AMOUNT
1	ELEVATED WATER STORAGE TANK (1.5 MG & 150 FT TO TCL)	$6,022,000
2	FRESH MIX SYSTEM	
3	CONTAINMENT	
4	YARD PIPING AND SITE WORK (Including Electric Actuated Altitude Valve)	$150,000
5	SCADA IMPLEMENTATION	$35,000
	SUB-TOTAL	$6,207,000
	CONTINGENCY (20%)	$1,241,000
	TOTAL ESTIMATED COST OF CONSTRUCTION	**$7,448,000**
	DESIGN AND CONSTRUCTION ENGINEERING (20%)	$1,490,000
	ELECTRIC SERVICE TO SITE	$0
	LAND ACQUISITION (on site of existing Well and WTP No. 11)	$0
	SOIL AND MATERIAL TESTING	$35,000
	TOTAL ESTIMATED COST OF PROJECT	**$8,973,000**

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Notes:

All values are based on 2022 construction costs.
Assumes EWST at Well and WTP site.

ENGINEER'S ESTIMATE OF PROBABLE CONSTRUCTION COST

EWST No. 7 (1.0 MG Waterspheroid)

Village of Huntley, McHenry & Kane Cos., IL

ITEM NO.	ITEM	AMOUNT
1	ELEVATED WATER STORAGE TANK (1.0 MG & 150 FT TO TCL)	$4,898,000
2	FRESH MIX SYSTEM	
3	CONTAINMENT	
4	YARD PIPING AND SITE WORK (Including Electric Actuated Altitude Valve)	$150,000
5	SCADA IMPLEMENTATION	$35,000
	SUB-TOTAL	$5,083,000
	CONTINGENCY (20%)	$1,017,000
	TOTAL ESTIMATED COST OF CONSTRUCTION	**$6,100,000**
	DESIGN AND CONSTRUCTION ENGINEERING (20%)	$1,220,000
	ELECTRIC SERVICE TO SITE (Included in Well & WTP Estimate)	$0
	LAND ACQUISITION (Assumed on site of future Well/WTP 17)	$0
	SOIL AND MATERIAL TESTING	$35,000
	TOTAL ESTIMATED COST OF PROJECT	**$7,355,000**

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Notes:

All values are based on 2022 construction costs.
Assumes EWST at Well and WTP site.

ENGINEER'S ESTIMATE OF PROBABLE CONSTRUCTION COST
EWST No. 8 (1.0 MG Waterspheroid)
Village of Huntley, McHenry & Kane Cos., IL

ITEM NO.	ITEM	AMOUNT
1	ELEVATED WATER STORAGE TANK (1.0 MG & 150 FT TO TCL)	$4,898,000
2	FRESH MIX SYSTEM	
3	CONTAINMENT	
4	YARD PIPING AND SITE WORK (Including Electric Actuated Altitude Valve)	$150,000
5	SCADA IMPLEMENTATION	$35,000
	SUB-TOTAL	$5,083,000
	CONTINGENCY (20%)	$1,017,000
	TOTAL ESTIMATED COST OF CONSTRUCTION	**$6,100,000**
	DESIGN AND CONSTRUCTION ENGINEERING (20%)	$1,220,000
	ELECTRIC SERVICE TO SITE (Included in Well & WTP Estimate)	$0
	LAND ACQUISITION (on site of existing by 2050 Well/WTP 14)	$0
	SOIL AND MATERIAL TESTING	$35,000
	TOTAL ESTIMATED COST OF PROJECT	**$7,355,000**

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Notes:

All values are based on 2022 construction costs.
Assumes EWST at Well and WTP site.

PRELIMINARY COST ESTIMATE

JOB NO:	HU2101
DESIGNED:	JMP/KDW
DATE:	September 23, 2022
PROJECT TITLE:	**MASTER PLAN 16" WATER MAIN EXTENSION**

ITEM				**UNIT**	
NO.	**ITEM**	**UNIT**	**QUANTITY**	**PRICE**	**AMOUNT**
1	WATER MAIN, 16-INCH D.I.P CLASS 52	LF	18,000	$ 200.00	$ 3,600,000.00
2	CONNECT TO EXISTING 12" WATER MAIN	EACH	1	$ 8,000.00	$ 8,000.00
3	WATER MAIN PROTECTION	LF	500	$ 120.00	$ 60,000.00
4	BUTTERFLY VALVE, 16-INCH IN 60" VALVE VAULT	EACH	18	$ 3,000.00	$ 54,000.00
5	FIRE HYDRANT ASSEMBLY, WITH AUXILIARY VALVE, 6-INCH MJ	EACH	36	$ 9,000.00	$ 324,000.00
6	DUCTILE IRON FITTINGS	LB	8,000	$ 15.00	$ 120,000.00
7	WATER MAIN TESTING - PRESSURE AND DISENFECTION	LS	1	$ 30,000.00	$ 30,000.00
8	FIELD TILE REPLACEMENT	FT	500	$ 30.00	$ 15,000.00
9	RESTORATION	SY	18,000	$ 10.00	$ 180,000.00
10	PERMANENT 30' EASEMENT ACQUISITION	SF	540,000	$ 0.10	$ 54,000.00
11	TEMPORARY 50' EASEMENT ACQUISITION	SF	900,000	$ 0.01	$ 9,000.00
12	TRAFFIC CONTROL AND PROTECTION	LS	1	$ 40,000.00	$ 40,000.00
13	ALLOWANCE- ITEMS ORDERED BY THE ENGINEER	UNIT	25,000	$ 1.00	$ 25,000.00

SUBTOTAL	$ 4,519,000
CONTINGENCY (20%)	$ 904,000
CONSTRUCTION TOTAL	$ 5,423,000
DESIGN ENGINEERING (10%)	$ 452,000
CONSTRUCTION ENGINEERING (10%)	$ 452,000
TOTAL PRELIMINARY COST ESTIMATE	$ 6,327,000

NOTES:

ASSUMES 2022 COSTS

ASSUMES WATER MAIN INSTALLED IN EASEMENT OUTSIDE OF PAVEMENT

ASSUMES OPEN CUT

ASSUMES TRENCH BACKFILL INCLUDED IN WATERMAIN COST

FIRE HYDRANT SPACING EVERY 500 FEET

VALVE SPACING EVERY 1000'

PRELIMINARY COST ESTIMATE

JOB NO:	HU2101
DESIGNED:	JMP/KDW
DATE:	September 23, 2022
PROJECT TITLE:	**MASTER PLAN 16" WATER MAIN EXTENSION I-90 CROSSING**

ITEM NO.	ITEM	UNIT	QUANTITY	UNIT PRICE	AMOUNT
1	WATER MAIN, 16-INCH D.I.P CLASS 52	LF	3,100	$ 200.00	$ 620,000.00
2	STEEL CASING PIPE, 30- INCH BORED AND JACKED	LF	200	$ 800.00	$ 160,000.00
3	CONNECT TO EXISTING 12" WATER MAIN	EACH	1	$ 8,000.00	$ 8,000.00
4	WATER MAIN PROTECTION	LF	200	$ 120.00	$ 24,000.00
5	BUTTERFLY VALVE, 16-INCH IN 60" VALVE VAULT	EACH	5	$ 8,000.00	$ 40,000.00
6	FIRE HYDRANT ASSEMBLY, WITH AUXILIARY VALVE, 6-INCH MJ	EACH	8	$ 9,000.00	$ 72,000.00
7	DUCTILE IRON FITTINGS	LB	2,000	$ 15.00	$ 30,000.00
8	WATER MAIN TESTING - PRESSURE AND DISENFECTION	LS	1	$ 30,000.00	$ 30,000.00
9	FIELD TILE REPLACEMENT	FT	200	$ 30.00	$ 6,000.00
10	RESTORATION	SY	3,100	$ 10.00	$ 31,000.00
11	PERMANENT 30' EASEMENT ACQUISITION	SF	93,000	$ 0.10	$ 9,300.00
12	TEMPORARY 50' EASEMENT ACQUISITION	SF	155,000	$ 0.01	$ 1,550.00
13	TRAFFIC CONTROL AND PROTECTION	LS	1	$ 40,000.00	$ 40,000.00
14	ALLOWANCE- ITEMS ORDERED BY THE ENGINEER	UNIT	25,000	$ 1.00	$ 25,000.00

SUBTOTAL	$ 1,097,000
CONTINGENCY (20%)	$ 220,000
CONSTRUCTION TOTAL	$ 1,317,000
DESIGN ENGINEERING (10%)	$ 110,000
CONSTRUCTION ENGINEERING (10%)	$ 110,000
TOTAL PRELIMINARY COST ESTIMATE	$ 1,536,000

NOTES:

ASSUMES 2022 COSTS

ASSUMES WATER MAIN INSTALLED IN EASEMENT OUTSIDE OF PAVEMENT

ASSUMES OPEN CUT WITH 200' BORE AND JACK UNDER I-90 TOLLWAY

ASSUMES TRENCH BACKFILL INCLUDED IN WATERMAIN COST

DOES NOT INCLUDE TOLLWAY PERMITTING COSTS

FIRE HYDRANT SPACING EVERY 500 FEET

VALVE SPACING EVERY 1000' AND AT ENDS OF BORE AND JACK

Wastewater System:

Wastewater Treatment and Southern Service Area Collection

ENGINEER'S ESTIMATE OF PROBABLE CONSTRUCTION COST

Wastewater Treatment Plant Improvements

Village of Huntley, IL

Upgrade Item	Site Piping & Demo	Concrete	Masonry	Steel	Roof & Carpentry	Painting	Equipment	HVAC	Mech. Piping	Electrical	SCADA	SubTotal	Engineering @ 20%	SubTotal	Contingency @ 25%	Total Project Cost
East WWTP																
Replace Bearings & Aerator Shafts on Ox Ditch 2							$ 284,000					$ 284,000	$ 56,800	$ 340,800	$ 85,200	$ 426,000
Replace Air Pipes & Valves for Digesters									$ 74,000			$ 74,000	$ 14,800	$ 88,800	$ 22,200	$ 111,000
Replace Belt Filter Press w/combined BFP/GBT;		$ 5,000				$ 5,000	$ 400,000	$ 15,000	$ 25,000	$ 30,000	$ 15,000	$ 495,000	$ 99,000	$ 594,000	$ 148,500	$ 743,000
Upgrade Non-Pot, Remove Dome from Clarifier 1	$ 5,000	$ 10,000					$ 110,000		$ 25,000	$ 20,000	$ 5,000	$ 175,000	$ 35,000	$ 210,000	$ 52,500	$ 263,000
Remove/Replace Electrical in Control Bldg 1; remove unused MCC Panels	$ 10,000	$ 15,000	$ 15,000	$ 10,000	$ 15,000	$ 10,000		$ 40,000		$ 450,000	$ 50,000	$ 615,000	$ 123,000	$ 738,000	$ 184,500	$ 923,000
Replace Bearings & Aerator Shafts on Ox Ditch 3							$ 40,000					$ 40,000	$ 8,000	$ 48,000	$ 12,000	$ 60,000
Modify Raw Sewage Pump Stations incl. Valves and Piping									$ 125,000			$ 125,000	$ 25,000	$ 150,000	$ 37,500	$ 188,000
Refurbish Screen No. 2							$ 28,000					$ 28,000	$ 5,600	$ 33,600	$ 8,400	$ 42,000
Moyno Pumps Replacement							$ 75,000		$ 5,000	$ 5,000		$ 85,000	$ 17,000	$ 102,000	$ 25,500	$ 128,000
Install Internal Recycle on Ox Ditches for Total N Removal		$ 10,000					$ 200,000			$ 75,000	$ 20,000	$ 305,000	$ 61,000	$ 366,000	$ 91,500	$ 458,000
Convert Sand Filter Building to Tertiary Filter Building	$ 75,000	$ 50,000			$ 10,000	$ 20,000	$ 600,000	$ 20,000	$ 75,000	$ 75,000	$ 25,000	$ 950,000	$ 190,000	$ 1,140,000	$ 285,000	$ 1,425,000
Replace 12-inch Effluent Parshall Flume with 18-inch Flume		$ 15,000					$ 10,000			$ 5,000	$ 3,000	$ 33,000	$ 6,600	$ 39,600	$ 9,900	$ 50,000
West WWTP																
Automated Controls for Aerobic Digesters							$ 15,000			$ 10,000	$ 20,000	$ 45,000	$ 9,000	$ 54,000	$ 13,500	$ 68,000
Replace Existing Comminutors/Screens with Alternate Screening		$ 10,000				$ 1,000	$ 242,000			$ 20,000	$ 10,000	$ 283,000	$ 56,600	$ 339,600	$ 84,900	$ 425,000
New Garage Building, No Bathroom (2,400 SF, Butler Building)	$ 35,000	$ 50,000		$ 40,000	$ 30,000	$ 10,000	$ 15,000	$ 25,000		$ 25,000		$ 230,000	$ 46,000	$ 276,000	$ 69,000	$ 345,000
Rehab Non-Potable Water System, Pumps, and Larger Bladder Tanks							$ 110,000		$ 15,000	$ 10,000	$ 5,000	$ 140,000	$ 28,000	$ 168,000	$ 42,000	$ 210,000
Replace the DO/ORP Probes in the Oxidation Ditches No. 3 ONLY. 1 and 2 Replaced already.							$ 18,000			$ 10,000	$ 10,000	$ 38,000	$ 7,600	$ 45,600	$ 11,400	$ 57,000
New or Refurbished Raw Sewage Pumps Nos. 1-3							$ 60,000		$ 30,000	$ 20,000	$ 10,000	$ 120,000	$ 24,000	$ 144,000	$ 36,000	$ 180,000
Upgrade UV System		$ 25,000					$ 250,000	$ 25,000		$ 75,000	$ 20,000	$ 395,000	$ 79,000	$ 474,000	$ 118,500	$ 593,000
Modifications to Ox Ditch Drainage System - Route 12" to Raw Sewage Pumps	$ 125,000	$ 25,000										$ 150,000	$ 30,000	$ 180,000	$ 45,000	$ 225,000
New Admin/Lab Building	$ 35,000	$ 150,000	$ 65,000	$ 50,000	$ 80,000	$ 60,000	$ 150,000	$ 120,000	$ 75,000	$ 150,000	$ 55,000	$ 990,000	$ 198,000	$ 1,188,000	$ 297,000	$ 1,485,000
Double Sludge Storage Capacity, Clear Span Structure (CHECK SIZE)	$ 25,000	$ 100,000		$ 100,000								$ 225,000	$ 45,000	$ 270,000	$ 67,500	$ 338,000
Digester Diffuser Replacements							$ 45,000					$ 45,000	$ 9,000	$ 54,000	$ 13,500	$ 68,000
Replace Polymer Feed Systems for Belt Filter Press (1) and Gravity Belt Thickeners (2) (3 Total)							$ 90,000					$ 90,000	$ 18,000	$ 108,000	$ 27,000	$ 135,000
Update DO Meters and ORP Probes in Oxidation Ditches																
Add 2 Digester Tanks and 1 Blower for Required Capacity @ 2% Solids in Digesters	$ 75,000	$ 250,000	$ 30,000	$ 5,000	$ 20,000	$ 5,000	$ 110,000	$ 15,000	$ 50,000	$ 50,000	$ 15,000	$ 625,000	$ 125,000	$ 750,000	$ 187,500	$ 938,000
Add 3rd Pump to Raw Sewage Pump Station No. 2							$ 25,000		$ 10,000	$ 10,000	$ 5,000	$ 50,000	$ 10,000	$ 60,000	$ 15,000	$ 75,000
Add 2nd Filter in Sand Filter Building B		$ 50,000					$ 350,000		$ 50,000	$ 15,000	$ 10,000	$ 475,000	$ 95,000	$ 570,000	$ 142,500	$ 713,000
Install Internal Recycle on Ox Ditches for Total N Removal		$ 10,000					$ 200,000			$ 75,000	$ 20,000	$ 305,000	$ 61,000	$ 366,000	$ 91,500	$ 458,000

* Costs include materials and labor (installation)

Engineering Enterprises, Inc.
52 Wheeler Road, Sugar Grove, IL 60554

JOB NO:	HU2003
DESIGNED:	CFB
DATE:	September 28, 2022
PROJECT TITLE:	**Comprehensive Utility Master Plan: Southern Service Area Conveyance Western Area Summary - Phase 2**

Preliminary Cost Estimate

ITEM NO.	ITEM	UNIT	QUANTITY	UNIT PRICE	AMOUNT
1	SANITARY LIFT STATION	LS	1	$ 3,000,000	$ 3,000,000
2	FORCEMAIN, PVC C-900, 6", Phase 1	LF	6300	$ 150.00	$ 945,000
3	FORCEMAIN, PVC C-900, 6", Phase 2	LF	2100	$ 150.00	$ 315,000
4	BORE AND JACK 24" STEEL CASING PIPE, 12' DEEP, PHASE 1	LF	150	$ 500.00	$ 75,000
6	BORE AND JACK 24" STEEL CASING PIPE, 12' DEEP, PHASE 2	LF	150	$ 500.00	$ 75,000
7	AIR RELEASE VALVE	EACH	4	$ 15,000.00	$ 60,000
8	CLEANOUTS	EACH	3	$ 10,000.00	$ 30,000
9	TREE REMOVAL	EACH	65	$ 500.00	$ 32,500
10	TREE REPLACEMENT	EACH	65	$ 500.00	$ 32,500
11	PRESSURE TESTING	LS	1	$ 15,000.00	$ 15,000
12	RESTORATION	LS	1	$ 50,000.00	$ 50,000
13	TRAFFIC CONTROL	LS	1	$ 50,000.00	$ 50,000
14					$ -
15					$ -
16	SANITARY SEWER, 12", 22 FEET DEEP	LF	2000	$ 300.00	$ 600,000
17	SANITARY SEWER, 15", 27 FEET DEEP	LF	2200	$ 325.00	$ 715,000
18	SANITARY MANHOLE, 22 FEET DEEP	EA	4	$ 15,000.00	$ 60,000
19	SANITARY MANHOLE, 32 FEET DEEP	EA	1	$ 10,000.00	$ 10,000
20	TREE REMOVAL	EA	5	$ 500.00	$ 2,500
21	TREE REPLACEMENT	EA	5	$ 500.00	$ 3,200
22	SANITARY TESTING (AIR, VACUUM, DEFLECTION)	LS	1	$ 7,500.00	$ 7,500
23	RESTORATION	LS	1	$ 25,000.00	$ 25,000
24	TRAFFIC CONTROL	LS	1	$ 5,000.00	$ 5,000
25					$ -
26					$ -
				SUBTOTAL	**$ 6,108,200**
				CONTINGENCY (20%)	$ 1,221,640
				TOTAL CONSTRUCTION	**$ 7,329,840**
				ENGINEERING (18%)	$ 1,319,000
				LAND ACQUISITION AND LEGAL FEES	
				TOTAL PRELIMINARY COST ESTIMATE	**$ 8,700,000**

Engineering Enterprises, Inc.

52 Wheeler Road, Sugar Grove, IL 60554

JOB NO:	HU2003
DESIGNED:	CFB
DATE:	September 28, 2022
PROJECT TITLE:	**Comprehensive Utility Master Plan: Southern Service Area Conveyance, Eastern Area Summary - Phase 2**

Preliminary Cost Estimate

ITEM NO.	ITEM	UNIT	QUANTITY	UNIT PRICE	AMOUNT
1	SANITARY LIFT STATION	LS	1	$ 2,300,000	$ 2,300,000
2	FORCEMAIN, PVC C-900, 6", Phase 1	LF	1100	$ 150.00	$ 165,000
4	BORE AND JACK 24" STEEL CASING PIPE, 12' DEEP	LF	150	$ 500.00	$ 75,000
6	BORE AND JACK 24" STEEL CASING PIPE, 12' DEEP	LF	150	$ 500.00	$ 75,000
7	AIR RELEASE VALVE	EACH	2	$ 15,000.00	$ 30,000
8	CLEANOUTS	EACH	2	$ 10,000.00	$ 20,000
9	TREE REMOVAL	EACH	25	$ 500.00	$ 12,500
10	TREE REPLACEMENT	EACH	25	$ 500.00	$ 12,500
11	PRESSURE TESTING	LS	1	$ 15,000.00	$ 15,000
12	RESTORATION	LS	1	$ 25,000.00	$ 25,000
13	TRAFFIC CONTROL	LS	1	$ 25,000.00	$ 25,000
14					$ -
15					$ -
16	SANITARY SEWER, 12", 22 FEET DEEP	LF	900	$ 300.00	$ 270,000
18	SANITARY MANHOLE, 22 FEET DEEP	EA	3	$ 15,000.00	$ 45,000
19	SANITARY MANHOLE, 32 FEET DEEP	EA	1	$ 10,000.00	$ 10,000
20	TREE REMOVAL	EA	5	$ 500.00	$ 2,500
21	TREE REPLACEMENT	EA	5	$ 500.00	$ 3,200
22	SANITARY TESTING (AIR, VACUUM, DEFLECTION)	LS	1	$ 7,500.00	$ 7,500
23	RESTORATION	LS	1	$ 20,000.00	$ 20,000
24	TRAFFIC CONTROL	LS	1	$ 5,000.00	$ 5,000
25					$ -
26					$ -
				SUBTOTAL	**$ 3,118,200**
				CONTINGENCY (20%)	$ 623,640
				TOTAL CONSTRUCTION	**$ 3,741,840**
				ENGINEERING (18%)	$ 674,000
				LAND ACQUISITION AND LEGAL FEES	
				TOTAL PRELIMINARY COST ESTIMATE	**$ 4,500,000**

Engineering Enterprises, Inc.
52 Wheeler Road, Sugar Grove, IL 60554

JOB NO:	HU2003
DESIGNED:	CFB
DATE:	September 28, 2022
PROJECT TITLE:	**Comprehensive Utility Master Plan: Southern Service Area Conveyance, Western Area Summary - Phase 3**

Preliminary Cost Estimate

ITEM NO.	ITEM	UNIT	QUANTITY	UNIT PRICE	AMOUNT
1	SANITARY LIFT STATION UPGRADE	LS	1	$ 750,000	$ 750,000
2					$ -
3					$ -
4	SANITARY SEWER, 12", 22 FEET DEEP, INFLATION ADDED	LF	2000	$ 310.00	$ 620,000
5	SANITARY SEWER, 15", 27 FEET DEEP, INFLATION ADDED	LF	2200	$ 330.00	$ 726,000
6	SANITARY MANHOLE, 22 FEET DEEP	EA	4	$ 15,000.00	$ 60,000
7	SANITARY MANHOLE, 32 FEET DEEP	EA	1	$ 10,000.00	$ 10,000
8	TREE REMOVAL	EA	5	$ 500.00	$ 2,500
9	TREE REPLACEMENT	EA	5	$ 500.00	$ 3,200
10	SANITARY TESTING (AIR, VACUUM, DEFLECTION)	LS	1	$ 7,500.00	$ 7,500
11	RESTORATION	LS	1	$ 25,000.00	$ 25,000
12	TRAFFIC CONTROL	LS	1	$ 5,000.00	$ 5,000
13					$ -
14					$ -
	SUBTOTAL				**$ 2,209,200**
	CONTINGENCY (20%)				$ 441,840
	TOTAL CONSTRUCTION				**$ 2,651,040**
	ENGINEERING (18%)				$ 477,000
	LAND ACQUISITION AND LEGAL FEES				
	TOTAL PRELIMINARY COST ESTIMATE				**$ 3,130,000**

Appendix H

Water Audit Results

AWWA Free Water Audit Software v5.0

This spreadsheet-based water audit tool is designed to help quantify and track water losses associated with water distribution systems and identify areas for improved efficiency and cost recovery. It provides a "top-down" summary water audit format, and is not meant to take the place of a full-scale, comprehensive water audit format.

Auditors are strongly encouraged to refer to the most current edition of AWWA M36 Manual for Water Audits for detailed guidance on the water auditing process and targetting loss reduction levels

The spreadsheet contains several separate worksheets. Sheets can be accessed using the tabs towards the bottom of the screen, or by clicking the buttons below.

Please begin by providing the following information

Name of Contact Person: Michele Piotrowski
Email Address: MPiotrowski@eeiweb.com
Telephone (incl Ext.): 603-466-6724
Name of City / Utility: Village of Huntley
City/Town/Municipality: Village of Huntley
State / Province: Illinois (IL)
Country: USA
Year: 2020
Start Date: 01/2020 Enter MM/YYYY numeric format
End Date: 12/2020 Enter MM/YYYY numeric format
Audit Preparation Date: 9/1/2022
Volume Reporting Units: Million gallons (US)
PWSID / Other ID: IL1110350

The following guidance will help you complete the Audit

All audit data are entered on the ***Reporting Worksheet***

☐	Value can be entered by user
🟨	Value calculated based on input data
🟪	These cells contain recommended default values

Use of Option (Radio) Buttons:

Pcnt: 0.25% ● ○ Value:

Select the default percentage by choosing the option button on the left

To enter a value, choose this button and enter a value in the cell to the right

The following worksheets are available by clicking the buttons below or selecting the tabs along the bottom of the page

Instructions
The current sheet. Enter contact information and basic audit details (year, units etc)

Reporting Worksheet
Enter the required data on this worksheet to calculate the water balance and data grading

Comments
Enter comments to explain how values were calculated or to document data sources

Performance Indicators
Review the performance indicators to evaluate the results of the audit

Water Balance
The values entered in the Reporting Worksheet are used to populate the Water Balance

Dashboard
A graphical summary of the water balance and Non-Revenue Water components

Grading Matrix
Presents the possible grading options for each input component of the audit

Service Connection Diagram
Diagrams depicting possible customer service connection line configurations

Definitions
Use this sheet to understand the terms used in the audit process

Loss Control Planning
Use this sheet to interpret the results of the audit validity score and performance indicators

Example Audits
Reporting Worksheet and Performance Indicators examples are shown for two validated audits

Acknowledgements
Acknowledgements for the AWWA Free Water Audit Software v5.0

If you have questions or comments regarding the software please contact us via email at: wlc@awwa.org

AWWA Free Water Audit Software:
Reporting Worksheet

WAS v5.0

? Click to access definition
\+ Click to add a comment

Water Audit Report for: Village of Huntley (IL1110350)
Reporting Year: 2020 1/2020 - 12/2020

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

<----------- Enter grading in column 'E' and 'J' ---------->

Master Meter and Supply Error Adjustments

WATER SUPPLIED

									Pcnt:		Value:	
Volume from own sources:	+	?	3	836.890	MG/Yr	+	?	2	-0.40%	● ○		MG/Yr
Water imported:	+	?	n/a	0.000	MG/Yr	+	?			● ○		MG/Yr
Water exported:	+	?	n/a	0.000	MG/Yr	+	?			● ○		MG/Yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: 840.251 MG/Yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

						Pcnt:		Value:	
Billed metered:	+	?	4	710.694	MG/Yr				
Billed unmetered:	+	?	n/a	0.000	MG/Yr				
Unbilled metered:	+	?	n/a	0.000	MG/Yr				
Unbilled unmetered:	+	?	6	57.624	MG/Yr		○ ●	57.624	MG/Yr

Unbilled Unmetered volume entered is greater than the recommended default value

AUTHORIZED CONSUMPTION: ? 768.318 MG/Yr

Use buttons to select percentage of water supplied
OR
value

WATER LOSSES (Water Supplied - Authorized Consumption) 71.933 MG/Yr

Apparent Losses

						Pcnt:		Value:	
Unauthorized consumption:	+	?		2.101	MG/Yr	0.25%	● ○		MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	+	?	2	18.223	MG/Yr	2.50%	● ○		MG/Yr
Systematic data handling errors:	+	?	5	1.777	MG/Yr	0.25%	● ○		MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: ? 22.100 MG/Yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: ? 49.833 MG/Yr

WATER LOSSES: 71.933 MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: ? 129.557 MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	+	?	8	175.4	miles
Number of active AND inactive service connections:	+	?	8	11,413	
Service connection density:		?		65	conn./mile main

Are customer meters typically located at the curbstop or property line? No

Average length of customer service line:	+	?	2	65.0	ft

(length of service line, beyond the property boundary, that is the responsibility of the utility)

Average operating pressure:	+	?	7	59.6	psi

COST DATA

Total annual cost of operating water system:	+	?	8	$2,721,218	$/Year
Customer retail unit cost (applied to Apparent Losses):	+	?	8	$3.57	$/1000 gallons (US)
Variable production cost (applied to Real Losses):	+	?	8	$540.14	$/Million gallons

☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 48 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources

2: Billed metered

3: Customer metering inaccuracies

AWWA Free Water Audit Software:
System Attributes and Performance Indicators

WAS v5.0

Water Audit Report for: Village of Huntley (IL1110350)
Reporting Year: 2020 | 1/2020 - 12/2020

***** YOUR WATER AUDIT DATA VALIDITY SCORE IS: 48 out of 100 *****

System Attributes:

	Apparent Losses:	22.100	MG/Yr
+	Real Losses:	49.833	MG/Yr
=	**Water Losses:**	**71.933**	MG/Yr
?	Unavoidable Annual Real Losses (UARL):	80.81	MG/Yr
	Annual cost of Apparent Losses:	$78,898	
	Annual cost of Real Losses:	$26,917	Valued at **Variable Production Cost** Return to Reporting Worksheet to change this assumpiton

Performance Indicators:

Financial:	Non-revenue water as percent by volume of Water Supplied:	15.4%	
	Non-revenue water as percent by cost of operating system:	5.0%	Real Losses valued at Variable Production Cost
Operational Efficiency:	Apparent Losses per service connection per day:	5.31	gallons/connection/day
	Real Losses per service connection per day:	11.96	gallons/connection/day
	Real Losses per length of main per day*:	N/A	
	Real Losses per service connection per day per psi pressure:	0.20	gallons/connection/day/psi

	From Above, Real Losses = Current Annual Real Losses (CARL):	49.83	million gallons/year
?	Infrastructure Leakage Index (ILI) [CARL/UARL]:	0.62	

* This performance indicator applies for systems with a low service connection density of less than 32 service connections/mile of pipeline

AWWA Free Water Audit Software:
User Comments

WAS v5.0

American Water Works Association.

Use this worksheet to add comments or notes to explain how an input value was calculated, or to document the sources of the information used.

General Comment:	

Audit Item	Comment
Volume from own sources:	All data was obtained from monthly operating reports, which was provided for calendar year 2020. Effluent meter usage was utilized for the purposes of this audit. Backwash water was assumed to be 5% of the water supplied and was subtracted from the treated water.
Vol. from own sources: Master meter error adjustment:	No master meter testing has been done. All meters have been replaced in the last 3-4 years. The master meter error adjustment was based on manufacturer tolerances.
Water imported:	The Village does not import any water.
Water imported: master meter error adjustment:	Not Applicable.
Water exported:	The Village does not export any water.
Water exported: master meter error adjustment:	Not Applicable.
Billed metered:	The monthly billed water use was provided by the Village Finance Department in an Excel spreadsheet. EEI interpolated the data to align with calendar year 2020.
Billed unmetered:	The Village does not have any billed unmetered accounts.
Unbilled metered:	The Village does not have any unbilled metered accounts or the usage was not recorded.
Unbilled unmetered:	The unbilled unmetered use includes the estimated use at the following facilities: •Estimate 4,000 gallons per month for each of the following: Municipal Complex (Village Hall and PD), Public Works Facility, West Wastewater Treatment Plant, East Wastewater Treatment Plant, Water Treatment Plant #7 – Village Green (Route 47, South), Water Treatment Plant #8 – Southwind, Water Treatment Plant #9, Water Treatment Plant #10, Water Treatment Plant #11, Downtown Irrigation. •Estimate 2,000 gallons per month for each of the following: Old Village Hall/Chamber of Commerce, Public Works Facility/Fleet Services, Visitor's Center/Visit McHenry County (Hackett House) Property, Cemetery Irrigation. •Estimated 33,000 gallons for house fires. Recorded 15,388,000 gallons in PW logs for seasonal hydrant flushing. Estimated 13,890 gallons for improving water quality complaints, new water main fill and flush, and Cl_2 lines fill and flush. •Estimated 5% of the treated water as the backwash water used in the Water Treatment Plants.
Unauthorized consumption:	Unauthorized consumption includes items such as unauthorized plumbing connections and unauthorized hydrant use. This value is challenging to estimate, so the default percentage of 0.25% is used.
Customer metering inaccuracies:	No customer meter testing has been done. Based on the AWWA M6 manual, the meters were assumed to be in good working condition and a 2.5% accuracy was assumed accordingly given the typical meter sizes used by the Village.
Systematic data handling errors:	The default value was utilized.
Length of mains:	The length of water main was obtained based on the Village's GIS maps and includes fire hydrant leads and irrigation lines.
Number of active AND inactive service connections:	The number of service connections in the Village is based on the information provided by the Village staff, which includes 11,444 cunsumer's accounts and 1,969 irrigation meters.
Average length of customer service line:	The average length as a best estimate is (1/2 x 66' (typical ROW width) + 30' or 35' (Avg Building Setback Line) = 33' + (30' or 35') = 65' (confirmed by Village during a discussion/review of the Water Audit).
Average operating pressure:	The Average Operating Pressure within the distribution system was determined utilizing the Village's calibrated water model.

Audit Item	Comment
Total annual cost of operating water system:	The operations costs were calculated utilizing the actual 2020 budget data.
Customer retail unit cost (applied to Apparent Losses):	The customer retail rate was calculated by dividing the overall annual charges for water by the overall annual billed water use.
Variable production cost (applied to Real Losses):	The Variable Production Cost was calculated by adding the following expenses: Chemicals and Utilities (Electricity and Natural Gas). The Village's budget is based on a fiscal year that begins January 1 and ends December 31.

AWWA Free Water Audit Software: Water Balance

WAS v5.0

Water Audit Report for: Village of Huntley (IL1110350)
Reporting Year: 2020 | 1/2020 - 12/2020
Data Validity Score: 48

<table>
<tr><td rowspan="8">Own Sources
(Adjusted for known errors)
840.251</td><td>Water Exported
0.000</td><td colspan="4">Billed Water Exported</td></tr>
<tr><td rowspan="10">Water Supplied
840.251</td><td rowspan="4">Authorized Consumption
768.318</td><td rowspan="2">Billed Authorized Consumption
710.694</td><td>Billed Metered Consumption (water exported is removed)
710.694</td><td rowspan="2">Revenue Water
710.694</td></tr>
<tr><td>Billed Unmetered Consumption
0.000</td></tr>
<tr><td rowspan="2">Unbilled Authorized Consumption
57.624</td><td>Unbilled Metered Consumption
0.000</td><td rowspan="8">Non-Revenue Water (NRW)
129.557</td></tr>
<tr><td>Unbilled Unmetered Consumption
57.624</td></tr>
<tr><td rowspan="6">Water Losses
71.933</td><td rowspan="3">Apparent Losses
22.100</td><td>Unauthorized Consumption
2.101</td></tr>
<tr><td>Customer Metering Inaccuracies
18.223</td></tr>
<tr><td>Systematic Data Handling Errors
1.777</td></tr>
<tr><td rowspan="3">Water Imported
0.000</td><td rowspan="3">Real Losses
49.833</td><td>Leakage on Transmission and/or Distribution Mains
Not broken down</td></tr>
<tr><td>Leakage and Overflows at Utility's Storage Tanks
Not broken down</td></tr>
<tr><td>Leakage on Service Connections
Not broken down</td></tr>
</table>

AWWA Free Water Audit Software: Dashboard

WAS v5.0

American Water Works Association.

The graphic below is a visual representation of the Water Balance with bar heights propotional to the volume of the audit components

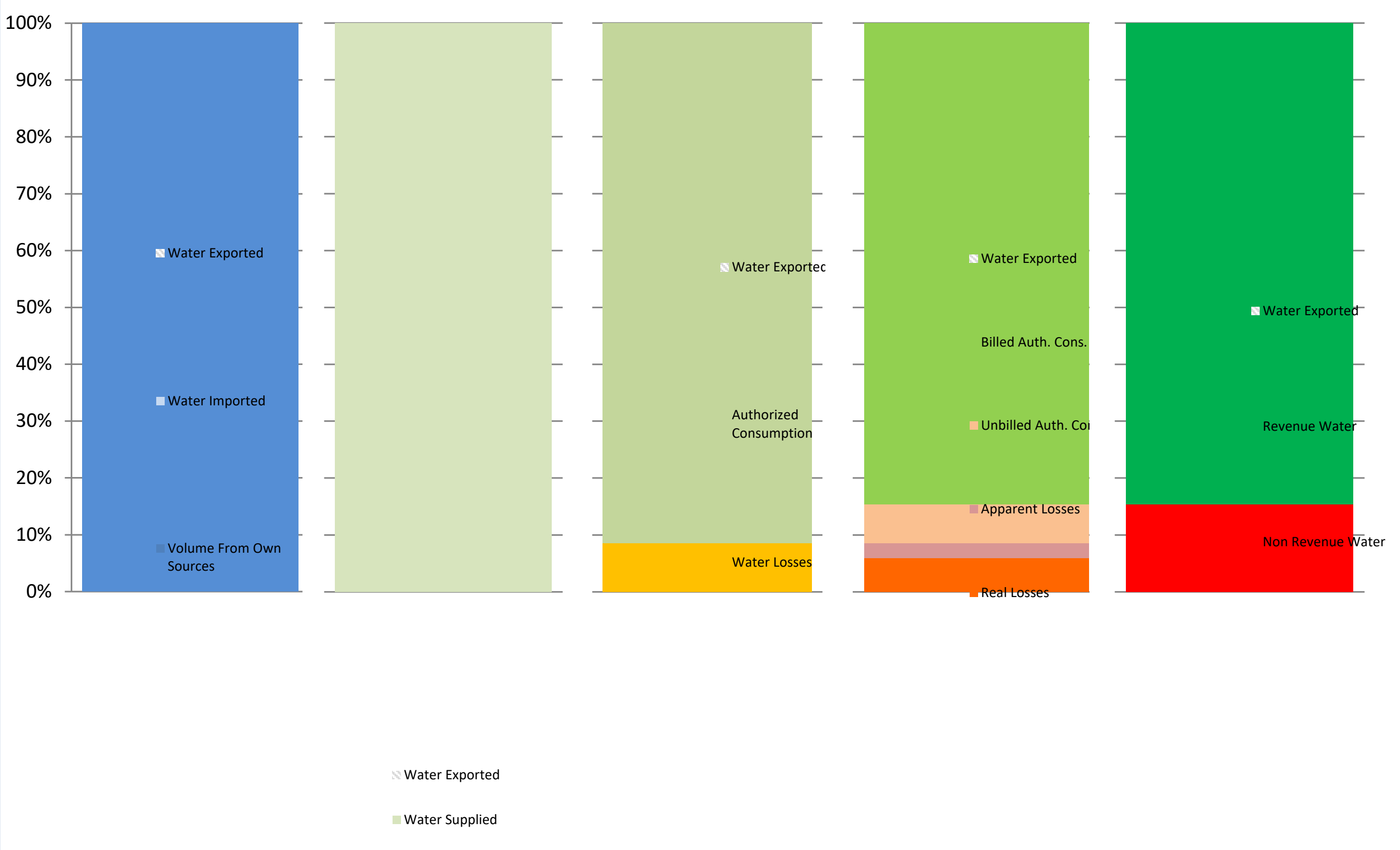
Water Audit Report for: Village of Huntley (IL1110350)

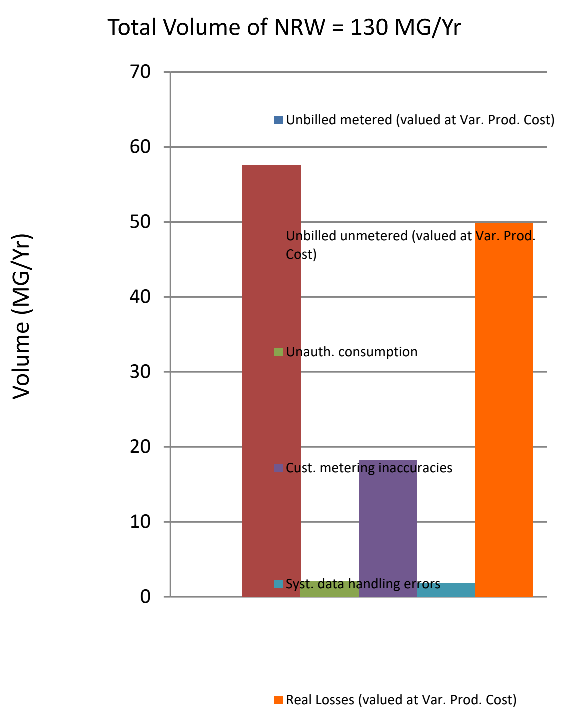
Reporting Year: 2020 1/2020 - 12/2020

Data Validity Score: 48

● Show me the VOLUME of Non-Revenue Water

○ Show me the COST of Non-Revenue Water





AWWA Free Water Audit Software: Grading Matrix

WAS 5.0

The grading assigned to each audit component and the corresponding recommended improvements and actions are highlighted in yellow. Audit accuracy is likely to be improved by prioritizing those items shown in red

Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
WATER SUPPLIED											
Volume from own sources:	Select this grading only if the water utility purchases/imports all of its water resources (i.e. has no sources of its own)	Less than 25% of water production sources are metered, remaining sources are estimated. No regular meter accuracy testing or electronic calibration conducted.	25% - 50% of treated water production sources are metered; other sources estimated. No regular meter accuracy testing or electronic calibration conducted.	Conditions between 2 and 4	50% - 75% of treated water production sources are metered, other sources estimated. Occasional meter accuracy testing or electronic calibration conducted.	Conditions between 4 and 6	At least 75% of treated water production sources are metered, or at least 90% of the source flow is derived from metered sources. Meter accuracy testing and/or electronic calibration of related instrumentation is conducted annually. Less than 25% of tested meters are found outside of +/- 6% accuracy.	Conditions between 6 and 8	100% of treated water production sources are metered, meter accuracy testing and electronic calibration of related instrumentation is conducted annually, less than 10% of meters are found outside of +/- 6% accuracy	Conditions between 8 and 10	100% of treated water production sources are metered, meter accuracy testing and electronic calibration of related instrumentation is conducted semi-annually, with less than 10% found outside of +/- 3% accuracy. Procedures are reviewed by a third party knowledgeable in the M36 methodology.
Improvements to attain higher data grading for "Volume from own Sources" component:	▨	to qualify for 2: Organize and launch efforts to collect data for determining volume from own sources	to qualify for 4: Locate all water production sources on maps and in the field, launch meter accuracy testing for existing meters, begin to install meters on unmetered water production sources and replace any obsolete/defective meters.		to qualify for 6: Formalize annual meter accuracy testing for all source meters; specify the frequency of testing. Complete installation of meters on unmetered water production sources and complete replacement of all obsolete/defective meters.		to qualify for 8: Conduct annual meter accuracy testing and calibration of related instrumentation on all meter installations on a regular basis. Complete project to install new, or replace defective existing, meters so that entire production meter population is metered. Repair or replace meters outside of +/- 6% accuracy.		to qualify for 10: Maintain annual meter accuracy testing and calibration of related instrumentation for all meter installations. Repair or replace meters outside of +/- 3% accuracy. Investigate new meter technology; pilot one or more replacements with innovative meters in attempt to further improve meter accuracy.		to maintain 10: Standardize meter accuracy test frequency to semi-annual, or more frequent, for all meters. Repair or replace meters outside of +/- 3% accuracy. Continually investigate/pilot improving metering technology.
Volume from own sources master meter and supply error adjustment:	Select n/a only if the water utility fails to have meters on its sources of supply	Inventory information on meters and paper records of measured volumes exist but are incomplete and/or in a very crude condition; data error cannot be determined	No automatic datalogging of production volumes; daily readings are scribed on paper records without any accountability controls. Flows are not balanced across the water distribution system: tank/storage elevation changes are not employed in calculating the "Volume from own sources" component and archived flow data is adjusted only when grossly evident data error occurs.	Conditions between 2 and 4	Production meter data is logged automatically in electronic format and reviewed at least on a monthly basis with necessary corrections implemented. "Volume from own sources" tabulations include estimate of daily changes in tanks/storage facilities. Meter data is adjusted when gross data errors occur, or occasional meter testing deems this necessary.	Conditions between 4 and 6	Hourly production meter data logged automatically & reviewed on at least a weekly basis. Data is adjusted to correct gross error when meter/instrumentation equipment malfunction is detected; and/or error is confirmed by meter accuracy testing. Tank/storage facility elevation changes are automatically used in calculating a balanced "Volume from own sources" component, and data gaps in the archived data are corrected on at least a weekly basis.	Conditions between 6 and 8	Continuous production meter data is logged automatically & reviewed each business day. Data is adjusted to correct gross error from detected meter/instrumentation equipment malfunction and/or results of meter accuracy testing. Tank/storage facility elevation changes are automatically used in "Volume from own sources" tabulations and data gaps in the archived data are corrected on a daily basis.	Conditions between 8 and 10	Computerized system (SCADA or similar) automatically balances flows from all sources and storages; results are reviewed each business day. Tight accountability controls ensure that all data gaps that occur in the archived flow data are quickly detected and corrected. Regular calibrations between SCADA and sources meters ensures minimal data transfer error.
Improvements to attain higher data grading for "Master meter and supply error adjustment" component:	▨	to qualify for 2: Develop a plan to restructure recordkeeping system to capture all flow data; set a procedure to review flow data on a daily basis to detect input errors. Obtain more reliable information about existing meters by conducting field inspections of meters and related instrumentation, and obtaining manufacturer literature.	to qualify for 4: Install automatic datalogging equipment on production meters. Complete installation of level instrumentation at all tanks/storage facilities and include tank level data in automatic calculation routine in a computerized system. Construct a computerized listing or spreadsheet to archive input volumes, tank/storage volume changes and import/export flows in order to determine the composite "Water Supplied" volume for the distribution system. Set a procedure to review this data on a monthly basis to detect gross anomalies and data gaps.		to qualify for 6: Refine computerized data collection and archive to include hourly production meter data that is reviewed at least on a weekly basis to detect specific data anomalies and gaps. Use daily net storage change to balance flows in calculating "Water Supplied" volume. Necessary corrections to data errors are implemented on a weekly basis.		to qualify for 8: Ensure that all flow data is collected and archived on at least an hourly basis. All data is reviewed and detected errors corrected each business day. Tank/storage levels variations are employed in calculating balanced "Water Supplied" component. Adjust production meter data for gross error and inaccuracy confirmed by testing.		to qualify for 10: Link all production and tank/storage facility elevation change data to a Supervisory Control & Data Acquisition (SCADA) System, or similar computerized monitoring/control system, and establish automatic flow balancing algorithm and regularly calibrate between SCADA and source meters. Data is reviewed and corrected each business day.		to maintain 10: Monitor meter innovations for development of more accurate and less expensive flowmeters. Continue to replace or repair meters as they perform outside of desired accuracy limits. Stay abreast of new and more accurate water level instruments to better record tank/storage levels and archive the variations in storage volume. Keep current with SCADA and data management systems to ensure that archived data is well-managed and error free.
Water Imported:	Select n/a if the water utility's supply is exclusively from its own water resources (no bulk purchased/ imported water)	Less than 25% of imported water sources are metered, remaining sources are estimated. No regular meter accuracy testing.	25% - 50% of imported water sources are metered; other sources estimated. No regular meter accuracy testing.	Conditions between 2 and 4	50% - 75% of imported water sources are metered, other sources estimated. Occasional meter accuracy testing conducted.	Conditions between 4 and 6	At least 75% of imported water sources are metered, meter accuracy testing and/or electronic calibration of related instrumentation is conducted annually for all meter installations. Less than 25% of tested meters are found outside of +/- 6% accuracy.	Conditions between 6 and 8	100% of imported water sources are metered, meter accuracy testing and electronic calibration of related instrumentation is conducted annually, less than 10% of meters are found outside of +/- 6% accuracy	Conditions between 8 and 10	100% of imported water sources are metered, meter accuracy testing and electronic calibration of related instrumentation is conducted semi-annually for all meter installations, with less than 10% of accuracy tests found outside of +/- 3% accuracy.
Improvements to attain higher data grading for "Water Imported Volume" component: (*Note: usually the water supplier selling the water - "the Exporter" - to the utility being audited is responsible to maintain the metering installation measuring the imported volume. The utility should coordinate carefully with the Exporter to ensure that adequate meter upkeep takes place and an accurate measure of the Water Imported volume is quantified.*)	▨	to qualify for 2: Review bulk water purchase agreements with partner suppliers; confirm requirements for use and maintenance of accurate metering. Identify needs for new or replacement meters with goal to meter all imported water sources.	To qualify for 4: Locate all imported water sources on maps and in the field, launch meter accuracy testing for existing meters, begin to install meters on unmetered imported water interconnections and replace obsolete/defective meters.		to qualify for 6: Formalize annual meter accuracy testing for all imported water meters, planning for both regular meter accuracy testing and calibration of the related instrumentation. Continue installation of meters on unmetered imported water interconnections and replacement of obsolete/defective meters.		to qualify for 8: Complete project to install new, or replace defective, meters on all imported water interconnections. Maintain annual meter accuracy testing for all imported water meters and conduct calibration of related instrumentation at least annually. Repair or replace meters outside of +/- 6% accuracy.		to qualify for 10: Conduct meter accuracy testing for all meters on a semi-annual basis, along with calibration of all related instrumentation. Repair or replace meters outside of +/- 3% accuracy. Investigate new meter technology; pilot one or more replacements with innovative meters in attempt to improve meter accuracy.		to maintain 10: Standardize meter accuracy test frequency to semi-annual, or more frequent, for all meters. Continue to conduct calibration of related instrumentation on a semi-annual basis. Repair or replace meters outside of +/- 3% accuracy. Continually investigate/pilot improving metering technology.

Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
Water imported master meter and supply error adjustment:	Select n/a if the Imported water supply is unmetered, with Imported water quantities estimated on the billing invoices sent by the Exporter to the purchasing Utility.	Inventory information on imported meters and paper records of measured volumes exist but are incomplete and/or in a very crude condition; data error cannot be determined Written agreement(s) with water Exporter(s) are missing or written in vague language concerning meter management and testing.	No automatic datalogging of imported supply volumes; daily readings are scribed on paper records without any accountability controls to confirm data accuracy and the absence of errors and data gaps in recorded volumes. Written agreement requires meter accuracy testing but is vague on the details of how and who conducts the testing.	Conditions between 2 and 4	Imported supply metered flow data is logged automatically in electronic format and reviewed at least on a monthly basis by the Exporter with necessary corrections implemented. Meter data is adjusted by the Exporter when gross data errors are detected. A coherent data trail exists for this process to protect both the selling and the purchasing Utility. Written agreement exists and clearly states requirements and roles for meter accuracy testing and data management.	Conditions between 4 and 6	Hourly Imported supply metered data is logged automatically & reviewed on at least a weekly basis by the Exporter. Data is adjusted to correct gross error when meter/instrumentation equipment malfunction is detected; and to correct for error confirmed by meter accuracy testing. Any data gaps in the archived data are detected and corrected during the weekly review. A coherent data trail exists for this process to protect both the selling and the purchasing Utility.	Conditions between 6 and 8	Continuous Imported supply metered flow data is logged automatically & reviewed each business day by the Importer. Data is adjusted to correct gross error from detected meter/instrumentation equipment malfunction and/or results of meter accuracy testing. Any data errors/gaps are detected and corrected on a daily basis. A data trail exists for the process to protect both the selling and the purchasing Utility.	Conditions between 8 and 10	Computerized system (SCADA or similar) automatically records data which is reviewed each business day by the Exporter. Tight accountability controls ensure that all error/data gaps that occur in the archived flow data are quickly detected and corrected. A reliable data trail exists and contract provisions for meter testing and data management are reviewed by the selling and purchasing Utility at least once every five years.
Improvements to attain higher data grading for "Water imported master meter and supply error adjustment" component:		to qualify for 2: Develop a plan to restructure recordkeeping system to capture all flow data; set a procedure to review flow data on a daily basis to detect input errors. Obtain more reliable information about existing meters by conducting field inspections of meters and related instrumentation, and obtaining manufacturer literature. Review the written agreement between the selling and purchasing Utility.	to qualify for 4: Install automatic datalogging equipment on Imported supply meters. Set a procedure to review this data on a monthly basis to detect gross anomalies and data gaps. Launch discussions with the Exporters to jointly review terms of the written agreements regarding meter accuracy testing and data management; revise the terms as necessary.		to qualify for 6: Refine computerized data collection and archive to include hourly Imported supply metered flow data that is reviewed at least on a weekly basis to detect specific data anomalies and gaps. Make necessary corrections to errors/data errors on a weekly basis.		to qualify for 8: Ensure that all Imported supply metered flow data is collected and archived on at least an hourly basis. All data is reviewed and errors/data gaps are corrected each business day.		to qualify for 10: Conduct accountability checks to confirm that all Imported supply metered data is reviewed and corrected each business day by the Exporter. Results of all meter accuracy tests and data corrections should be available for sharing between the Exporter and the purchasing Utility. Establish a schedule for a regular review and updating of the contractual language in the written agreement between the selling and the purchasing Utility; at least every five years.		to maintain 10: Monitor meter innovations for development of more accurate and less expensive flowmeters; work with the Exporter to help identify meter replacement needs. Keep communication lines with Exporters open and maintain productive relations. Keep the written agreement current with clear and explicit language that meets the ongoing needs of all parties.
Water Exported:	Select n/a if the water utility sells no bulk water to neighboring water utilities (no exported water sales)	Less than 25% of exported water sources are metered, remaining sources are estimated. No regular meter accuracy testing.	25% - 50% of exported water sources are metered; other sources estimated. No regular meter accuracy testing.	Conditions between 2 and 4	50% - 75% of exported water sources are metered, other sources estimated. Occasional meter accuracy testing conducted.	Conditions between 4 and 6	At least 75% of exported water sources are metered, meter accuracy testing and/or electronic calibration conducted annually. Less than 25% of tested meters are found outside of +/- 6% accuracy.	Conditions between 6 and 8	100% of exported water sources are metered, meter accuracy testing and electronic calibration of related instrumentation is conducted annually, less than 10% of meters are found outside of +/- 6% accuracy	Conditions between 8 and 10	100% of exported water sources are metered, meter accuracy testing and electronic calibration of related instrumentation is conducted semi-annually for all meter installations, with less than 10% of accuracy tests found outside of +/- 3% accuracy.
Improvements to attain higher data grading for "Water Exported Volume" component: *(Note: usually, if the water utility being audited sells (Exports) water to a neighboring purchasing Utility, it is the responsibility of the utility exporting the water to maintain the metering installation measuring the Exported volume. The utility exporting the water should ensure that adequate meter upkeep takes place and an accurate measure of the Water Exported volume is quantified.)*		to qualify for 2: Review bulk water sales agreements with purchasing utilities; confirm requirements for use & upkeep of accurate metering. Identify needs to install new, or replace defective meters as needed.	To qualify for 4: Locate all exported water sources on maps and in field, launch meter accuracy testing for existing meters, begin to install meters on unmetered exported water interconnections and replace obsolete/defective meters		to qualify for 6: Formalize annual meter accuracy testing for all exported water meters. Continue installation of meters on unmetered exported water interconnections and replacement of obsolete/defective meters.		to qualify for 8: Complete project to install new, or replace defective, meters on all exported water interconnections. Maintain annual meter accuracy testing for all exported water meters. Repair or replace meters outside of +/- 6% accuracy.		to qualify for 10: Maintain annual meter accuracy testing for all meters. Repair or replace meters outside of +/- 3% accuracy. Investigate new meter technology; pilot one or more replacements with innovative meters in attempt to improve meter accuracy.		to maintain 10: Standardize meter accuracy test frequency to semi-annual, or more frequent, for all meters. Repair or replace meters outside of +/- 3% accuracy. Continually investigate/pilot improving metering technology.
Water exported master meter and supply error adjustment:	Select n/a only if the water utility fails to have meters on its exported supply interconnections.	Inventory information on exported meters and paper records of measured volumes exist but are incomplete and/or in a very crude condition; data error cannot be determined Written agreement(s) with the utility purchasing the water are missing or written in vague language concerning meter management and testing.	No automatic datalogging of exported supply volumes; daily readings are scribed on paper records without any accountability controls to confirm data accuracy and the absence of errors and data gaps in recorded volumes. Written agreement requires meter accuracy testing but is vague on the details of how and who conducts the testing.	Conditions between 2 and 4	Exported metered flow data is logged automatically in electronic format and reviewed at least on a monthly basis, with necessary corrections implemented. Meter data is adjusted by the utility selling (exporting) the water when gross data errors are detected. A coherent data trail exists for this process to protect both the utility exporting the water and the purchasing Utility. Written agreement exists and clearly states requirements and roles for meter accuracy testing and data management.	Conditions between 4 and 6	Hourly exported supply metered data is logged automatically & reviewed on at least a weekly basis by the utility selling the water. Data is adjusted to correct gross error when meter/instrumentation equipment malfunction is detected; and to correct for error found by meter accuracy testing. Any data gaps in the archived data are detected and corrected during the weekly review. A coherent data trail exists for this process to protect both the selling (exporting) utility and the purchasing Utility.	Conditions between 6 and 8	Continuous exported supply metered flow data is logged automatically & reviewed each business day by the utility selling (exporting) the water. Data is adjusted to correct gross error from detected meter/instrumentation equipment malfunction and any error confirmed by meter accuracy testing. Any data errors/gaps are detected and corrected on a daily basis. A data trail exists for the process to protect both the selling (exporting) Utility and the purchasing Utility.	Conditions between 8 and 10	Computerized system (SCADA or similar) automatically records data which is reviewed each business day by the utility selling (exporting) the water. Tight accountability controls ensure that all error/data gaps that occur in the archived flow data are quickly detected and corrected. A reliable data trail exists and contract provisions for meter testing and data management are reviewed by the selling Utility and purchasing Utility at least once every five years.

Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
Improvements to attain higher data grading for "Water exported master meter and supply error adjustment" component:	▨	to qualify for 2: Develop a plan to restructure recordkeeping system to capture all flow data; set a procedure to review flow data on a daily basis to detect input errors. Obtain more reliable information about existing meters by conducting field inspections of meters and related instrumentation, and obtaining manufacturer literature. Review the written agreement between the utility selling (exporting) the water and the purchasing Utility.	to qualify for 4: Install automatic datalogging equipment on exported supply meters. Set a procedure to review this data on a monthly basis to detect gross anomalies and data gaps. Launch discussions with the purchasing utilities to jointly review terms of the written agreements regarding meter accuracy testing and data management; revise the terms as necessary.		to qualify for 6: Refine computerized data collection and archive to include hourly exported supply metered flow data that is reviewed at least on a weekly basis to detect specific data anomalies and gaps. Make necessary corrections to errors/data errors on a weekly basis.		to qualify for 8: Ensure that all exported metered flow data is collected and archived on at least an hourly basis. All data is reviewed and errors/data gaps are corrected each business day.		to qualify for 10: Conduct accountability checks to confirm that all exported metered flow data is reviewed and corrected each business day by the utility selling the water. Results of all meter accuracy tests and data corrections should be available for sharing between the utility and the purchasing Utility. Establish a schedule for a regular review and updating of the contractual language in the written agreements with the purchasing utilities; at least every five years.		to maintain 10: Monitor meter innovations for development of more accurate and less expensive flowmeters; work with the purchasing utilities to help identify meter replacement needs. Keep communication lines with the purchasing utilities open and maintain productive relations. Keep the written agreement current with clear and explicit language that meets the ongoing needs of all parties.
AUTHORIZED CONSUMPTION											
Billed metered:	n/a (not applicable). Select n/a only if the entire customer population is not metered and is billed for water service on a flat or fixed rate basis. In such a case the volume entered must be zero.	Less than 50% of customers with volume-based billings from meter readings; flat or fixed rate billing exists for the majority of the customer population	At least 50% of customers with volume-based billing from meter reads; flat rate billing for others. Manual meter reading is conducted, with less than 50% meter read success rate, remaining accounts' consumption is estimated. Limited meter records, no regular meter testing or replacement. Billing data maintained on paper records, with no auditing.	Conditions between 2 and 4	At least 75% of customers with volume-based, billing from meter reads; flat or fixed rate billing for remaining accounts. Manual meter reading is conducted with at least 50% meter read success rate; consumption for accounts with failed reads is estimated. Purchase records verify age of customer meters; only very limited meter accuracy testing is conducted. Customer meters are replaced only upon complete failure. Computerized billing records exist, but only sporadic internal auditing conducted.	Conditions between 4 and 6	At least 90% of customers with volume-based billing from meter reads; consumption for remaining accounts is estimated. Manual customer meter reading gives at least 80% customer meter reading success rate; consumption for accounts with failed reads is estimated. Good customer meter records exist, but only limited meter accuracy testing is conducted. Regular replacement is conducted for the oldest meters. Computerized billing records exist with annual auditing of summary statistics conducted by utility personnel.	Conditions between 6 and 8	At least 97% of customers exist with volume-based billing from meter reads. At least 90% customer meter reading success rate; or at least 80% read success rate with planning and budgeting for trials of Automatic Meter Reading (AMR) or Advanced Metering Infrastructure (AMI) in one or more pilot areas. Good customer meter records. Regular meter accuracy testing guides replacement of statistically significant number of meters each year. Routine auditing of computerized billing records for global and detailed statistics occurs annually by utility personnel, and is verified by third party at least once every five years.	Conditions between 8 and 10	At least 99% of customers exist with volume-based billing from meter reads. At least 95% customer meter reading success rate; or minimum 80% meter reading success rate, with Automatic Meter Reading (AMR) or Advanced Metering Infrastructure (AMI) trials underway. Statistically significant customer meter testing and replacement program in place on a continuous basis. Computerized billing with routine, detailed auditing, including field investigation of representative sample of accounts undertaken annually by utility personnel. Audit is conducted by third party auditors at least once every three years.
Improvements to attain higher data grading for "Billed Metered Consumption" component:	If n/a is selected because the customer meter population is unmetered, consider establishing a new policy to meter the customer population and employ water rates based upon metered volumes.	to qualify for 2: Conduct investigations or trials of customer meters to select appropriate meter models. Budget funding for meter installations. Investigate volume based water rate structures.	to qualify for 4: Purchase and install meters on unmetered accounts. Implement policies to improve meter reading success. Catalog meter information during meter read visits to identify age/model of existing meters. Test a minimal number of meters for accuracy. Install computerized billing system.		to qualify for 6: Purchase and install meters on unmetered accounts. Eliminate flat fee billing and establish appropriate water rate structure based upon measured consumption. Continue to achieve verifiable success in removing manual meter reading barriers. Expand meter accuracy testing. Launch regular meter replacement program. Launch a program of annual auditing of global billing statistics by utility personnel.		to qualify for 8: Purchase and install meters on unmetered accounts. If customer meter reading success rate is less than 97%, assess cost-effectiveness of Automatic Meter Reading (AMR) or Advanced Metering Infrastructure (AMI) system for portion or entire system; or otherwise achieve ongoing improvements in manual meter reading success rate to 97% or higher. Refine meter accuracy testing program. Set meter replacement goals based upon accuracy test results. Implement annual auditing of detailed billing records by utility personnel and implement third party auditing at least once every five years.		to qualify for 10: Purchase and install meters on unmetered accounts. Launch Automatic Meter Reading (AMR) or Advanced Metering Infrastructure (AMI) system trials if manual meter reading success rate of at least 99% is not achieved within a five-year program. Continue meter accuracy testing program. Conduct planning and budgeting for large scale meter replacement based upon meter life cycle analysis using cumulative flow target. Continue annual detailed billing data auditing by utility personnel and conduct third party auditing at least once every three years.		to maintain 10: Continue annual internal billing data auditing, and third party auditing at least every three years. Continue customer meter accuracy testing to ensure that accurate customer meter readings are obtained and entered as the basis for volume based billing. Stay abreast of improvements in Automatic Meter Reading (AMR) and Advanced Metering Infrastructure (AMI) and information management. Plan and budget for justified upgrades in metering, meter reading and billing data management to maintain very high accuracy in customer metering and billing.
Billed unmetered:	Select n/a if it is the policy of the water utility to meter all customer connections and it has been confirmed by detailed auditing that all customers do indeed have a water meter; i.e. no intentionally unmetered accounts exist	Water utility policy does not require customer metering; flat or fixed fee billing is employed. No data is collected on customer consumption. The only estimates of customer population consumption available are derived from data estimation methods using average fixture count multiplied by number of connections, or similar approach.	Water utility policy does not require customer metering; flat or fixed fee billing is employed. Some metered accounts exist in parts of the system (pilot areas or District Metered Areas) with consumption read periodically or recorded on portable dataloggers over one, three, or seven day periods. Data from these sample meters are used to infer consumption for the total customer population. Site specific estimation methods are used for unusual buildings/water uses.	Conditions between 2 and 4	Water utility policy does require metering and volume based billing in general. However, a liberal amount of exemptions and a lack of clearly written and communicated procedures result in up to 20% of billed accounts believed to be unmetered by exemption; or the water utility is in transition to becoming fully metered, and a large number of customers remain unmetered. A rough estimate of the annual consumption for all unmetered accounts is included in the annual water audit, with no inspection of individual unmetered accounts.	Conditions between 4 and 6	Water utility policy does require metering and volume based billing but established exemptions exist for a portion of accounts such as municipal buildings. As many as 15% of billed accounts are unmetered due to this exemption or meter installation difficulties. Only a group estimate of annual consumption for all unmetered accounts is included in the annual water audit, with no inspection of individual unmetered accounts.	Conditions between 6 and 8	Water utility policy does require metering and volume based billing for all customer accounts. However, less than 5% of billed accounts remain unmetered because meter installation is hindered by unusual circumstances. The goal is to minimize the number of unmetered accounts. Reliable estimates of consumption are obtained for these unmetered accounts via site specific estimation methods.	Conditions between 8 and 10	Water utility policy does require metering and volume based billing for all customer accounts. Less than 2% of billed accounts are unmetered and exist because meter installation is hindered by unusual circumstances. The goal exists to minimize the number of unmetered accounts to the extent that is economical. Reliable estimates of consumption are obtained at these accounts via site specific estimation methods.

Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
Improvements to attain higher data grading for "Billed Unmetered Consumption" component:		to qualify for 2: Conduct research and evaluate cost/benefit of a new water utility policy to require metering of the customer population; thereby greatly reducing or eliminating unmetered accounts. Conduct pilot metering project by installing water meters in small sample of customer accounts and periodically reading the meters or datalogging the water consumption over one, three, or seven day periods.	to qualify for 4: Implement a new water utility policy requiring customer metering. Launch or expand pilot metering study to include several different meter types, which will provide data for economic assessment of full scale metering options. Assess sites with access difficulties to devise means to obtain water consumption volumes. Begin customer meter installation.		to qualify for 6: Refine policy and procedures to improve customer metering participation for all but solidly exempt accounts. Assign staff resources to review billing records to identify errant unmetered properties. Specify metering needs and funding requirements to install sufficient meters to significant reduce the number of unmetered accounts		to qualify for 8: Push to install customer meters on a full scale basis. Refine metering policy and procedures to ensure that all accounts, including municipal properties, are designated for meters. Plan special efforts to address "hard-to-access" accounts. Implement procedures to obtain a reliable consumption estimate for the remaining few unmetered accounts awaiting meter installation.		to qualify for 10: Continue customer meter installation throughout the service area, with a goal to minimize unmetered accounts. Sustain the effort to investigate accounts with access difficulties, and devise means to install water meters or otherwise measure water consumption.		to maintain 10: Continue to refine estimation methods for unmetered consumption and explore means to establish metering, for as many billed remaining unmetered accounts as is economically feasible.
Unbilled metered:	select n/a if all billing-exempt consumption is unmetered.	Billing practices exempt certain accounts, such as municipal buildings, but written policies do not exist; and a reliable count of unbilled metered accounts is unavailable. Meter upkeep and meter reading on these accounts is rare and not considered a priority. Due to poor recordkeeping and lack of auditing, water consumption for all such accounts is purely guesstimated.	Billing practices exempt certain accounts, such as municipal buildings, but only scattered, dated written directives exist to justify this practice. A reliable count of unbilled metered accounts is unavailable. Sporadic meter replacement and meter reading occurs on an as-needed basis. The total annual water consumption for all unbilled, metered accounts is estimated based upon approximating the number of accounts and assigning consumption from actively billed accounts of same meter size.	Conditions between 2 and 4	Dated written procedures permit billing exemption for specific accounts, such as municipal properties, but are unclear regarding certain other types of accounts. Meter reading is given low priority and is sporadic. Consumption is quantified from meter readings where available. The total number of unbilled, unmetered accounts must be estimated along with consumption volumes.	Conditions between 4 and 6	Written policies regarding billing exemptions exist but adherence in practice is questionable. Metering and meter reading for municipal buildings is reliable but sporadic for other unbilled metered accounts. Periodic auditing of such accounts is conducted. Water consumption is quantified directly from meter readings where available, but the majority of the consumption is estimated.	Conditions between 6 and 8	Written policy identifies the types of accounts granted a billing exemption. Customer meter management and meter reading are considered secondary priorities, but meter reading is conducted at least annually to obtain consumption volumes for the annual water audit. High level auditing of billing records ensures that a reliable census of such accounts exists.	Conditions between 8 and 10	Clearly written policy identifies the types of accounts given a billing exemption, with emphasis on keeping such accounts to a minimum. Customer meter management and meter reading for these accounts is given proper priority and is reliably conducted. Regular auditing confirms this. Total water consumption for these accounts is taken from reliable readings from accurate meters.
Improvements to attain higher data grading for "Unbilled Metered Consumption" component:		to qualify for 2: Reassess the water utility's policy allowing certain accounts to be granted a billing exemption. Draft an outline of a new written policy for billing exemptions, with clear justification as to why any accounts should be exempt from billing, and with the intention to keep the number of such accounts to a minimum.	to qualify for 4: Review historic written directives and policy documents allowing certain accounts to be billing-exempt. Draft an outline of a written policy for billing exemptions, identify criteria that grants an exemption, with a goal of keeping this number of accounts to a minimum. Consider increasing the priority of reading meters on unbilled accounts at least annually.		to qualify for 6: Draft a new written policy regarding billing exemptions based upon consensus criteria allowing this occurrence. Assign resources to audit meter records and billing records to obtain census of unbilled metered accounts. Gradually include a greater number of these metered accounts to the routes for regular meter reading.		to qualify for 8: Communicate billing exemption policy throughout the organization and implement procedures that ensure proper account management. Conduct inspections of accounts confirmed in unbilled metered status and verify that accurate meters exist and are scheduled for routine meter readings. Gradually increase the number of unbilled metered accounts that are included in regular meter reading routes.		to qualify for 10: Ensure that meter management (meter accuracy testing, meter replacement) and meter reading activities for unbilled accounts are accorded the same priority as billed accounts. Establish ongoing annual auditing process to ensure that water consumption is reliably collected and provided to the annual water audit process.		to maintain 10: Reassess the utility's philosophy in allowing any water uses to go "unbilled". It is possible to meter and bill all accounts, even if the fee charged for water consumption is discounted or waived. Metering and billing all accounts ensures that water consumption is tracked and water waste from plumbing leaks is detected and minimized.
Unbilled unmetered:		Extent of unbilled, unmetered consumption is unknown due to unclear policies and poor recordkeeping. Total consumption is quantified based upon a purely subjective estimate.	Clear extent of unbilled, unmetered consumption is unknown, but a number of events are randomly documented each year, confirming existence of such consumption, but without sufficient documentation to quantify an accurate estimate of the annual volume consumed.	Conditions between 2 and 4	Extent of unbilled, unmetered consumption is partially known, and procedures exist to document certain events such as miscellaneous fire hydrant uses. Formulae is used to quantify the consumption from such events (time running multiplied by typical flowrate, multiplied by number of events).	Default value of 1.25% of system input volume is employed	Coherent policies exist for some forms of unbilled, unmetered consumption but others await closer evaluation. Reasonable recordkeeping for the managed uses exists and allows for annual volumes to be quantified by inference, but unsupervised uses are guesstimated.	Conditions between 6 and 8	Clear policies and good recordkeeping exist for some uses (ex: water used in periodic testing of unmetered fire connections), but other uses (ex: miscellaneous uses of fire hydrants) have limited oversight. Total consumption is a mix of well quantified use such as from formulae (time running multiplied by typical flow, multiplied by number of events) or temporary meters, and relatively subjective estimates of less regulated use.	Conditions between 8 and 10	Clear policies exist to identify permitted use of water in unbilled, unmetered fashion, with the intention of minimizing this type of consumption. Good records document each occurrence and consumption is quantified via formulae (time running multiplied by typical flow, multiplied by number of events) or use of temporary meters.
Improvements to attain higher data grading for "Unbilled Unmetered Consumption" component:		to qualify for 5: Utilize the accepted default value of 1.25% of the volume of water supplied as an expedient means to gain a reasonable quantification of this use. to qualify for 2: Establish a policy regarding what water uses should be allowed to remain as unbilled and unmetered. Consider tracking a small sample of one such use (ex: fire hydrant flushing).	to qualify for 5: Utilize accepted default value of 1.25% of the volume of water supplied as an expedient means to gain a reasonable quantification of this use. to qualify for 4: Evaluate the documentation of events that have been observed. Meet with user groups (ex: for fire hydrants - fire departments, contractors to ascertain their need and/or volume requirements for water from fire hydrants).		to qualify for 5: Utilize accepted default value of 1.25% of the volume of water supplied as an expedient means to gain a reasonable quantification of all such use. This is particularly appropriate for water utilities who are in the early stages of the water auditing process, and should focus on other components since the volume of unbilled, unmetered consumption is usually a relatively small quantity component, and other larger-quantity components should take priority.	to qualify for 6 or greater: Finalize policy and begin to conduct field checks to better establish and quantify such usage. Proceed if top-down audit exists and/or a great volume of such use is suspected.	to qualify for 8: Assess water utility policy and procedures for various unmetered usages. For example, ensure that a policy exists and permits are issued for use of fire hydrants by persons outside of the utility. Create written procedures for use and documentation of fire hydrants by water utility personnel. Use same approach for other types of unbilled, unmetered water usage.		to qualify for 10: Refine written procedures to ensure that all uses of unbilled, unmetered water are overseen by a structured permitting process managed by water utility personnel. Reassess policy to determine if some of these uses have value in being converted to billed and/or metered status.		to maintain 10: Continue to refine policy and procedures with intention of reducing the number of allowable uses of water in unbilled and unmetered fashion. Any uses that can feasibly become billed and metered should be converted eventually.
APPARENT LOSSES											

Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
Unauthorized consumption:		Extent of unauthorized consumption is unknown due to unclear policies and poor recordkeeping. Total unauthorized consumption is guesstimated.	Unauthorized consumption is a known occurrence, but its extent is a mystery. There are no requirements to document observed events, but periodic field reports capture some of these occurrences. Total unauthorized consumption is approximated from this limited data.	conditions between 2 and 4	Procedures exist to document some unauthorized consumption such as observed unauthorized fire hydrant openings. Use formulae to quantify this consumption (time running multiplied typical flowrate, multiplied by number of events).	Default value of 0.25% of volume of water supplied is employed	Coherent policies exist for some forms of unauthorized consumption (more than simply fire hydrant misuse) but others await closer evaluation. Reasonable surveillance and recordkeeping exist for occurrences that fall under the policy. Volumes quantified by inference from these records.	Conditions between 6 and 8	Clear policies and good auditable recordkeeping exist for certain events (ex: tampering with water meters, illegal bypasses of customer meters); but other occurrences have limited oversight. Total consumption is a combination of volumes from formulae (time x typical flow) and subjective estimates of unconfirmed consumption.	Conditions between 8 and 10	Clear policies exist to identify all known unauthorized uses of water. Staff and procedures exist to provide enforcement of policies and detect violations. Each occurrence is recorded and quantified via formulae (estimated time running multiplied by typical flow) or similar methods. All records and calculations should exist in a form that can be audited by a third party.
Improvements to attain higher data grading for "Unauthorized Consumption" component:		to qualify for 5: Use accepted default of 0.25% of volume of water supplied. to qualify for 2: Review utility policy regarding what water uses are considered unauthorized, and consider tracking a small sample of one such occurrence (ex: unauthorized fire hydrant openings)	to qualify for 5: Use accepted default of 0.25% of system input volume to qualify for 4: Review utility policy regarding what water uses are considered unauthorized, and consider tracking a small sample of one such occurrence (ex: unauthorized fire hydrant openings)		to qualify for 5: Utilize accepted default value of 0.25% of volume of water supplied as an expedient means to gain a reasonable quantification of all such use. This is particularly appropriate for water utilities who are in the early stages of the water auditing process.	to qualify for 6 or greater: Finalize policy updates to clearly identify the types of water consumption that are authorized from those usages that fall outside of this policy and are, therefore, unauthorized. Begin to conduct regular field checks. Proceed if the top-down audit already exists and/or a great volume of such use is suspected.	to quality for 8: Assess water utility policies to ensure that all known occurrences of unauthorized consumption are outlawed, and that appropriate penalties are prescribed. Create written procedures for detection and documentation of various occurrences of unauthorized consumption as they are uncovered.		to qualify for 10: Refine written procedures and assign staff to seek out likely occurrences of unauthorized consumption. Explore new locking devices, monitors and other technologies designed to detect and thwart unauthorized consumption.		to maintain 10: Continue to refine policy and procedures to eliminate any loopholes that allow or tacitly encourage unauthorized consumption. Continue to be vigilant in detection, documentation and enforcement efforts.
Customer metering inaccuracies:	select n/a only if the entire customer population is unmetered. In such a case the volume entered must be zero.	Customer meters exist, but with unorganized paper records on meters; no meter accuracy testing or meter replacement program for any size of retail meter. Metering workflow is driven chaotically with no proactive management. Loss volume due to aggregate meter inaccuracy is guesstimated.	Poor recordkeeping and meter oversight is recognized by water utility management who has allotted staff and funding resources to organize improved recordkeeping and start meter accuracy testing. Existing paper records gathered and organized to provide cursory disposition of meter population. Customer meters are tested for accuracy only upon customer request.	Conditions between 2 and 4	Reliable recordkeeping exists; meter information is improving as meters are replaced. Meter accuracy testing is conducted annually for a small number of meters (more than just customer requests, but less than 1% of inventory). A limited number of the oldest meters are replaced each year. Inaccuracy volume is largely an estimate, but refined based upon limited testing data.	Conditions between 4 and 6	A reliable electronic recordkeeping system for meters exists. The meter population includes a mix of new high performing meters and dated meters with suspect accuracy. Routine, but limited, meter accuracy testing and meter replacement occur. Inaccuracy volume is quantified using a mix of reliable and less certain data.	Conditions between 6 and 8	Ongoing meter replacement and accuracy testing result in highly accurate customer meter population. Testing is conducted on samples of meters of varying age and accumulated volume of throughput to determine optimum replacement time for various types of meters.	Ongoing meter replacement and accuracy testing result in highly accurate customer meter population. Statistically significant number of meters are tested in audit year. This testing is conducted on samples of meters of varying age and accumulated volume of throughput to determine optimum replacement time for these meters.	Good records of all active customer meters exist and include as a minimum: meter number, account number/location, type, size and manufacturer. Ongoing meter replacement occurs according to a targeted and justified basis. Regular meter accuracy testing gives a reliable measure of composite inaccuracy volume for the customer meter population. New metering technology is embraced to keep overall accuracy improving. Procedures are reviewed by a third party knowledgeable in the M36 methodology.
Improvements to attain higher data grading for "Customer meter inaccuracy volume" component:	If n/a is selected because the customer meter population is unmetered, consider establishing a new policy to meter the customer population and employ water rates based upon metered volumes.	to qualify for 2: Gather available meter purchase records. Conduct testing on a small number of meters believed to be the most inaccurate. Review staffing needs of the metering group and budget for necessary resources to better organize meter management.	to qualify for 4: Implement a reliable record keeping system for customer meter histories, preferably using electronic methods typically linked to, or part of, the Customer Billing System or Customer Information System. Expand meter accuracy testing to a larger group of meters.		to qualify for 6: Standardize the procedures for meter recordkeeping within an electronic information system. Accelerate meter accuracy testing and meter replacements guided by testing results.		to qualify for 8: Expand annual meter accuracy testing to evaluate a statistically significant number of meter makes/models. Expand meter replacement program to replace statistically significant number of poor performing meters each year.		to qualify for 9: Continue efforts to manage meter population with reliable recordkeeping. Test a statistically significant number of meters each year and analyze test results in an ongoing manner to serve as a basis for a target meter replacement strategy based upon accumulated volume throughput.	to qualify for 10: Continue efforts to manage meter population with reliable recordkeeping, meter testing and replacement. Evaluate new meter types and install one or more types in 5-10 customer accounts each year in order to pilot improving metering technology.	to maintain 10: Increase the number of meters tested and replaced as justified by meter accuracy test data. Continually monitor development of new metering technology and Advanced Metering Infrastructure (AMI) to grasp opportunities for greater accuracy in metering of water flow and management of customer consumption data.

Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
Systematic Data Handling Errors:	Note: all water utilities incur some amount of this error. Even in water utilities with unmetered customer populations and fixed rate billing, errors occur in annual billing tabulations. Enter a positive value for the volume and select a grading.	Policies and procedures for activation of new customer water billing accounts are vague and lack accountability. Billing data is maintained on paper records which are not well organized. No auditing is conducted to confirm billing data handling efficiency. An unknown number of customers escape routine billing due to lack of billing process oversight.	Policy and procedures for activation of new customer accounts and oversight of billing records exist but need refinement. Billing data is maintained on paper records or insufficiently capable electronic database. Only periodic unstructured auditing work is conducted to confirm billing data handling efficiency. The volume of unbilled water due to billing lapses is a guess.	Conditions between 2 and 4	Policy and procedures for new account activation and oversight of billing operations exist but needs refinement. Computerized billing system exists, but is dated or lacks needed functionality. Periodic, limited internal audits conducted and confirm with approximate accuracy the consumption volumes lost to billing lapses.	Conditions between 4 and 6	Policy and procedures for new account activation and oversight of billing operations is adequate and reviewed periodically. Computerized billing system is in use with basic reporting available. Any effect of billing adjustments on measured consumption volumes is well understood. Internal checks of billing data error conducted annually. Reasonably accurate quantification of consumption volume lost to billing lapses is obtained.	Conditions between 6 and 8	New account activation and billing operations policy and procedures are reviewed at least biannually. Computerized billing system includes an array of reports to confirm billing data and system functionality. Checks are conducted routinely to flag and explain zero consumption accounts. Annual internal checks conducted with third party audit conducted at least once every five years. Accountability checks flag billing lapses. Consumption volume lost to billing lapses is well quantified and reducing year-by-year.	Conditions between 8 and 10	Sound written policy and procedures exist for new account activation and oversight of customer billing operations. Robust computerized billing system gives high functionality and reporting capabilities which are utilized, analyzed and the results reported each billing cycle. Assessment of policy and data handling errors are conducted internally and audited by third party at least once every three years, ensuring consumption lost to billing lapses is minimized and detected as it occurs.
Improvements to attain higher data grading for "Systematic Data Handling Error volume" component:		to qualify for 2: Draft written policy and procedures for activating new water billing accounts and oversight of billing operations. Investigate and budget for computerized customer billing system. Conduct initial audit of billing records by flow-charting the basic business processes of the customer account/billing function.	to qualify for 4: Finalize written policy and procedures for activation of new billing accounts and overall billing operations management. Implement a computerized customer billing system. Conduct initial audit of billing records as part of this process.		to qualify for 6: Refine new account activation and billing operations procedures and ensure consistency with the utility policy regarding billing, and minimize opportunity for missed billings. Upgrade or replace customer billing system for needed functionality - ensure that billing adjustments don't corrupt the value of consumption volumes. Procedurize internal annual audit process.		to qualify for 8: Formalize regular review of new account activation process and general billing practices. Enhance reporting capability of computerized billing system. Formalize regular auditing process to reveal scope of data handling error. Plan for periodic third party audit to occur at least once every five years.		to qualify for 10: Close policy/procedure loopholes that allow some customer accounts to go unbilled, or data handling errors to exist. Ensure that billing system reports are utilized, analyzed and reported every billing cycle. Ensure that internal and third party audits are conducted at least once every three years.		to maintain 10: Stay abreast of customer information management developments and innovations. Monitor developments of Advanced Metering Infrastructure (AMI) and integrate technology to ensure that customer endpoint information is well-monitored and errors/lapses are at an economic minimum.
SYSTEM DATA											
Length of mains:		Poorly assembled and maintained paper as-built records of existing water main installations makes accurate determination of system pipe length impossible. Length of mains is guesstimated.	Paper records in poor or uncertain condition (no annual tracking of installations & abandonments). Poor procedures to ensure that new water mains installed by developers are accurately documented.	Conditions between 2 and 4	Sound written policy and procedures exist for documenting new water main installations, but gaps in management result in a uncertain degree of error in tabulation of mains length.	Conditions between 4 and 6	Sound written policy and procedures exist for permitting and commissioning new water mains. Highly accurate paper records with regular field validation; or electronic records and asset management system in good condition. Includes system backup.	Conditions between 6 and 8	Sound written policy and procedures exist for permitting and commissioning new water mains. Electronic recordkeeping such as a Geographical Information System (GIS) and asset management system are used to store and manage data.	Conditions between 8 and 10	Sound written policy exists for managing water mains extensions and replacements. Geographic Information System (GIS) data and asset management database agree and random field validation proves truth of databases. Records of annual field validation should be available for review.
Improvements to attain higher data grading for "Length of Water Mains" component:		to qualify for 2: Assign personnel to inventory current as-built records and compare with customer billing system records and highway plans in order to verify poorly documented pipelines. Assemble policy documents regarding permitting and documentation of water main installations by the utility and building developers; identify gaps in procedures that result in poor documentation of new water main installations.	to qualify for 4: Complete inventory of paper records of water main installations for several years prior to audit year. Review policy and procedures for commissioning and documenting new water main installation.		to qualify for 6: Finalize updates/improvements to written policy and procedures for permitting/commissioning new main installations. Confirm inventory of records for five years prior to audit year; correct any errors or omissions.		to qualify for 8: Launch random field checks of limited number of locations. Convert to electronic database such as a Geographic Information System (GIS) with backup as justified. Develop written policy and procedures.		to qualify for 10: Link Geographic Information System (GIS) and asset management databases, conduct field verification of data. Record field verification information at least annually.		to maintain 10: Continue with standardization and random field validation to improve the completeness and accuracy of the system.
Number of active AND inactive service connections:		Vague permitting (of new service connections) policy and poor paper recordkeeping of customer connections/billings result in suspect determination of the number of service connections, which may be 10-15% in error from actual count.	General permitting policy exists but paper records, procedural gaps, and weak oversight result in questionable total for number of connections, which may vary 5-10% of actual count.	Conditions between 2 and 4	Written account activation policy and procedures exist, but with some gaps in performance and oversight. Computerized information management system is being brought online to replace dated paper recordkeeping system. Reasonably accurate tracking of service connection installations & abandonments; but count can be up to 5% in error from actual total.	Conditions between 4 and 6	Written new account activation and overall billing policies and procedures are adequate and reviewed periodically. Computerized information management system is in use with annual installations & abandonments totaled. Very limited field verifications and audits. Error in count of number of service connections is believed to be no more than 3%.	Conditions between 6 and 8	Policies and procedures for new account activation and overall billing operations are written, well-structured and reviewed at least biannually. Well-managed computerized information management system exists and routine, periodic field checks and internal system audits are conducted. Counts of connections are no more than 2% in error.	Conditions between 8 and 10	Sound written policy and well managed and audited procedures ensure reliable management of service connection population. Computerized information management system, Customer Billing System, and Geographic Information System (GIS) information agree; field validation proves truth of databases. Count of connections recorded as being in error is less than 1% of the entire population.
Improvements to attain higher data grading for "Number of Active and Inactive Service Connections" component:	**Note: The number of Service Connections does not include fire hydrant leads/lines connecting the hydrant to the water main**	to qualify for 2: Draft new policy and procedures for new account activation and overall billing operations. Research and collect paper records of installations & abandonments for several years prior to audit year.	to qualify for 4: Refine policy and procedures for new account activation and overall billing operations. Research computerized recordkeeping system (Customer Information System or Customer Billing System) to improve documentation format for service connections.		to qualify for 6: Refine procedures to ensure consistency with new account activation and overall billing policy to establish new service connections or decommission existing connections. Improve process to include all totals for at least five years prior to audit year.		to qualify for 8: Formalize regular review of new account activation and overall billing operations policies and procedures. Launch random field checks of limited number of locations. Develop reports and auditing mechanisms for computerized information management system.		to qualify for 10: Close any procedural loopholes that allow installations to go undocumented. Link computerized information management system with Geographic Information System (GIS) and formalize field inspection and information system auditing processes. Documentation of new or decommissioned service connections encounters several levels of checks and balances.		to maintain 10: Continue with standardization and random field validation to improve knowledge of system.
	Note: if customer water	Gradings 1-9 apply if customer properties are unmetered, if customer meters exist and are located inside the customer building premises, or if the water utility owns and is responsible for the entire service connection piping from the water main to the customer building. In any of these cases the average distance between the curb stop or boundary separating utility/customer responsibility for service connection piping, and the typical first point of use (ex: faucet) or the customer meter must be quantified. Gradings of 1-9 are used to grade the validity of the means to quantify this value. (See the "Service Connection Diagram" worksheet)									Either of two conditions can be met for a grading of 10:

Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
Average length of customer service line:	meters are located outside of the customer building next to the curb stop or boundary separating utility/customer responsibility, then the auditor should answer "Yes" to the question on the Reporting Worksheet asking about this. If the answer is Yes, the grading description listed under the Grading of 10(a) will be followed, with a value of zero automatically entered at a Grading of 10. See the Service Connection Diagram worksheet for a visual presentation of this distance.	Vague policy exists to define the delineation of water utility ownership and customer ownership of the service connection piping. Curb stops are perceived as the breakpoint but these have not been well-maintained or documented. Most are buried or obscured. Their location varies widely from site-to-site, and estimating this distance is arbitrary due to the unknown location of many curb stops.	Policy requires that the curb stop serves as the delineation point between water utility ownership and customer ownership of the service connection piping. The piping from the water main to the curb stop is the property of the water utility; and the piping from the curb stop to the customer building is owned by the customer. Curb stop locations are not well documented and the average distance is based upon a limited number of locations measured in the field.	Conditions between 2 and 4	Good policy requires that the curb stop serves as the delineation point between water utility ownership and customer ownership of the service connection piping. Curb stops are generally installed as needed and are reasonably documented. Their location varies widely from site-to-site, and an estimate of this distance is hindered by the availability of paper records of limited accuracy.	Conditions between 4 and 6	Clear written policy exists to define utility/customer responsibility for service connection piping. Accurate, well-maintained paper or basic electronic recordkeeping system exists. Periodic field checks confirm piping lengths for a sample of customer properties.	Conditions between 6 and 8	Clearly worded policy standardizes the location of curb stops and meters, which are inspected upon installation. Accurate and well maintained electronic records exist with periodic field checks to confirm locations of service lines, curb stops and customer meter pits. An accurate number of customer properties from the customer billing system allows for reliable averaging of this length.	Conditions between 8 and 10	a) Customer water meters exist outside of customer buildings next to the curb stop or boundary separating utility/customer responsibility for service connection piping. If so, answer "Yes" to the question on the Reporting Working asking about this condition. A value of zero and a Grading of 10 are automatically entered in the Reporting Worksheet . b). Meters exist inside customer buildings, or properties are unmetered. In either case, answer "No" to the Reporting Worksheet question on meter location, and enter a distance determined by the auditor. For a Grading of 10 this value must be a very reliable number from a Geographic Information System (GIS) and confirmed by a statistically valid number of field checks.
Improvements to attain higher data grading for "Average Length of Customer Service Line" component:		to qualify for 2: Research and collect paper records of service line installations. Inspect several sites in the field using pipe locators to locate curb stops. Obtain the length of this small sample of connections in this manner.	to qualify for 4: Formalize and communicate policy delineating utility/customer responsibilities for service connection piping. Assess accuracy of paper records by field inspection of a small sample of service connections using pipe locators as needed. Research the potential migration to a computerized information management system to store service connection data.		to qualify for 6: Establish coherent procedures to ensure that policy for curb stop, meter installation and documentation is followed. Gain consensus within the water utility for the establishment of a computerized information management system.		to qualify for 8: Implement an electronic means of recordkeeping, typically via a customer information system, customer billing system, or Geographic Information System (GIS). Standardize the process to conduct field checks of a limited number of locations.		to qualify for 10: Link customer information management system and Geographic Information System (GIS), standardize process for field verification of data.		to maintain 10: Continue with standardization and random field validation to improve knowledge of service connection configurations and customer meter locations.
Average operating pressure:		Available records are poorly assembled and maintained paper records of supply pump characteristics and water distribution system operating conditions. Average pressure is guesstimated based upon this information and ground elevations from crude topographical maps. Widely varying distribution system pressures due to undulating terrain, high system head loss and weak/erratic pressure controls further compromise the validity of the average pressure calculation.	Limited telemetry monitoring of scattered pumping station and water storage tank sites provides some static pressure data, which is recorded in handwritten logbooks. Pressure data is gathered at individual sites only when low pressure complaints arise. Average pressure is determined by averaging relatively crude data, and is affected by significant variation in ground elevations, system head loss and gaps in pressure controls in the distribution system.	Conditions between 2 and 4	Effective pressure controls separate different pressure zones; moderate pressure variation across the system, occasional open boundary valves are discovered that breech pressure zones. Basic telemetry monitoring of the distribution system logs pressure data electronically. Pressure data gathered by gauges or dataloggers at fire hydrants or buildings when low pressure complaints arise, and during fire flow tests and system flushing. Reliable topographical data exists. Average pressure is calculated using this mix of data.	Conditions between 4 and 6	Reliable pressure controls separate distinct pressure zones; only very occasional open boundary valves are encountered that breech pressure zones. Well-covered telemetry monitoring of the distribution system (not just pumping at source treatment plants or wells) logs extensive pressure data electronically. Pressure gathered by gauges/dataloggers at fire hydrants and buildings when low pressure complaints arise, and during fire flow tests and system flushing. Average pressure is determined by using this mix of reliable data.	Conditions between 6 and 8	Well-managed, discrete pressure zones exist with generally predictable pressure fluctuations. A current full-scale SCADA System or similar realtime monitoring system exists to monitor the water distribution system and collect data, including real time pressure readings at representative sites across the system. The average system pressure is determined from reliable monitoring system data.	Conditions between 8 and 10	Well-managed pressure districts/zones, SCADA System and hydraulic model exist to give very precise pressure data across the water distribution system. Average system pressure is reliably calculated from extensive, reliable, and cross-checked data. Calculations are reported on an annual basis as a minimum.
Improvements to attain higher data grading for "Average Operating Pressure" component:		to qualify for 2: Employ pressure gauging and/or datalogging equipment to obtain pressure measurements from fire hydrants. Locate accurate topographical maps of service area in order to confirm ground elevations. Research pump data sheets to find pump pressure/flow characteristics	to qualify for 4: Formalize a procedure to use pressure gauging/datalogging equipment to gather pressure data during various system events such as low pressure complaints, or operational testing. Gather pump pressure and flow data at different flow regimes. Identify faulty pressure controls (pressure reducing valves, altitude valves, partially open boundary valves) and plan to properly configure pressure zones. Make all pressure data from these efforts available to generate system-wide average pressure.		to qualify for 6: Expand the use of pressure gauging/datalogging equipment to gather scattered pressure data at a representative set of sites, based upon pressure zones or areas. Utilize pump pressure and flow data to determine supply head entering each pressure zone or district. Correct any faulty pressure controls (pressure reducing valves, altitude valves, partially open boundary valves) to ensure properly configured pressure zones. Use expanded pressure dataset from these activities to generate system-wide average pressure.		to qualify for 8: Install a Supervisory Control and Data Acquisition (SCADA) System, or similar realtime monitoring system, to monitor system parameters and control operations. Set regular calibration schedule for instrumentation to insure data accuracy. Obtain accurate topographical data and utilize pressure data gathered from field surveys to provide extensive, reliable data for pressure averaging.		to qualify for 10: Annually, obtain a system-wide average pressure value from the hydraulic model of the distribution system that has been calibrated via field measurements in the water distribution system and confirmed in comparisons with SCADA System data.		to maintain 10: Continue to refine the hydraulic model of the distribution system and consider linking it with SCADA System for real-time pressure data calibration, and averaging.

Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
COST DATA											
Total annual cost of operating water system:	▨	Incomplete paper records and lack of financial accounting documentation on many operating functions makes calculation of water system operating costs a pure guesstimate	Reasonably maintained, but incomplete, paper or electronic accounting provides data to estimate the major portion of water system operating costs.	Conditions between 2 and 4	Electronic, industry-standard cost accounting system in place. However, gaps in data are known to exist, periodic internal reviews are conducted but not a structured financial audit.	Conditions between 4 and 6	Reliable electronic, industry-standard cost accounting system in place, with all pertinent water system operating costs tracked. Data audited periodically by utility personnel, but not a Certified Public Accountant (CPA).	Conditions between 6 and 8	Reliable electronic, industry-standard cost accounting system in place, with all pertinent water system operating costs tracked. Data audited at least annually by utility personnel, and at least once every three years by third-party CPA.	Conditions between 8 and 10	Reliable electronic, industry-standard cost accounting system in place, with all pertinent water system operating costs tracked. Data audited annually by utility personnel and annually also by third-party CPA.
Improvements to attain higher data grading for "Total Annual Cost of Operating the Water System" component:	▨	to qualify for 2: Gather available records, institute new financial accounting procedures to regularly collect and audit basic cost data of most important operations functions.	to qualify for 4: Implement an electronic cost accounting system, structured according to accounting standards for water utilities		to qualify for 6: Establish process for periodic internal audit of water system operating costs; identify cost data gaps and institute procedures for tracking these outstanding costs.		to qualify for 8: Standardize the process to conduct routine financial audit on an annual basis. Arrange for CPA audit of financial records at least once every three years.		to qualify for 10: Standardize the process to conduct a third-party financial audit by a CPA on an annual basis.		to maintain 10: Maintain program, stay abreast of expenses subject to erratic cost changes and long-term cost trend, and budget/track costs proactively
Customer retail unit cost (applied to Apparent Losses):	Customer population unmetered, and/or only a fixed fee is charged for consumption.	Antiquated, cumbersome water rate structure is used, with periodic historic amendments that were poorly documented and implemented; resulting in classes of customers being billed inconsistent charges. The actual composite billing rate likely differs significantly from the published water rate structure, but a lack of auditing leaves the degree of error indeterminate.	Dated, cumbersome water rate structure, not always employed consistently in actual billing operations. The actual composite billing rate is known to differ from the published water rate structure, and a reasonably accurate estimate of the degree of error is determined, allowing a composite billing rate to be quantified.	Conditions between 2 and 4	Straight-forward water rate structure in use, but not updated in several years. Billing operations reliably employ the rate structure. The composite billing rate is derived from a single customer class such as residential customer accounts, neglecting the effect of different rates from varying customer classes.	Conditions between 4 and 6	Clearly written, up-to-date water rate structure is in force and is applied reliably in billing operations. Composite customer rate is determined using a weighted average residential rate using volumes of water in each rate block.	Conditions between 6 and 8	Effective water rate structure is in force and is applied reliably in billing operations. Composite customer rate is determined using a weighted average composite consumption rate, which includes residential, commercial, industrial, institutional (CII), and any other distinct customer classes within the water rate structure.	Conditions between 8 and 10	Current, effective water rate structure is in force and applied reliably in billing operations. The rate structure and calculations of composite rate - which includes residential, commercial, industrial, institutional (CII), and other distinct customer classes - are reviewed by a third party knowledgeable in the M36 methodology at least once every five years.
Improvements to attain higher data grading for "Customer Retail Unit Cost" component:	▨	to qualify for 2: Formalize the process to implement water rates, including a secure documentation procedure. Create a current, formal water rate document and gain approval from all stakeholders.	to qualify for 4: Review the water rate structure and update/formalize as needed. Assess billing operations to ensure that actual billing operations incorporate the established water rate structure.		to qualify for 6: Evaluate volume of water used in each usage block by residential users. Multiply volumes by full rate structure.	Launch effort to fully meter the customer population and charge rates based upon water volumes	to qualify for 8: Evaluate volume of water used in each usage block by all classifications of users. Multiply volumes by full rate structure.		to qualify for 10: Conduct a periodic third-party audit of water used in each usage block by all classifications of users. Multiply volumes by full rate structure.		to maintain 10: Keep water rate structure current in addressing the water utility's revenue needs. Update the calculation of the customer unit rate as new rate components, customer classes, or other components are modified.
Variable production cost (applied to Real Losses):	Note: if the water utility purchases/imports its entire water supply, then enter the unit purchase cost of the bulk water supply in the Reporting Worksheet with a grading of 10	Incomplete paper records and lack of documentation on primary operating functions (electric power and treatment costs most importantly) makes calculation of variable production costs a pure guesstimate	Reasonably maintained, but incomplete, paper or electronic accounting provides data to roughly estimate the basic operations costs (pumping power costs and treatment costs) and calculate a unit variable production cost.	Conditions between 2 and 4	Electronic, industry-standard cost accounting system in place. Electric power and treatment costs are reliably tracked and allow accurate weighted calculation of unit variable production costs based on these two inputs and water imported purchase costs (if applicable). All costs are audited internally on a periodic basis.	Conditions between 4 and 6	Reliable electronic, industry-standard cost accounting system in place, with all pertinent water system operating costs tracked. Pertinent additional costs beyond power, treatment and water imported purchase costs (if applicable) such as liability, residuals management, wear and tear on equipment, impending expansion of supply, are included in the unit variable production cost, as applicable. The data is audited at least annually by utility personnel.	Conditions between 6 and 8	Reliable electronic, industry-standard cost accounting system in place, with all pertinent primary and secondary variable production and water imported purchase (if applicable) costs tracked. The data is audited at least annually by utility personnel, and at least once every three years by a third-party knowledgeable in the M36 methodology.	Conditions between 8 and 10	Either of two conditions can be met to obtain a grading of 10: 1) Third party CPA audit of all pertinent primary and secondary variable production and water imported purchase (if applicable) costs on an annual basis. or: 2) Water supply is entirely purchased as bulk imported water, and unit purchase cost serves as the variable production cost.
Improvements to attain higher data grading for "Variable Production Cost" component:	▨	to qualify for 2: Gather available records, institute new procedures to regularly collect and audit basic cost data and most important operations functions.	to qualify for 4: Implement an electronic cost accounting system, structured according to accounting standards for water utilities		to qualify for 6: Formalize process for regular internal audits of production costs. Assess whether additional costs (liability, residuals management, equipment wear, impending infrastructure expansion) should be included to calculate a more representative variable production cost.		to qualify for 8: Formalize the accounting process to include direct cost components (power, treatment) as well as indirect cost components (liability, residuals management, etc.) Arrange to conduct audits by a knowledgeable third-party at least once every three years.		to qualify for 10: Standardize the process to conduct a third-party financial audit by a CPA on an annual basis.		to maintain 10: Maintain program, stay abreast of expenses subject to erratic cost changes and budget/track costs proactively

AWWA Free Water Audit Software:
Determining Water Loss Standing

WAS v5.0

Water Audit Report for: Village of Huntley (IL1110350)
Reporting Year: 2020 | 1/2020 - 12/2020
Data Validity Score: 48

Water Loss Control Planning Guide

	Water Audit Data Validity Level / Score				
Functional Focus Area	**Level I** (0-25)	**Level II** (26-50)	**Level III** (51-70)	**Level IV** (71-90)	**Level V** (91-100)
Audit Data Collection	Launch auditing and loss control team; address production metering deficiencies	Analyze business process for customer metering and billing functions and water supply operations. Identify data gaps.	Establish/revise policies and procedures for data collection	Refine data collection practices and establish as routine business process	Annual water audit is a reliable gauge of year-to-year water efficiency standing
Short-term loss control	Research information on leak detection programs. Begin flowcharting analysis of customer billing system	Conduct loss assessment investigations on a sample portion of the system: customer meter testing, leak survey, unauthorized consumption, etc.	Establish ongoing mechanisms for customer meter accuracy testing, active leakage control and infrastructure monitoring	Refine, enhance or expand ongoing programs based upon economic justification	Stay abreast of improvements in metering, meter reading, billing, leakage management and infrastructure rehabilitation
Long-term loss control		Begin to assess long-term needs requiring large expenditure: customer meter replacement, water main replacement program, new customer billing system or Automatic Meter Reading (AMR) system.	Begin to assemble economic business case for long-term needs based upon improved data becoming available through the water audit process.	Conduct detailed planning, budgeting and launch of comprehensive improvements for metering, billing or infrastructure management	Continue incremental improvements in short-term and long-term loss control interventions
Target-setting			Establish long-term apparent and real loss reduction goals (+10 year horizon)	Establish mid-range (5 year horizon) apparent and real loss reduction goals	Evaluate and refine loss control goals on a yearly basis
Benchmarking			Preliminary Comparisons - can begin to rely upon the Infrastructure Leakage Index (ILI) for performance comparisons for real losses (see below table)	Performance Benchmarking - ILI is meaningful in comparing real loss standing	Identify Best Practices/ Best in class - the ILI is very reliable as a real loss performance indicator for best in class service

For validity scores of 50 or below, the shaded blocks should not be focus areas until better data validity is achieved.

Once data have been entered into the Reporting Worksheet, the performance indicators are automatically calculated. How does a water utility operator know how well his or her system is performing? The AWWA Water Loss Control Committee provided the following table to assist water utilities is gauging an approximate Infrastructure Leakage Index (ILI) that is appropriate for their water system and local conditions. The lower the amount of leakage and real losses that exist in the system, then the lower the ILI value will be.

Note: this table offers an approximate guideline for leakage reduction target-setting. The best means of setting such targets include performing an economic assessment of various loss control methods. However, this table is useful if such an assessment is not possible.

General Guidelines for Setting a Target ILI
(without doing a full economic analysis of leakage control options)

Target ILI Range	Financial Considerations	Operational Considerations	Water Resources Considerations
1.0 - 3.0	Water resources are costly to develop or purchase; ability to increase revenues via water rates is greatly limited because of regulation or low ratepayer affordability.	Operating with system leakage above this level would require expansion of existing infrastructure and/or additional water resources to meet the demand.	Available resources are greatly limited and are very difficult and/or environmentally unsound to develop.
>3.0 -5.0	Water resources can be developed or purchased at reasonable expense; periodic water rate increases can be feasibly imposed and are tolerated by the customer population.	Existing water supply infrastructure capability is sufficient to meet long-term demand as long as reasonable leakage management controls are in place.	Water resources are believed to be sufficient to meet long-term needs, but demand management interventions (leakage management, water conservation) are included in the long-term
>5.0 - 8.0	Cost to purchase or obtain/treat water is low, as are rates charged to customers.	Superior reliability, capacity and integrity of the water supply infrastructure make it relatively immune to supply shortages.	Water resources are plentiful, reliable, and easily extracted.
Greater than 8.0	Although operational and financial considerations may allow a long-term ILI greater than 8.0, such a level of leakage is not an effective utilization of water as a resource. Setting a target level greater than 8.0 - other than as an incremental goal to a smaller long-term target - is discouraged.		
Less than 1.0	If the calculated Infrastructure Leakage Index (ILI) value for your system is 1.0 or less, two possibilities exist. a) you are maintaining your leakage at low levels in a class with the top worldwide performers in leakage control. b) A portion of your data may be flawed, causing your losses to be greatly understated. This is likely if you calculate a low ILI value but do not employ extensive leakage control practices in your operations. In such cases it is beneficial to validate the data by performing field measurements to confirm the accuracy of production and customer meters, or to identify any other potential sources of error in the data.		