APPENDIX 1-B

WATER & WASTEWATER BASELINE REPORTS

CITY OF GREATER SUDBURY WATER AND WASTEWATER MASTER PLAN

BASELINE REVIEW REPORT - WATER

CITY OF GREATER SUDBURY

PROJECT NO.: 121-23026-00
DATE: FEBRUARY 2015

WSP
100 COMMERCE VALLEY DRIVE WEST
THORNHILL, ON, CANADA L3T 0A1

TEL.: +1 905 882-1100
FAX: +1 905 882-0055
WSP.COM

TABLE OF CONTENTS

1 INTRODUCTION 1

2 REGULATORY REQUIREMENTS 2

2.1 The Planning Act, 1990 2

2.2 Provincial Policy Statement, 2014 2

2.3 Ontario Water Resources Act 3

2.4 Safe Drinking Water Act, 2002 3

2.5 Clean Water Act, 2006 3

3 WATER SUPPLY SYSTEMS 4

3.1 Dowling Supply and Distribution System 4

3.1.1 Dowling Wells 4

3.1.2 Distribution System 5

3.1.3 System Capacity 5

3.2 Falconbridge Supply and Distribution System 6

3.2.1 Falconbridge Wells 6

3.2.2 Distribution System 7

3.2.3 System Capacity 7

3.3 Onaping-Levack Supply and Distribution System 7

3.3.1 Onaping Wells 8

3.3.2 Distribution System 8

3.3.3 System Capacity 9

3.4 Sudbury Supply and Distribution System 9

3.4.1 Background 9

3.4.2 Wanapitei Water Treatment Plant 11

3.4.3 David Street Water Treatment Plant 13

3.4.4 Garson Wells 15

3.4.5 Distribution System 16

3.4.6 System Capacity 16

3.5 Valley Supply and Distribution System 17

3.5.1 Background 17

3.5.2 Well Supply 18
3.5.3 Valley Wells 18
3.5.4 Capreol Wells 20
3.5.5 Distribution System 21
3.6 Vermilion Supply and Distribution System 22
3.6.1 Vermilion Water Treatment Plant 22
3.6.2 Distribution System 22
4 WATER SYSTEM MODELS 24
4.1 Dowling Water System 24
4.2 Falconbridge Water System 24
4.3 Onaping Levack Water System 25
4.4 Sudbury Water System 25
4.5 Valley Water System 26
4.6 Walden Water System 26
5 SUMMARY 28

TABLES

TABLE 3-1 DOWLING WELLS' PROCESS INFORMATION 5
TABLE 3-2 DOWLING SYSTEM RATED CAPACITY 5
TABLE 3-3 FALCONBRIDGE WELLS' PROCESS INFORMATION[1] 6
TABLE 3-4 FALCONBRIDGE WATER SYSTEM CAPACITY 7
TABLE 3-5 ONAPING WELLS' PROCESS INFORMATION[1] 8
TABLE 3-6 ONAPING-LEVACK SYSTEM RATED CAPACITY 9
TABLE 3-7 GARSON WELLS' PROCESS INFORMATION[1] 16
TABLE 3-8 SUDBURY SYSTEM CAPACITY 16
TABLE 3-9 VALLEY WELLS' PROCESS INFORMATION 19
TABLE 3-10 CAPREOL WELLS' PROCESS INFORMATION[1] 20
TABLE 3-11 SUMMARY OF VALLEY WATER STORAGE 21
TABLE 4-1 DOWLING WATER SYSTEM MODEL SUMMARY 24
TABLE 4-2 FALCONBRIDGE WATER SYSTEM MODEL SUMMARY 24
TABLE 4-3 ONAPING-LEVACK WATER SYSTEM MODEL SUMMARY 25
TABLE 4-4 SUDBURY WATER SYSTEM MODEL SUMMARY 26
TABLE 4-5 VALLEY WATER SYSTEM MODEL SUMMARY 26
TABLE 4-6 WALDEN WATER SYSTEM MODEL SUMMARY 27

FIGURES

FIGURE 3-1 DOWLING WELLS' PROCESS FLOW DIAGRAM (TYPICAL FOR BOTH RIVERSIDE AND LIONEL WELLS)[1] 5
FIGURE 3-2 FALCONBRIDGE WELLS' PROCESS FLOW DIAGRAM 6
FIGURE 3-3 ONAPING WELLS' PROCESS FLOW DIAGRAM 8
FIGURE 3-4 WANAPITEI WTP PROCESS BLOCK FLOW DIAGRAM 12
FIGURE 3-5 DAVID STREET WTP PROCESS FLOW DIAGRAM 14

FIGURE 3-6 GARSON WELLS' PROCESS FLOW DIAGRAM 15
FIGURE 3-7 VALLEY WELLS' PROCESS FLOW DIAGRAM (TYPICAL FOR ALL VALLEY WELLS, EXCEPT CAPREOL) 19
FIGURE 3-8 CAPREOL WELLS' PROCESS FLOW DIAGRAM (TYPICAL FOR BOTH WELLS J AND M) 20

EXHIBITS

1 WATER SYSTEMS AND PRESSURE ZONE MAPS

APPENDICES

A STORAGE CALCULATIONS

B MODELED SYSTEM RESPONSES TO FLOW SCENARIOS

1 INTRODUCTION

The City of Greater Sudbury (CGS) retained WSP to undertake a Water and Wastewater Master Plan. The purpose of the Master Plan project is to establish servicing strategies for water and wastewater infrastructure for the core urban areas and surrounding communities in the City for the next 20 years, per the City's Official Plan.

The Study is being conducted in accordance with the requirements set out in the Municipal Class Environmental Assessment (Class EA) document (June 2000 as amended in 2007 and in 2011).

A key component of the Master Plan is to incorporate the City's Official Plan, as well as the City's Water and Wastewater mission statement into long-term infrastructure planning. The mission statement is:

The City of Greater Sudbury Water/Wastewater Services Division is committed to providing its customers with safe, reliable, and environmentally responsible municipal water and wastewater services with a sustainable, cost effective approach.

This Baseline Review Report compiles and documents available information on the City's existing water infrastructure and establishes the starting point in the assessment of the water systems to service the existing and projected development. The report also includes an overview of the regulatory requirements relevant to the planning and design of water systems in Ontario and a description of the various water supply and distribution systems in the City.

A separate Baseline Review Report has been completed for the City of Greater Sudbury wastewater systems.

2 REGULATORY REQUIREMENTS

2.1 THE PLANNING ACT, 1990

The Planning Act (1990) establishes the mechanisms and rules for land use planning in Ontario, outlining how land uses may be controlled, and who may control them. The Act sets the basis for the preparation of Official Plans and planning policies for future development, and it provides municipalities with local autonomy to make decisions and streamline the planning process. The Act empowers local citizens to provide their input to their municipal council and, where permitted, to appeal decisions to the Ontario Municipal Board. Through the Act, the Province issues Provincial Policy Statements and plans.

2.2 PROVINCIAL POLICY STATEMENT, 2014

The Provincial Policy Statement (PPS) is a key component of Ontario's planning system as it sets policy direction on matters of provincial interest related to land use planning, growth management, environmental protection, and public health and safety. It aims to provide a stronger policy framework that guides communities in Ontario toward a higher quality of life and a better long-term future.

The PPS establishes the various municipalities' roles in planning for growth, intensification and redevelopment. New settlement area policies will only permit expansions where it is demonstrated that opportunities for growth are not available through intensification, redevelopment or in designated areas. The PPS also requires municipalities to co–ordinate and provide direction on policies with cross municipal boundaries, such as natural heritage systems and resource management.

The PPS states that infrastructure planning must be coordinated and integrated with land use planning so that they are:

1. Financially viable over the lifecycle, which may be demonstrated through asset management planning
2. Available to meet current and projected needs

The PPS promotes optimizing existing infrastructure and public service facilities as well as using opportunities for adaptive re-use, where feasible.

In addition to the above, requirements for planning water and wastewater infrastructure specified in the PPS are listed below:

1. Direct and accommodate expected growth or development in a manner that promotes the efficient use and optimization of existing:
   - Municipal sewage services and municipal water services
   - Private communal sewage services and private communal water services, where municipal sewage services and municipal water services are not available
2. Ensure that these systems are provided in a manner that:
   - Can be sustained by the water resources upon which such services rely
   - Is feasible, financially viable and complies with all regulatory requirements and
   - Protects human health and the natural environment
3. Promote water conservation and water use efficiency
4. Integrate servicing and land use considerations at all stages of the planning process
5. Be in accordance with the servicing hierarchy outlined in the PPS, which briefly identifies the following in order of descending preference:
   - Municipal servicing
   - Private communal servicing

— Individual on-site servicing
— Partial servicing

2.3 ONTARIO WATER RESOURCES ACT

The Ontario Water Resources Act (OWRA) states that the Ontario Ministry of Environment and Climate Change (MOECC) is responsible for the “supervision of all surface waters and ground waters in Ontario.” Under the OWRA, the province operates the Permit to Take Water (PTTW) program.

A PTTW is required for any water taking greater than 50,000 litres per day. Generally, all municipal water supply sources require a PTTW. Through the PTTW application, the MOECC is able to identify and analyse potential impacts of long term impacts of a proposed water taking. Such impacts include effects on the natural environment, private wells, and recreational water use. The PTTW process allows for responsible management of water resources.

2.4 SAFE DRINKING WATER ACT, 2002

Following the Walkerton Inquiry, the Ontario government enacted the Safe Drinking Water Act (SDWA). This Act covers all matters related to the treatment and distribution of drinking water. Part of the SDWA, O.Reg. 170/03 Drinking Water Systems provides sampling and testing requirements, minimum treatment standards, adverse water quality notification, non–compliance penalties, operator certification, and public reporting requirements.

O.Reg 170/03 also details the requirements for municipalities to comply with the Municipal Drinking Water Licencing (MDWL) program. Formerly, municipal water supply systems were granted Certificates of Approval (Cs of A) for individual facilities within a respective supply system. However, following the Walkerton Tragedy in 2000, Justice O’Conner made several recommendations toward improving the approvals process for public water supplies, the outcome of which is the MDWL program. The MDWL consolidates approvals for all facilities in a single water system into a single set of documents, including a Drinking Water Works Permit (DWWP), a Financial Plan, a Quality Management System, and a Permit to Take Water.

2.5 CLEAN WATER ACT, 2006

The Province of Ontario developed the Clean Water Act to protect drinking water through a “source to tap” policy. This policy is intended to provide necessary protection of drinking water resources through a multi barrier approach which includes protection of the source water, such as surface or groundwater, prior to intake into the drinking water system. A key requirement of the Act is development of a Source Protection Plan specific to a respective watershed.

The three main phases of developing a Source Protection Plan include: Assessment, Planning, and Management. Assessment involves taking an inventory of current conditions of and potential threats to drinking water sources. Planning ensures appropriate land use designations to prevent threats of existing and future land use activities to drinking water sources. Finally, Management aims to monitor to prevent threats to drinking water sources.

A Source Protection Plan has been prepared for the Sudbury area and can be reviewed online at www.sourcewatersudbury.ca.

3 WATER SUPPLY SYSTEMS

The City of Greater Sudbury (CGS) includes six municipal drinking water supply systems that service the various communities in the City, as listed below with their associated Drinking Water Works Permit (DWWP):

1. Dowling Drinking Water System (DWWP 016-203)
2. Falconbridge Drinking Water System (DWWP 016-201)
3. Onaping/Levack Drinking Water System (DWWP 016-202)
4. Sudbury Drinking Water System (DWWP 016-206)
5. Valley Drinking Water System (DWWP 016-205)
6. Vermilion Drinking Water System (DWWP 016-204)

There are three surface water treatment plants, two of which are owned and operated by the CGS and one of which is owned and operated by a third party. The David Street Water Treatment Plant (WTP) and Wanapitei WTP, located within the Sudbury Drinking Water System, are both owned and operated by the CGS whereas the Vermilion WTP, located within the Vermilion Drinking Water System, is owned and operated by Vale, a mining company with an operation within the City's urban boundary. The remaining systems are supplied by groundwater sources. Each of the six water systems is illustrated in **Exhibit 1** on Map 1 and detailed descriptions of each system are included in the following sections.

3.1 DOWLING SUPPLY AND DISTRIBUTION SYSTEM

The Dowling Supply and Distribution System is a communal groundwater system, which supplies water to the community of Dowling. The system includes two wells, the Riverside Well and the Lionel Well, a distribution network and an elevated storage tank.

The construction of the water system was subsidized by the MOECC in the 1970s. The ownership and operation of the water works was transferred to the former Regional Municipality of Sudbury and it is now owned and operated by the City of Greater Sudbury. Map 2a of **Exhibit 1** provides an illustration of the system components and Map 2b illustrates the water operating pressure boundary.

3.1.1 DOWLING WELLS

The water supply source for the Dowling wells is an unconfined aquifer of sand and gravel deposits located within the Onaping River watershed. Due to the unconfined nature of the soils and the proximity to the river, the water source is classified as potentially groundwater under direct influence of surface water (GUDI) (Golder Associates Ltd., 2005). The Dowling Wells are reported to have effective in-situ filtration.

The Riverside Well includes a vertical turbine pump with a capacity of 42.1 L/s at 71.6 m total dynamic head (TDH), a UV disinfection system for primary disinfection, a gas chlorination disinfection system for secondary disinfection, and a fluoride injection system. The Lionel Well includes a similar treatment process, as shown in Figure 3-1. The capacity of the Lionel well pump is 42.1 L/s at 68.6 m TDH. The Lionel Well is also equipped with a vertical turbine well pump and diesel generator for standby power to supply both the Lionel and Riverside Wells. Key process data is summarized in Table 3-1.

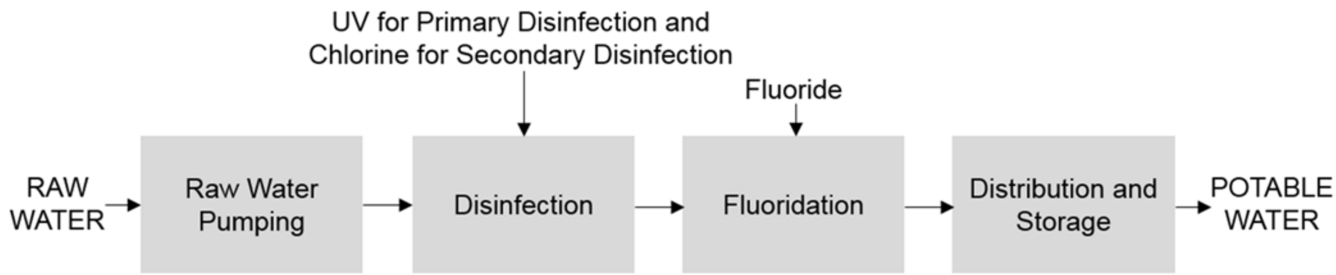


Figure 3-1 Dowling Wells' Process Flow Diagram (Typical for Both Riverside and Lionel Wells)[1]

Table 3-1 Dowling Wells' Process Information

WELL	PUMP TYPE	OPERATING POINT	STANDBY POWER
Riverside	Vertical turbine well pump	42.1 L/s (3,637 m^3/d) at 71.6 m TDH	100 kW diesel generator set (located at Lionel, but services both wells).
Lionel	Vertical turbine well pump	42.1 L/s (3,637 m^3/d) at 68.6 m TDH	

[1] *Data obtained from the Dowling Drinking Water Works Permit, Number 016-203 Issue 1.*

3.1.2 DISTRIBUTION SYSTEM

The Dowling Distribution System consists of a single pressure zone with one elevated tank. From discussions with City operations staff, the Dowling system does not have any known pressure or chlorine residual concerns, and does not have a high frequency of watermain breaks.

3.1.3 SYSTEM CAPACITY

WELLS

Table 3-2 Dowling System Rated Capacity

WATER SUPPLY	RATED CAPACITY (M3/D)
Lionel Well	3,640
Riverside Well	3,640
Dowling System	**3,640**

The rated capacity for each well was obtained from the Dowling DWWP; however, it should be noted that the overall system rated capacity is limited by the PTTW for the Lionel and Riverside wells. In this case, the PTTW prescribes that up to 3,640 m^3/d may be taken from either one or both wells, but the total water taking cannot exceed 3,640 m^3/d.

STORAGE

Floating storage is provided by an elevated water storage tank with a total volume of 1,364 m^3 and a useable volume of 907 m^3. The Dowling DWWP indicates the useable volume to be 1,364 m^3; however, per an assessment of the tank's hydraulic gradeline, it was determined that the effective useable volume for the tank is actually 907 m^3. The elevated tank has diameter of 11.6 m, a base elevation of 285.6 m and minimum and maximum water elevations of 308.4 m and 317 m, respectively.

3.2 FALCONBRIDGE SUPPLY AND DISTRIBUTION SYSTEM

The Falconbridge Drinking Water System is a communal groundwater system that supplies water to the community of Falconbridge, the Nickel Rim Reservoir (not City owned), the Airport Reservoir (not City owned), and Glencore. The Falconbridge Supply and Distribution System consists of three wells (Well No. 5, No. 6, and No. 7), the Hardy Fluoridation Facility and the Falconbridge Storage Tank.

Map 3a of **Exhibit 1** provides an illustration of the system components and Map 3b illustrates the water operating pressure boundaries.

3.2.1 FALCONBRIDGE WELLS

Wells No. 5, 6 and 7 are located north of the Sudbury Airport and were originally developed by Glencore and purchased by the CGS in 2009. Each of the wells is equipped with a well pump with capacity of 16.4 L/s at 130 m TDH. Wellhouse No. 7 contains the treatment facilities for all three wells. This facility includes standby power, chlorine gas for disinfection, and a corrosion inhibitor feed system. Fluoride is added to the treated water at the Hardy Fluoridation Facility before entering the distribution system. The facility has a maximum day capacity of 8.4 L/s (727 m^3/d), and average day capacity of 2.6 L/s (226 m^3/d), but typically operates at 2.0 L/s (173 m^3/d).Figure 3-2 and Table 3-3 summarize key process information.

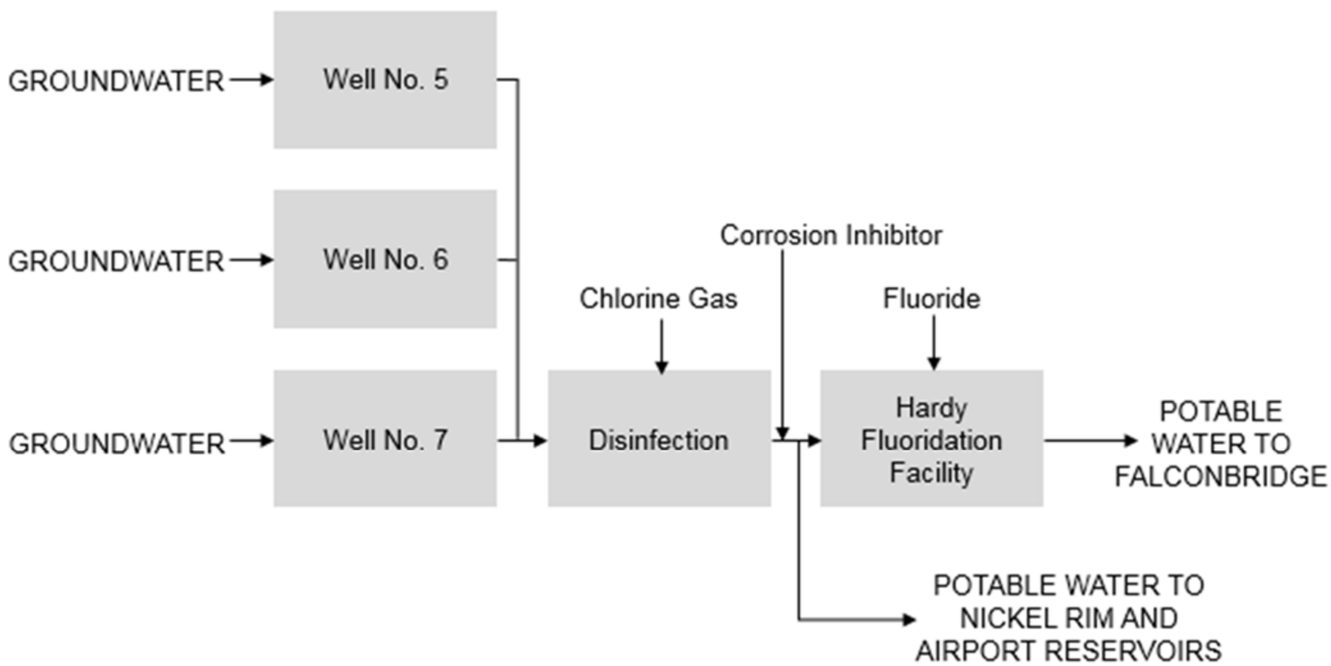


Figure 3-2 Falconbridge Wells' Process Flow Diagram

Table 3-3 Falconbridge Wells' Process Information[1]

WELL	PUMP TYPE	OPERATING POINT	STANDBY POWER
Well 5	Well pump	16.4 L/s at 130 m TDH	200 kW diesel generator
Well 6	Well pump	16.4 L/s at 130 m TDH	
Well 7	Well pump	16.4 L/s at 130 m TDH	

[1] Data obtained from the Falconbridge Drinking Water Works Permit, Number 016-201 Issue 1.

City staff has indicated that Well 6 has higher turbidity on startup and can take up to 20 minutes to go below 1 NTU.

3.2.2 DISTRIBUTION SYSTEM

The Falconbridge distribution system consists of two pressure zones, the southwest part of Falconbridge being boosted by the Mott Booster Pumping Station, which was constructed in 1983 and has two pumps, each rated at 2.5 L/s at 22.0 m TDH. The system also contains one elevated tank. City operations staff have indicated that the Falconbridge system experiences few to no discoloured water or pressure complaints, and the frequency of watermain breaks is low.

The watermain connecting the wells to the town passes through private property (the Glencore Smelter Complex). As a result, City staff requiring access to the watermain must complete Glencore's mandatory training.

In addition, there is limited information, such as as-built or record drawings, of the watermains in Falconbridge.

STORAGE

The Falconbridge elevated storage tank was constructed in 1962 and is in need of repairs, according to City staff. The tank provides floating storage to the community of Falconbridge and has a total volume of 1,136 m^3, with a diameter of 13.1 m, minimum water level of 358 m, and maximum water level of 367 m.

3.2.3 SYSTEM CAPACITY

The PTTW for the Falconbridge system specifies that a maximum of 1,417 m^3/d may be taken from each well, for a total maximum water taking of 4,251 m^3/d from all wells. Each well house is equipped with a single well pump, and all of the wells share a 200 kW diesel generator for standby power. Table 3 4 lists the rated capacity for each well as well as the overall system. Although the rated system capacity is 4,251 m^3/d (per PTTW), the system has a firm capacity of 2,713 m^3/d, which is calculated by considering the largest pump out of service.

The Falconbridge wells have elevated sodium levels, ranging from 22-29 mg/L.

Table 3-4 Falconbridge Water System Capacity

WATER SUPPLY	CAPACITY (CUBIC METRES/DAY)
Falconbridge No. 5	1,417 (rated)
Falconbridge No. 6	1,417 (rated)
Falconbridge No. 7	1,417 (rated)
Falconbridge System – Rated Capacity	**4,251**
Falconbridge System – Firm Capacity	**2,713**

3.3 ONAPING-LEVACK SUPPLY AND DISTRIBUTION SYSTEM

In 2010, the CGS connected the Onaping and Levack Water Systems and formed the Onaping-Levack Supply and Distribution System. This system includes three wells (Onaping Wells No. 3, 4, and 5), the Onaping storage tank, the Craig Mine Tank, and a Pressure Control Building (PCB). Map 4a of **Exhibit 1** provides an illustration of the system components and Map 4b illustrates the water operating pressure boundaries.

3.3.1 ONAPING WELLS

The Onaping wells draw water from a non–GUDI water source. Onaping Wells 3 and 4 are housed in a single pump house while Onaping Well 5 is housed in a separate building that includes the common treatment facility for the entire system. The treatment processes include a chlorine gas system, fluoridation system, polyphosphate addition system and standby power. Sodium hydroxide (caustic soda) is also added to control pH. Figure 3-3 and Table 3-5 summarize the wells' process information.

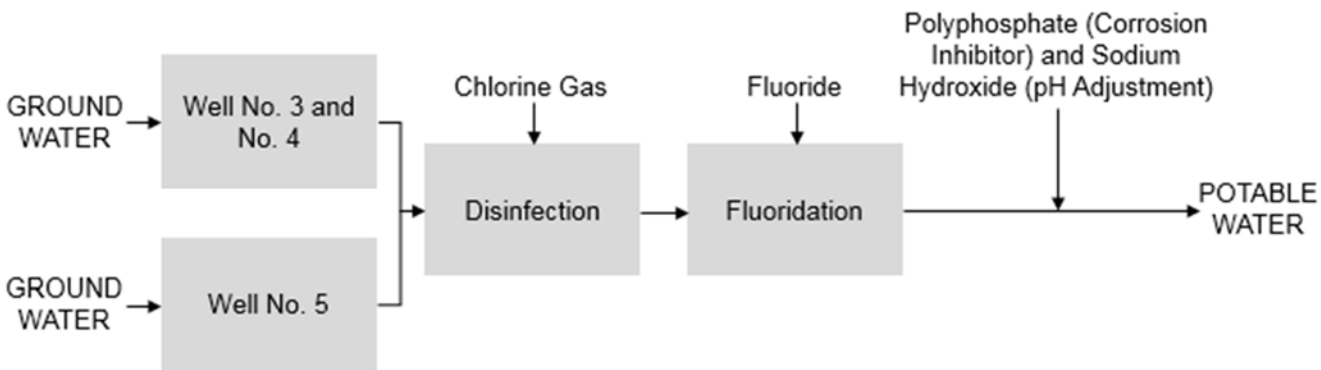


Figure 3-3 Onaping Wells' Process Flow Diagram

Table 3-5 Onaping Wells' Process Information[1]

WELL	PUMP TYPE	OPERATING POINT	STANDBY POWER
Well 3	Vertical turbine pump	30.3 L/s at 83 m TDH	250 kW diesel generator with ATS
Well 4	Vertical turbine pump	30.3 L/s at 83 m TDH	
Well 5	Vertical turbine pump with VFD	60.0 L/s at 83 m TDH	

[1] Data obtained from the Onaping-Levack DWWP.

Sodium levels at the Onaping Wells are higher than average and range from 63.9 to 70.3 mg/L.

3.3.2 DISTRIBUTION SYSTEM

The Onaping/Levack System includes three pressure districts with one elevated storage tank and the PCB. The PCB reduces the pressure in the Levack system and increases the pressure to Glencore's Craig Mine.

The Craig Mine can use booster pumps for approximately one hour to fill their water tank. When the mine's demands are high, this can occur as frequently as every four hours, putting strain on the City's supply and drawing from the Onaping Elevated Tank.

The system also includes the Frasier PRV. This valve maintains higher pressures at the top of Frasier Avenue and Frasier Crescent and reduces pressure at the bottom of Frasier Avenue.

City operations staff has indicated that, during harsh winters, watermain services along 1st Avenue and Levack Drive may freeze. Moreover, some watermains and services in Levack are located in backyards, rather than roads. This limits staff access when needed. Staff has also reported that the watermain from the Onaping Elevated Tank has high pressures.

STORAGE

The capacity of the elevated tank is 2,400 m^3 and has a diameter of 16.5 m. The tank's low and high water elevations are 402 m and 414 m, respectively. City staff has noted that the tank cycles frequently in the winter.

3.3.3 SYSTEM CAPACITY

Table 3-6 documents the capacity at each well in addition to the overall system capacity. The rated capacity was obtained from the PTTW for the wells. In accordance with the PTTW, the total water permitted to be taken from the well field may not exceed 5,237 m^3/d. That is, the PTTW allows pumping from a single well or a combination of wells, provided that the total volume taken is no more than 5,237 m^3/d.

Table 3-6 Onaping-Levack System Rated Capacity

WATER SUPPLY	RATED CAPACITY (M3/D)
Onaping Well No. 3	5,237
Onaping Well No. 4	5,237
Onaping Well No. 5	5,237
Onaping-Levack System	**5,237**

3.4 SUDBURY SUPPLY AND DISTRIBUTION SYSTEM

3.4.1 BACKGROUND

The Sudbury Drinking Water system supplies the communities of Sudbury, Wahnapitae, Garson, and Coniston and the municipality of Markstay-Warren. The supply system consists of two surface water treatment plants (Wanapitei WTP and David Street WTP), and a ground water well field (Garson Wells), as listed in the Drinking Water Works Permit.

Map 5a of **Exhibit 1** illustrates the Sudbury Water System and Map 5b illustrates the system's operating pressure zone. The sections below provide an overview of the various water facilities and former water systems.

GARSON OVERVIEW

Historically, the Garson Wells produced water of high quality and was not chlorinated. Over time, regulatory requirements have changed necessitating chlorination.

In addition, the Garson wells have detectable levels of tetrachloroethylene (PCE) historically ranging from 0 to 3.74 µg/L. The PCE levels will be addressed further in the Sudbury Water Gap Report.

The O'Neil Emergency Supply Valve, a pressure sustaining valve (PSV), isolates the east and west sides of the Garson water distribution network. Typically, the west end is fed from Sudbury surface water, while the east side is fed from the Garson Wells. If pressure drops beyond a specific setpoint on either side of the valve, the PSV opens to feed water into the area of lower pressure.

SUDBURY OVERVIEW

The Sudbury system was originally supplied by only the David Street Water Treatment Plant, constructed in 1895. The plant has since undergone several upgrades, the latest and most significant of which was completed in 2005. In the 1970s, water supply was augmented by the addition of the Wanapitei WTP, which was upgraded in 1988 to increase capacity to 54 ML/d.

In 1998, a Class EA (Proctor & Redfern, 1998) was initiated after the City identified a need for an alternative water supply because the David Street WTP, at that time, did not meet the MOECC minimum requirements for surface water treatment. In addition, the plant had limited yield and was susceptible to contamination of the source water, Ramsey Lake. It was also noted that Ramsey Lake experienced higher than average levels of sodium, which have continued to increase since the 1998 study.

Alternative solutions developed as part of the Class EA included construction of a new WTP using Lake Wanapitei as its source, expansion of the existing Wanapitei WTP, construction of a new WTP on Ramsey Lake combined with expansion of the existing Wanapitei WTP, construction of a new WTP on Ramsey Lake combined with water diversion from the Wanapitei River, purchasing additional water, and finally, using a groundwater supply source. The solution recommended was the construction of a new WTP using Lake Wanapitei.

Following completion of the Class EA, funding the capital expenditure was not feasible at the time and the public exhibited interest in retaining the David Street WTP as a drinking water supply. As such, instead of constructing the new Wanapitei Lake WTP, the City invested in the David Street WTP and reserved land necessary for the Wanapitei Lake WTP, should it need to be constructed in the future. In 2004, the treatment process at David Street WTP was upgraded through addition of membrane ultrafiltration, as well as completing other necessary upgrades. Currently, sodium levels in Ramsey Lake continue to increase and the Lake is still at risk of contamination from, stormwater runoff, road salt, and microcystin.

Moreover, through the 1988 upgrades, the Wanapitei WTP was designed to operate at 54 ML/d and was capable of operating at this flow until changes were made in the mid-1990s. In the mid-1990s, the former Pearl and Ash Street Elevated Tanks were decommissioned and the Ellis Reservoir was put into service. Also, at this time, many sections of the distribution system were operated at higher pressures than previously. The former Kingsway Booster Pumping Station was taken out of service since it was not able to pump the required flows at acceptable higher pressure. Furthermore, the trunk watermain conveying treated water from the Wanapitei WTP into Sudbury was not rated for the new, higher operating pressures. As a result of these modifications to the system, it was no longer possible to operate the Wanapitei WTP at its rated capacity of 54 ML/d, while maintaining the higher system pressure due to limitations in the distribution system. The WTP was able to convey up to approximately 40 to 42 ML/d at the required pressure, without risking a break to the trunk watermain.

Currently, the City is proceeding with the design for twinning the trunk watermain with a second trunk of the same size. This would provide redundancy for the trunk into Sudbury, reducing operational risk, and would allow the Wanapitei WTP to operate at a higher flow rate without stressing the trunk system.

DRINKING WATER SOURCE PROTECTION

Source water protection studies and water budgets have been completed, and most recently updated in September 2014. A water budget is a tool to identify the sources of water input to and output from a watershed or water system. They are used to characterize the pathways of water movement through a watershed and help understand water quantity issues, as well as water quality issues.

DAVID STREET WTP AND RAMSEY LAKE ASSESSMENT

Following the calculation of the water budget, a Tier 1 and 2 water stress assessment was completed. This exercise involved analyzing worst case scenarios, such as high future water demands and drought conditions. Drought conditions (low precipitation levels) did not expose the David Street WTP intake, and was therefore deemed to have negligible impact to stress levels. However, high future water demands caused higher stress levels in the months of February, August and September which was deemed as significant and warranted a Tier 3 evaluation.

Under the Tier Three framework, once the water budget was developed, several scenarios were simulated in the model under existing and future conditions, including 2-year and 10-year drought conditions. The results of the analysis show that Ramsey Lake has a high tolerance for changing conditions which do not result in the water intake in being exposed, thus resulting in low risk levels. An uncertainty and sensitivity analysis was conducted on various parameters, such as climate data, water level data, etc. which confirmed a low level of uncertainty in the results. Therefore, the risk level of quantitative water stresses to Ramsey Lake was designated as 'low'.

In addition to the above assessment of water quantity threats, water quality threats were also reviewed. Quality threat levels were determined based on quantity, toxicity level, how the contaminant behaves in the environment (slow, fast), intrinsic vulnerability, type of vulnerable area, etc. Threats to surface waters are classified based on their impact to Intake Protection Zones (IPZ). An Intake Protection Zone is the region, made up of both water and land, surrounding a surface water intake pipe. The size of an IPZ is determined by the time that it takes for a material spilled in or near the water to flow into the water intake pipe. In Ontario, IPZs are separated into three categories:

1. The area immediately adjacent to the intake.
2. An area upstream where a spill might reach the intake pipe before the plant operator can react.
3. A larger part of the watershed where contaminants might find their way into the intake pipe.

The Ramsey Lake Issue Contributing Area (ICA) is comprised of all three of the IPZ categories. The types of threats applicable to Ramsey Lake include:

— Sodium (salt): Sodium ICAs include road salt from 4,550 properties within the watershed, snow storage on 19 properties, the 210 septic systems as was the handling and storage of road salt on more than 205 properties.
— Microcystin LR: Phosphorus Issue Contributing Areas include: waste disposal, septic systems (210 properties within the watershed), sewage lift stations (eight in total) agricultural sources such as commercial fertilizer, livestock / farm-animal yards from 4,550 properties within the watershed, non-agricultural sources such as discharge of untreated stormwater from a stormwater retention pond.
— Two occurrences of contamination from the operation of a waste disposal site.
— Two occurrences of stormwater runoff contaminating the Ramsey Lake Intake.
— Three occurrences of contamination from the transportation of hazardous substances along transportation corridors (roadways, railways).

Sodium levels have been steadily increasing since 1991 from 32 mg/L to approximately 58 mg/L in 2013. Although 200 mg/L is the Ontario Drinking Water Quality Standard for sodium, values above 20 mg/L must be reported to a local medical officer of health.

Microcystin LR is a toxin sometimes produced by cyanobacteria (also known as blue-green algae) and is listed as a parameter of concern in the Ontario Drinking Water Quality Standards. High levels of phosphorous tend to promote cyanobacteria, some of which produce Microcystin. Therefore, the presence of phosphorous is associated with this issue. Several blooms have occurred in the last 5 years.

Several policies have been developed to address potential threats to Ramsey Lake within the Source Protection Plan for the Greater Sudbury Watersheds published in September 2014. The type of policy tools used to address these threats include education & outreach, land use planning, monitoring, prescribed instruments (such as legal instruments required by the Province of Ontario), risk management plans, transition provisions and specified actions. The implementation of these policies will help mitigate potential threats and reduce water quality issues to Ramsey Lake. However, to determine whether these actions actually reduce water quality threats will require extensive monitoring and reporting. Further details on each policy and monitoring policies are provided in the Source Protection Plan report.

Overall, although the David Street WTP and Ramsey Lake have a low risk of quantity concerns, the risk of having issues related to water quality is high.

WANAPITEI WTP AND WANAPITEI RIVER ASSESSMENT

Through the Tier One assessment, the Wanapitei River Subwatershed was determined to have a low risk of threats to water quantity. As such, the study for this subwatershed was completed at Tier One.

3.4.2 WANAPITEI WATER TREATMENT PLANT

The Wanapitei WTP services the City of Sudbury, the communities of Wahnapitae and Coniston, and the Municipality of Markstay-Warren. The plant is located at 49 Hwy 17 East in Coniston. It is a conventional surface water treatment plant, which draws water from the Wanapitei River. The plant was constructed in the 1970s and has since undergone several upgrades to enhance treatment efficiency, increase production, and to reduce energy costs. According to the *Wanapitei WTP Hydraulic Capacity Report* (AECOM, 2009), the plant is limited to a maximum flow of 44,000 m^3/d due to hydraulic limitations (the system's hydraulic grade line); however, City operations staff has indicated that, in practice, the plant operates at 40,000 to 42,000 m^3/d. For purposes of this study, a conservative plant capacity of 40,000 m^3/d was used (estimated actual capacity). A process flow block diagram is shown in Figure 3-4.

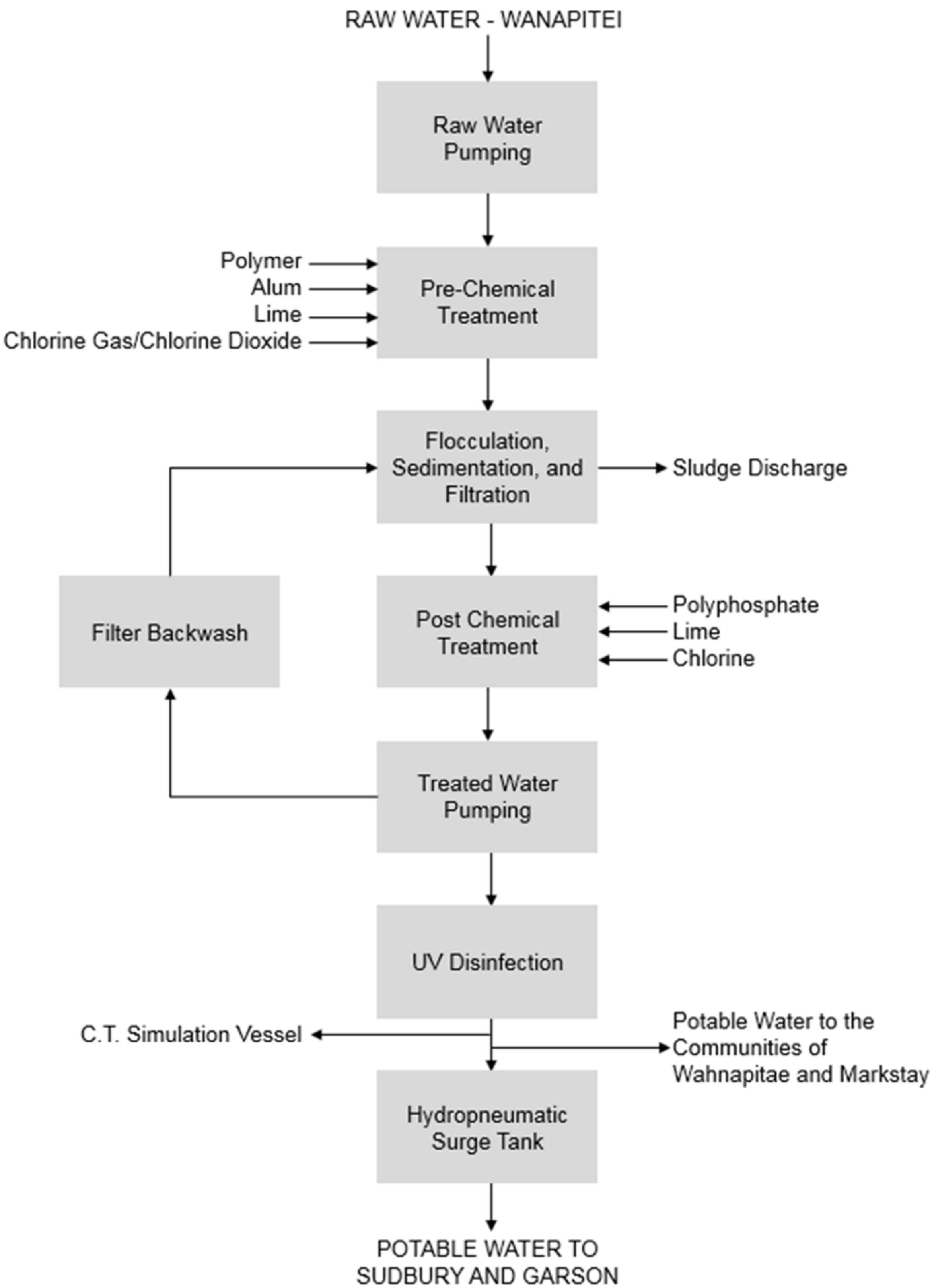


Figure 3-4 Wanapitei WTP Process Block Flow Diagram

Raw water is drawn by five raw water pumps. It is then pretreated with chlorine gas or chlorine dioxide for taste and odor control. When high levels of organics are present in the raw water, chlorine dioxide is dosed to reduce the formation of trihalomethanes (THMs) and other disinfection by products (DBPs). The raw water is mixed with alum in the flash mixing chamber. After the sedimentation process in two settling tanks, the water flows through four dual media (silica sand/anthracite coal) gravity filters. The filtered water is then treated with hydrated lime (for pH /alkalinity adjustment), fluoride, chlorine, and polyphosphate to reduce corrosion in the distribution system. The treated water is then disinfected using an ultraviolet (UV) system. To ensure the correct contact time (CT), a CT simulation vessel is used to simulate the conditions before the first service connection on the distribution main. The simulation vessel is fed from treated water.

The Wanapitei WTP includes five high lift pumps that discharge treated water to a single 750 mm diameter watermain to the Sudbury Distribution System and a 250 mm diameter watermain to the communities of Wanapitei and Markstay-Warren.

The plant is equipped with a hydropneumatic tank fed off the 750 mm discharge to protect the Sudbury Distribution System from hydraulic transients.

As noted above, for the purpose of this Master Plan, the plant will be assessed as operating at 40,000 m^3/d (estimated actual capacity), below its rated capacity of 54,000 m^3/d, due to hydraulic limitations.

3.4.3 DAVID STREET WATER TREATMENT PLANT

The David Street WTP services the south, west and downtown areas of the community of Sudbury. The plant also has the potential to service Garson through the Ellis Reservoir under specific pressure conditions in the system and given that the Wanapitei WTP is not in service. That is, the David Street WTP does not typically service Garson, unless there is a low pressure in the Garson network in which case a pressure sustaining valve opens up. The plant is located at 355 David Street, Sudbury. The David St. WTP is a surface water plant drawing water from Ramsey Lake. According to the plant PTTW, the maximum permitted water taking is 40,000 m^3/d (462 L/s), on any given day; however, the monthly average rate may not exceed 27,000 m^3/d (312 L/s).

Because the plant was constructed in the early 1900s, it has undergone numerous upgrades. In 2004, major upgrades were made to install a membrane ultrafiltration system and a UV disinfection system. The existing process flow diagram is presented in Figure 3-5 below.

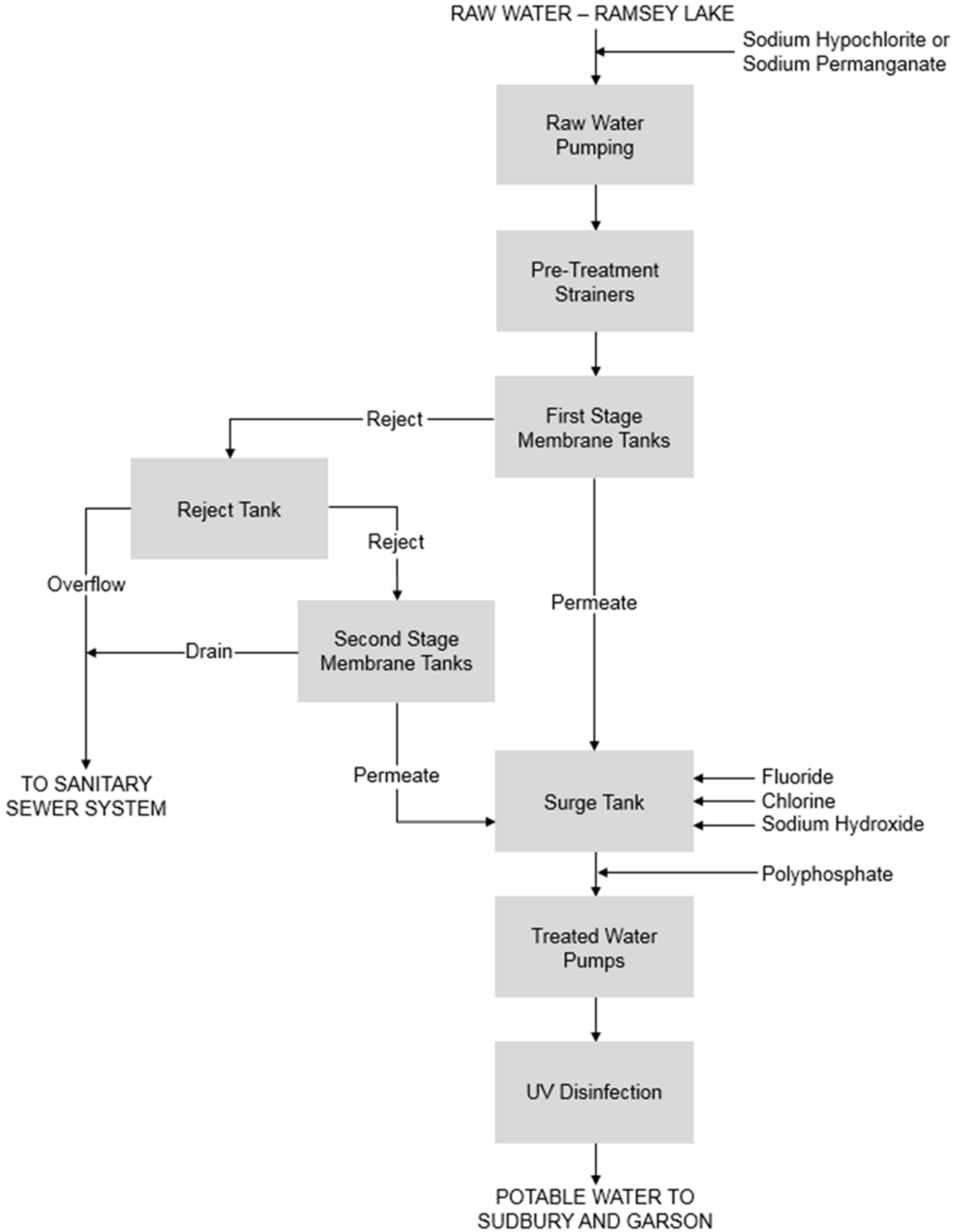


Figure 3-5 David Street WTP Process Flow Diagram

The David Street WTP poses operational and maintenance challenges, as reported by City staff. The plant has problems with moisture and corrosion and consistent issues with valves and analyzers. For the purpose of the Master Plan, under existing conditions, the plant's estimated actual capacity was 37,260 m^3/d.

3.4.4 GARSON WELLS

The Garson groundwater system consists of three wells, Garson Wells No. 1, 2 and 3, normally servicing the eastern area of Garson. The wells also service the west side of the town if the pressure in the west drops below the pressure in the east side through the O'Neil PSV. A recent study completed by the Source Water Protection Committee determined that the wells are classified as non-GUDI.

Garson Well 2 is located on the east side of Falconbridge Highway at Spruce Street. This well house is not equipped with standby power supply. A vertical turbine well pump equipped with a variable frequency drive (VFD) draws water which is then chlorinated and fluoridated.

Garson Wells 1 and 3 are located on the south side of Falconbridge Road at Orell Street. The property has two well houses, one chemical building, and one buried chlorine contact tank. Well Houses 1 and 2 contain the vertical turbine well pumps, pumping to a common 200 mm header to the chemical building. The raw water is then treated with sodium hypochlorite and fluoride prior to entering the contact tank. The buried process piping allows for isolation of the contact tank. These wells have elevated levels of tetrachloroethylene, but the levels do not exceed the regulated Maximum Acceptable Concentration (MAC). An analysis of the tetrachloroethylene in the system was undertaken as part of the Sudbury Water System Gap Report (WSP, 2016).

When the duty well switches over from Well 2 to Well 1 or 3 (or the reverse), flow in part of the distribution system reverses. The flow reversal results in movement of water that, in some areas, was previously stagnant, and chlorine residuals are less than the rest of the system, but continue to meet regulatory requirements.

Table 3-7 summarizes additional process information for the Garson Wells, and a process flow chart is shown in Figure 3-6. For the purpose of undertaking the analysis for the Master Plan, it was assumed that the existing production capacity for the well system is 4,553 m^3/d, based on the wells' rated capacity, with the largest well (Well 3) out of service.

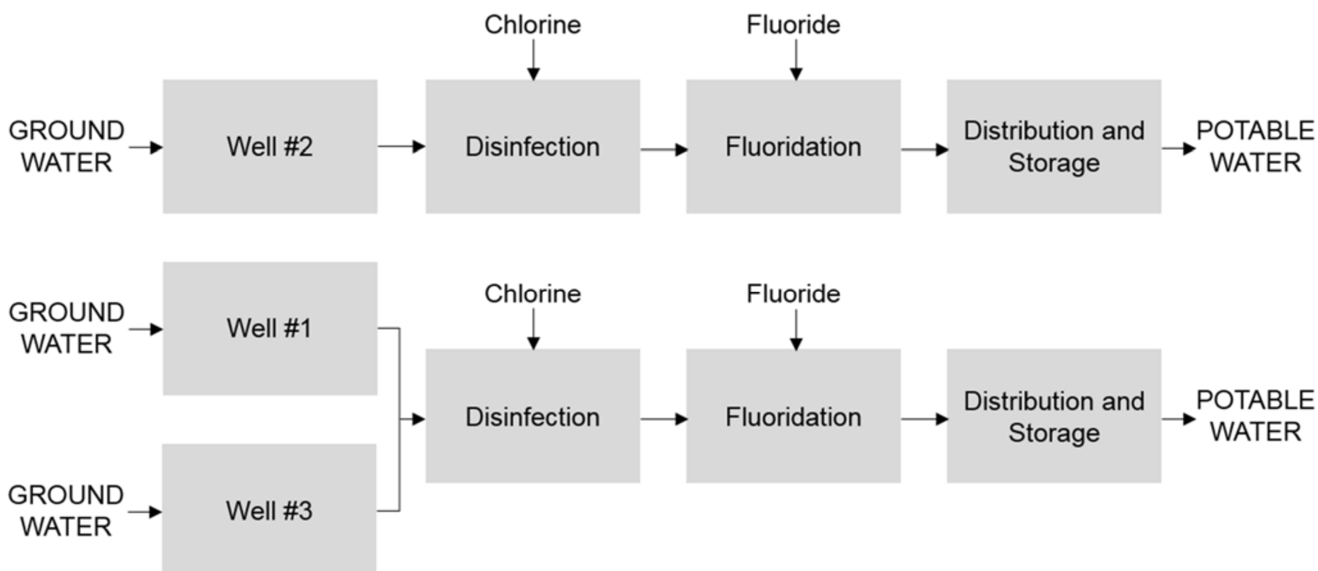


Figure 3-6 Garson Wells' Process Flow Diagram

Table 3-7 Garson Wells' Process Information[1]

SOURCE	PUMP TYPE	OPERATING POINT	STANDBY POWER
Well 2	Vertical turbine pump equipped with variable frequency drive (VFD)	34.5 L/s at 93.8 m TDH	None
Well 1	Vertical turbine pump	22.7 L/s at 63.7 m TDH	125 kW diesel generator with automatic transfer switch (ATS)
Well 3	Vertical turbine pump	34 L/s at 64.0 m TDH	

[1] *Data obtained from the Sudbury Drinking Water Works Permit, Number 016-206 Issue 2.*

3.4.5 DISTRIBUTION SYSTEM

The Sudbury distribution system includes 15 pressure zones fed by booster stations and PRVs. The Garson community is divided into two pressure zones: Zones 2A and 2B. The community west of Penman Avenue, Zone 2A, is supplied by the David Street WTP through the Maley Booster Station while the east side, Zone 2B, is supplied by the Garson Wells.

The two Zones are connected at the corner of O'Neil Street and MR 86 through the O'Neil PSV. If the pressure in Zone 2B drops below approximately 290 kPa (42 psi), the valve opens to pressurize the system from Zone 2A, and vice versa. It is not feasible to flush the watermain on either side of the valve.

The Maley Booster Station maintains a pressure of approximately 690 kPa (100 psi) in Zone 2A. It is equipped with three pumps: two at 45 L/s at 49 m TDH, and one at 120 L/s at 56 m TDH.

City operations staff has indicated that there are small diameter (35 and 50 mm) galvanized watermains in the West End and Downtown areas of Sudbury. Also, there is a high frequency of watermain breaks in some parts of town, particularly the area just north of the Snowdon Booster Pumping Station (BPS) and Maley Drive. The HDPE portion of the Maley Drive watermain experiences frequent longitudinal breaks. In addition, some areas have dead end watermains, for example a series of watermains just south of Alexander Street and others just south of Weller Street and Bancroft Drive.

Laurentian University receives water from the City, but owns and operates its own booster pumping station, the Laurentian Booster Pumping Station, to maintain water pressures on the campus.

STORAGE

The Ellis Reservoir is an in-ground dual cell reservoir and rechlorination facility that receives water directly from the Wanapitei and David Street WTPs. The reservoir provides floating storage for Zone 1 (Sudbury). According to the Drinking Water Works Permit, the reservoir has a capacity of 36,400 m^3. Its top water level is 324.6 m and its low water level is 318 m. However, City staff have observed that when the reservoir is filled to its top water level, the frequency of watermain breaks in the surrounding area increases. As a result, the Ellis Reservoir is not filled to capacity, thereby reducing its useful volume. The reservoir is typically filled to a water level of 321.1 m to 322.6 m, for a maximum useful volume of approximately 26,700 m^3.

3.4.6 SYSTEM CAPACITY

Table 3-8 documents the estimated actual and rated capacities for the Sudbury water system.

Table 3-8 Sudbury System Capacity

WATER SUPPLY	RATED CAPACITY (M3/D)	ETIMATED ACTUAL CAPACITY (M3/D)
Wanapitei WTP	54,000	40,000[1]

WATER SUPPLY	RATED CAPACITY (M3/D)	ETIMATED ACTUAL CAPACITY (M3/D)
David Street WTP	40,000	37,260[2]
Garson Orell Well No. 1	1,572	1,572
Garson Well No. 2	2,981	2,981
Garson Orell Well No. 3	3,274	0[3]
Sudbury System	**101,827**	**81,813**

[1] As mentioned in Section 3.4.2, although the rated capacity for the Wanapitei WTP is 54,000 m^3/day, the reported operating capacity of the plant is 40,000-42,000 m^3/day. 40,000 m^3/d was used to be conservative.

[2] As mentioned in Section 3.4.3, although the rated plant capacity is 40,000 m^3/d, the PTTW for this facility limits the monthly average production to 27,760 m^3/day. Assuming a max day peaking factor of 1.38, this would result in an estimated actual capacity of 37,260 m^3/d.

[3] 0 m^3/day was taken as the estimated actual capacity for Well No. 3 due to the firm capacity calculation assuming the largest pump out of service.

3.5 VALLEY SUPPLY AND DISTRIBUTION SYSTEM

3.5.1 BACKGROUND

The Valley Drinking Water System is a groundwater system servicing the communities of Azilda, Blezard Valley, Capreol, Chelmsford, Hanmer, McCrea Heights and Val Caron. The water works were originally constructed by the MOECC in the 1970s as two separate systems: the Valley System and the Capreol System. In 2010, the two systems were interconnected to form the Valley Water Supply System. There are 13 groundwater wells, three booster pumping stations and three water storage tanks. Detailed information about each component is provided in the following sections. Map 6a of Exhibit 1 illustrates the Valley Water System and Map 6b illustrates the system's operating pressure zone.

VALLEY EAST AND CAPREOL WELLS OVERVIEW

The Valley system consisted of nine wells (Deschene, Kenneth, Philippe, Frost, Notre Dame, Linden, Pharand, and Michelle), and formerly included Well #6 located in Capreol. Well #6 was a high producing well with good water quality; however over time, the raw water quality in Well #6 deteriorated and the well was decommissioned in October 2007. From 2007 to 2012, the system operated only with the above eight wells. The loss of Well #6 put additional stress on the remaining wells to produce sufficient water to meet demands. In 2010, Deschene was locked out due to low water level in summer 2010 (Golder Associates, 2012). Furthermore, in 2011, rainfall was low and resulted in a lower groundwater table. From discussion with City staff, the Valley wells struggled to keep up with demand in 2011. In 2012, two new wells, Chenier and R, were commissioned to augment the existing capacity. This reduced some of the stress on the system.

In 2012, the Capreol system was integrated with the Valley system. A valve interconnects the two systems and allows water to flow from Valley into Capreol, or Capreol into Valley, in case of emergencies (Golder Associates, 2012).

The Valley system has three storage tanks located in Chelmsford, Azilda, and Val Caron, as detailed in Section 3.5.5. A single trunk watermain supplies Azilda and Chelmsford from the wells in Hamner, filling the tanks. All three tanks operate at a common high water level, and the entire Valley water system, except Capreol, is a single pressure zone except for small areas that are boosted, including those serviced by the Val Caron and Centennial Booster Stations. Capreol is a direct pumped subsystem with no storage.

In general, not all wells in the Valley system operate simultaneously. A combination of wells operates depending on demand and the water level in the storage tanks.

Over time, the quantity produced by each of the wells has dropped, despite rehabilitation efforts every three to five years. Currently, Kenneth Well produces little water and has iron and manganese concerns. In addition, Wells I, J and M have elevated levels of iron and manganese. City operations staff has indicated that, due to elevated iron and manganese levels, iron and manganese precipitate and clog the well screen. This causes a net reduction in the well output. Additionally, I Well has known drawdown problems, while Michelle, Kenneth, and Pharand have persistent water quality issues (Golder Associates, 2012). Additional information on the rated and operating flow rates for each of the wells is provided in Sections 3.5.3 and 3.5.4.

Since there is iron and manganese in the well water, when water is moving more slowly through the distribution system iron and manganese tends to settle in the distribution network. This may result in coloured water at the customer's tap. Also, in all water distribution system, stagnant water loses chlorine residual. To prevent issues, the City flushes and bleeds water from the mains to keep the water moving, clearing the sediment from the watermains and maintaining water quality. In addition, the system includes dead-end watermains which are fed from a single source, meaning that a break could cause a loss of supply. To improve system reliability and security, the City undertook a Watermain Looping and Storage Class EA, completed in 2012. The Study identified and evaluated alternative solutions for watermain looping and storage. Watermain looping would reduce the need for flushing/bleeding, and would improve system reliability. The study identified loops that should be prioritized and proposed construction of a new storage tank in Hanmer to supply Capreol and Hanmer.

DRINKING WATER SOURCE PROTECTION

The Valley Water System was subject to Drinking Water Source Protection studies, including a series of water budget reviews.

For the Conceptual Water Budget, Tier 1 and Tier 2 Water Budgets, the Valley and Capreol Wells were considered independently because the systems had not yet been integrated. In addition, Chenier and R Wells were not yet commissioned. The Tier 3 Water Budget considered the current Valley system, which included the two new wells and Capreol.

Through Tier 1 and 2, it was determined that the Capreol system had low water quantity risk, while the Valley system exhibited moderate to high risk. The Tier 3 assessment included Capreol, as mentioned above, since it was now included with the Valley system.

The Valley wells are susceptible to various water quality threats, such as being located near storage and handling of fuel, sewage, and livestock. Wells with the most occurrences are Deschene (23 occurrences) and Kenneth (12 occurrences). The remaining wells have fewer than eight occurrences. In addition, a number of wells are noted to have elevated sodium levels, but there was insufficient data to determine whether there is a significant increasing trend.

3.5.2 WELL SUPPLY

A total of 13 wells are located in the Valley Drinking Water System, 11 of which are in Valley (PTTW #7366-8CLQUW), and two in Capreol (PTTW #03-P-5010). The Valley wells are housed individually, but draw water from the same aquifer. Similarly, the Capreol wells are located in individual well houses, but draw from the same aquifer.

3.5.3 VALLEY WELLS

The Valley Wells aquifer is characterized as a non-GUDI, shallow sand and gravel aquifer. There are 11 wells in Valley. All the wells are located throughout the Hanmer and Val Therese communities. Well I has been turned off since 2013 due to low production flows and elevated iron and manganese levels resulting in very high chlorine use. This effectively reduces the number of operational wells to 10 in Valley, or 12 in the Valley Drinking Water System.

Each well located in Valley is equipped with a vertical turbine well pump, a UV system for primary disinfection, a chlorine gas system for secondary disinfection, and fluoride injection equipment. Some of the wells also have standby diesel generators, as summarized in Table 3-9.

From discussions with City staff, there are planned improvements to the Valley Wells commencing in the near future. However, details of the intended works are not available at the time of this report.

A typical process flow diagram is provided below, and a summary of the process equipment at each facility is provided in Table 3-9.

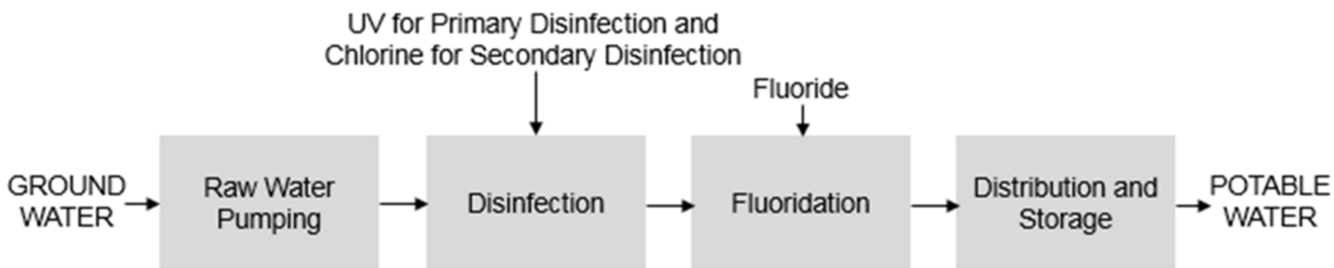


Figure 3-7 Valley Wells' Process Flow Diagram (Typical for all Valley Wells, Except Capreol)

Table 3-9 Valley Wells' Process Information

WELL	PUMP TYPE	RATED CAPACITY (M3/D)[1]	ESTIMATED ACTUAL CAPACITY (M3/D)[2]	STANDBY POWER
Chenier	Vertical turbine well pump with variable speed control	2,333	2,278	150 kW diesel generator
Deschene	Vertical turbine well pump	1,798	1,631	50 kW diesel generator
Kenneth	Vertical turbine well pump	2,288	1,521	50 kW diesel generator
Frost	Vertical turbine well pump	2,288	2,290	70 kW diesel generator
Linden	Vertical turbine well pump	3,269	2,506	None
Well I	Vertical turbine well pump	1,974	0	150 kW diesel generator with ATS
Michelle	Vertical turbine well pump	2,290	2,290	None
Notre Dame	Vertical turbine well pump	3,105	2,103	70 kW diesel generator
Pharand	Vertical turbine well pump	2,290	2,007	None
Philippe	Vertical turbine well pump	2,288	2,198	50 kW diesel generator
Well R	Vertical turbine well pump with variable speed control	3,162	3,014	150 kW diesel generator
Total	**N/A**	**27,085**	**21,839**	**N/A**

[1] Data obtained from the Valley Municipal Drinking Water Licence, Number 016-105 Issue 4.

[2] Estimated based on discussions with City staff. Based on 2015 maximum day capacities.

City operations staff has indicated several concerns with the wells, noted below:

- There are operational issues with the UV system at Deschene and Kenneth Wells when running under standby power
- Pharand Well has higher than average sodium levels.
- Elevated levels of iron at Kenneth Well result is high use of chlorine and higher maintenance requirements for the UV system.
- Iron levels at Linden Well are high and analyzers need frequent maintenance as a result.

3.5.4 CAPREOL WELLS

The Capreol portion of the system includes Wells J and M. The wells draw water from a common unconfined aquifer comprised mostly of sands and gravels, and classified as potentially GUDI water source, per discussions with City staff. City Operations Staff have also reported that the wells have effective in-situ filtration, which can be taken into account for disinfection contact time calculations.

The two wells are located approximately 30 meters apart on the east side of Greens Lake and west of Municipal Road No.84. Each of the wells includes a vertical turbine well pump. The wells discharge into a common header. The water is treated with UV irradiation for primary disinfection, chlorine gas for secondary disinfection, and polyphosphate for iron and manganese sequestration. Fluoride is also added. Previously, a common chlorine analyzer was used for both wells. However, this caused problems with the readings because the pH differs at each well. For this reason, a second analyzer was installed, one for each well. The emergency diesel generator and booster for both wells are located at Well “M”.

Figure 3-8 summarizes key process information.

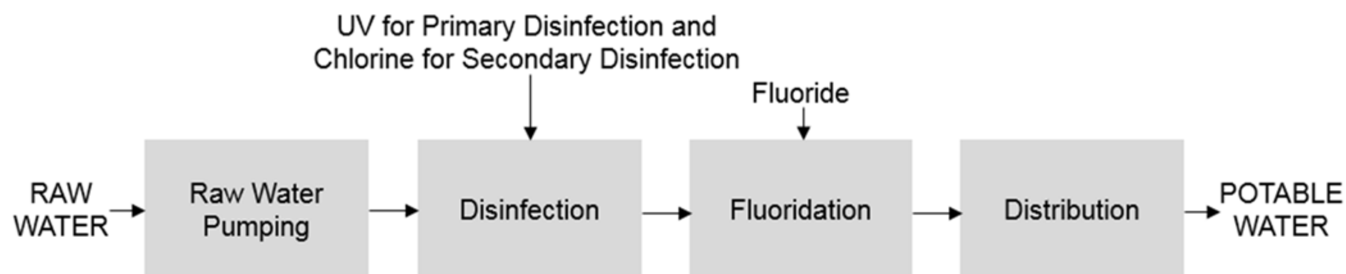


Figure 3-8 Capreol Wells’ Process Flow Diagram (Typical for Both Wells J and M)

Table 3-10 Capreol Wells’ Process Information

WELL	PUMP TYPE	RATED CAPACITY (M^3/D)[1]	ESTIMATED ACTUAL CAPACITY (M^3/D)[2]	STANDBY POWER
Well J	Vertical turbine well pump with VFD	3,273	2,740	400 kW diesel generator with ATS located at Well M and servicing both wells
Well M	Vertical turbine well pump with variable speed drive	3,927	3,875[3]	
Total	**N/A**	**7,200**	**6,615**	**N/A**

[1] Data obtained from the Valley Municipal Drinking Water Licence, Number 016-105 Issue 4.

[2] Estimated based on discussions with City staff. Based on 2015 maximum day capacities.

[3] When calculating the actual capacity of the Valley and Capreol Wells combined (see Section 5), Well M was removed from the total capacity since the firm capacity is calculated by considering the largest pump out of service.

The Capreol Wells do not run at their rated capacity because the Capreol subsystem is isolated from the remaining Valley system. The Capreol subsystem operates as a direct-pumped system pressurized by the wells on an as-needed basis.

Capreol can be connected to the rest of the Valley system in an emergency by opening a manual valve that isolates the two sides.

3.5.5 DISTRIBUTION SYSTEM

The Valley distribution system includes four pressure districts. The supply wells are located in Hanmer, Val Therese, and Capreol, and water is conveyed west to Azilda and Chelmsford through a single watermain.

Each of the pressure zones in Valley is fed by a booster pumping station, except one. There are three booster pumping stations in the Valley distribution system:

1. Centennial BPS – two pumps, one with a capacity of 4.4 L/s at 31 m TDH and the other with a capacity of 75 L/s at 18.3 m TDH.
2. Val Caron BPS – two pumps, one with a capacity of 12 L/s at 32 m TDH and the other with a capacity of 25 L/s at 32 m TDH.
3. Capreol BPS – three pumps, each with a capacity of 34 L/s at 57.3 TDH.

City operations staff has indicated that some of the air release valves, particularly those located on 600 mm watermains and the watermain south of the Val Caron Storage Tank, require maintenance and possible replacement.

In addition, a Class Environmental Assessment was recently completed to review and prioritize opportunities for looping watermains (R. V. Anderson Associates Limited, 2012). The study identified 21 watermain looping alternatives, and recommended implementing eight of them:

- Connect Fernand Avenue and Rose Court
- Connect Pilon Street to Main Street/MR15
- Connect Division Street and Felix Street
- Frappier Road from Main Street to north of the creek
- Yorkshire Drive and Percy Avenue from MR80 to Yorkshire Drive
- Extend Saddle Creek Drive south and Josephine Drive east
- Belisle Drive from Valleyview Road to Lamondin Street
- Gravel Drive and Notre Dame Avenue from Sanitary landfill/Dump Road to Linden Drive

STORAGE

There are three treated water storage tanks in the system, described in the table below, and located in Val Caron, Azilda, and Chelmsford. There is no storage located in Capreol. The Capreol subsystem operates independently as a direct-pumped system fed from the Capreol Wells.

Table 3-11 Summary of Valley Water Storage

TANK	STYLE	DIA. (M)	BASE EL. (M)	LOW WATER LEVEL (M)	HIGH WATER LEVEL (M)	ESTIMATED ACTUAL USABLE VOLUME (ML)	DWWP USEABLE VOLUME (ML)
Val Caron	Ground Level	26	317	317.1	327	5.3 (5,274 m^3)	5.6
Azilda	Standpipe	12.2	285	288.3	327	4.5 (4,524 m^3)	4.5
Chelmsford	Elevated	12.8	283	317	327	1.4 (1,353 m^3)	1.4

The Val Caron tank does not fill to its full 10 m depth capacity, but instead to approximately 8.3 m. Similarly, the Chelmsford tank fills to approximately 8.5 m depth, not the full 10 m depth, as indicated by city staff. For the purpose of assessing water storage capacity; however, the theoretical storage depth per the tanks' designs were utilized to calculate the useful storage which is documented in Table 3-11.

The Azilda storage tank does not currently have sufficient turnover and experiences diminished chlorine residual and water freezing due to stagnation (R. V. Anderson Associates Limited, 2012). The City has planned to install a mixing system in the near future to remedy these problems. In addition, this tank typically fills to about 35-36 m instead of the full 42 m depth, as indicated by city staff.

3.6 VERMILION SUPPLY AND DISTRIBUTION SYSTEM

The Vermilion distribution system services Copper Cliff, Lively, Naughton, Whitefish, and Atikameksheng Anishnawbek (previously known as the Whitefish Lake First Nations Reserve). The system receives water from the Vermilion Water Treatment Plant, which is owned and operated by a third party, Vale Limited (Vale). Vale has several mining operations throughout Greater Sudbury and owns and operates this plant to supply its own operations, as well as supplying the City for municipal purposes. The Vermilion WTP complies with all MOECC drinking water quality standards and requirements, and as such, possesses a DWWP, MDWL, and Operational Plan. The City consumes approximately 20-30% of the Vermilion WTP capacity of 81,800 m^3/d.

The Vermilion distribution system consists of a network of watermains owned by the City, as well as others owned by Vale. The overall network is interconnected.

Limited water data is available for the Vermilion system. Until 2015 there was not a designated flow meter to calculate the demand entering the municipal system and the City used customer billing volumes to estimate the average demand. However, a metering chamber, complete with a pressure reducing valve and electromagnetic flow meter, was commissioned in early 2015. The metering chamber allows the City to measure flows entering the City's portion of the distribution system.

Map 7a of **Exhibit 1** provides an illustration of the system and Map 7b illustrates the operating pressure zones.

3.6.1 VERMILION WATER TREATMENT PLANT

The Vermilion WTP, owned and operated by Vale, has a peak capacity of 81,800 m^3/d. The raw surface water comes from the nearby Vermilion River. The Plant uses a conventional treatment process. City operations staff estimate that the City purchases approximately 20% to 30% of the Vermilion WTP annual production.

3.6.2 DISTRIBUTION SYSTEM

The system includes infrastructure owned by both the City and Vale. The City owns:

- 2,662 m^3 useful volume in the Walden Standpipe
- A number of watermains

Through discussions with City staff, it is understood that much of the City-owned infrastructure was grandfathered into the municipal system and information such as material and age of construction, as well as existing condition is not available. Staff has also noted that the air release valves on the trunk watermains are aged and require maintenance or replacement.

The following infrastructure is owned by Vale:

- 60,543 m^3 Copper Cliff water storage tank
- Cobalt Booster Pumping Station (BPS)
- C.C. North Mine BPS

— Clarabelle North Mine BPS
— A number of watermains

WATERMAINS

Historically, the communities in Vermilion were small mining towns, built by the mining companies for their employees. The infrastructure in these towns was originally constructed as a short-term solution to service employees' temporary homes. In some cases, watermains were built in backyards, and in others, small diameter pipes (less than 100 mm diameter) were used as mains. These are both contrary to current standards. Over time, the mining companies' watermains were 'grandfathered' into the municipal system. However, accurate records for all watermains do not exist. In addition, the backyard watermains are difficult to access for maintenance or emergency operations.

4 WATER SYSTEM MODELS

Hydraulic models for the six water systems have been developed by different consultants on behalf of the City of Greater Sudbury. Different modelling scenarios have been developed for each system. Some of the system models are outdated (some were last updated in 2005). The state of each of the models is discussed in the following sections.

4.1 DOWLING WATER SYSTEM

The Dowling water model is a representation of the water network in the community of Dowling using Bentley WaterGEMS software. The model contains four scenarios representing different demand conditions in 2008: Average Day, Maximum Day, Maximum Hour, and Minimum Hour. The model contains over 21 km of pipeline ranging in diameter from 150 mm to 400 mm. Given the size and topography of the community, it is serviced as a single pressure district. The model runs without any errors.

The key features of the model are summarized in Table 4-1 below.

Table 4-1 Dowling Water System Model Summary

COMMUNITIES SERVICED	SCENARIOS	TANKS / RESERVOIR	PRESSURE ZONES
Dowling	— March 2008 Average Day — March 2008 Maximum Day — March 2008 Maximum Hour — March 2008 Minimum Hour	Dowling Tank	Dowling

4.2 FALCONBRIDGE WATER SYSTEM

The Falconbridge water model was developed using Bentley WaterGEMS. The model contains four 2005 scenarios, namely Average Day, Maximum Day, Maximum Hour, and Minimum Hour. Storage in the model is provided by the Falconbridge Tank. The model contains over 22 km of pipeline ranging in diameter from 100 mm to 450 mm. The roughness factor of many pipes in the model indicates they have significantly reduced cross–sectional areas and increased headloss. The model runs successfully without any error messages. The community is serviced as a single pressure district with a boosted sub–zone.

The key features of the model are summarized in Table 4-2.

Table 4-2 Falconbridge Water System Model Summary

COMMUNITIES SERVICED	SCENARIOS	TANKS / RESERVOIR	PRESSURE ZONES
Falconbridge	— October 2005 Average Day — October 2005 Maximum Day — October 2005 Maximum Hour — October 2005 Minimum Hour	Falconbridge Tank	— Falconbridge Village — Mott Booster

4.3 ONAPING LEVACK WATER SYSTEM

The Onaping water model was built using the EPANet software. The model consists of 8 separate EPANet files, one for each of the scenarios modeled. The scenarios do not indicate the simulation date so it is unclear when they were last updated. However, the files were created in November 2005.

The model consists of over 25 km of pipelines ranging in diameter from 50 mm to 300 mm. The supply into the community comes from two Onaping groundwater wells. The area is serviced as a single pressure district with a sub–zone fed by a pressure relief valve. The model contains three pumps located at the well fields with 3–point pump curves.

The model runs without any errors. The key features of the model are summarized in Table 4-3.

Table 4-3 Onaping-Levack Water System Model Summary

COMMUNITIES SERVICED	SCENARIOS	TANKS / RESERVOIR	PRESSURE ZONES
Onaping	— Existing Average Day — Existing Maximum Day — Existing Maximum Hour — Existing Minimum Hour — Future Average Day — Future Maximum Day — Future Maximum Hour — Future Minimum Hour	Onaping-Levack Elevated Tank	— Zone 1 — Pressure Reduced Zone 1A

4.4 SUDBURY WATER SYSTEM

The Sudbury water model was developed using Bentley's WaterGEMS. The model reflects 2011 demand conditions. The model includes the O'Neil valve connecting the areas serviced by surface water supply (Zone 2A) to those serviced by the Garson Wells (Zone 2B). The valve opens when pressure in Zone 2B drops below 290 kPa (42 psi). In such an event, water from Wanapitei flows into Garson. This event is likely to happen when the Maley Booster station that supplies Zone 2A fails or when demand in Garson increases drastically. The operation of the valve is adequately reflected in the model.

Several modelling scenarios were made available for our review: 2011 Average Day, 2011 Maximum Day, 2011 Maximum Hour, and 2011 Minimum Hour.

The model includes over 512 km of watermains ranging in size from 30 mm to 900 mm, and over 3200 nodes. Sub–zones are supplied by either booster pumping stations or pressure reducing valves. There are 35 active pumps in the model and a number of pressure reducing/pressure sustaining valves. The key features of the model are summarized in Table 4-4.

Table 4-4 Sudbury Water System Model Summary

COMMUNITIES SERVICED	SCENARIOS	TANKS / RESERVOIR	PRESSURE ZONES
Sudbury, Wahnapitae, Garson, Coniston & Markstay–Warren (not part of the Greater Sudbury system; however, Markstay-Warren purchases water from Greater Sudbury)	2011 Average Day 2011 Maximum Day 2011 Maximum Hour 2011 Minimum Hour	Ellis Reservoir	Zone 1 Sudbury Zone 2A Garson (Maley Booster) Zone 2B Garson (wells) Zone 3 (Wahnapitae) Zone 7 Moss St. Booster Zone 8 Montrose Booster Zone 9 Snowden Booster Zone 10 Laurentian University Booster Zone 11 Algonquin Booster Zone 12 Robinson Booster Sunrise Ridge Estates Goodview PRV Copper Park Booster

4.5 VALLEY WATER SYSTEM

The Valley model is a representation of the interconnected water system of Hanmer, Val Therese, Val Caron, McRae Heights, Blezard, Azilda, Chelmsford and Capreol. The model was built using the Bentley's WaterGEMS. It contains four scenarios from 2009 namely Average Day, Maximum Day, Maximum Hour and Minimum Hour.

The model contains over 287 km of watermains ranging in size from 50 mm to 600 mm.

Storage is provided by three storage tanks located in Azilda, Val Caron, and Chelmsford. The model contains 1,282 nodes capturing the extent and topography of the serviced communities. The model runs successfully.

The key features of the model are summarized in Table 4-5.

Table 4-5 Valley Water System Model Summary

COMMUNITIES SERVICED	SCENARIOS	TANKS / RESERVOIR	PRESSURE ZONES
Hanmer Val Therese Val Caron McRae Heights Blezard Azilda Chelmsford Capreol	Average Day 2009 Maximum Day 2009 Maximum Hour 2009 Minimum Hour 2009	Val Caron Tank Azilda Tank Chelmsford Tank	Zone 1 Centennial Booster McCrae Heights Booster Capreol Booster

4.6 WALDEN WATER SYSTEM

The Walden water model is a representation of the interconnected water network of the communities of Lively, Walden, Copper Cliff and Whitefish. The model was built using Bentley WaterGEMS. The model contains four 2009 scenarios, namely Average Day, Maximum Day, Maximum Hour and Minimum Hour.

The model contains over 115 km of watermains and 637 nodes to represent the extent and topography of the network. The watermains range in size from 30 mm to 750 mm. The model contains two storage tanks and the supply into the area is from a single groundwater well. The area is serviced as multiple zones supplied by PRVs and booster pumps.

The model runs successfully with no error messages. The key features of the model are summarized in Table 4-6.

Table 4-6 Walden Water System Model Summary

COMMUNITIES SERVICED	SCENARIOS	TANKS / RESERVOIR	PRESSURE ZONES
Lively Dogpatch Walden Copper Cliff	Average Day 2009 Maximum Day 2009 Maximum Hour 2009 Minimum Hour 2009	Copper Cliff Storage Tank Walden Storage Tank	Inco Lively Walden Industrial Old Soo PRV Black LK Road Mikkola Copper Cliff North Mine Booster Dogpatch Whitefish Lake First Nation

5 SUMMARY

SUPPLY AND STORAGE CAPACITY

	DOWLING	FALCONBRIDGE	ONAPING-LEVACK	SUDBURY	VALLEY	VERMILION
Rated Capacity (m^3/day)	3,640	4,251	5,237	101,827	34,796[1]	81,800[5]
Production Capacity (m^3/day)[2]	3,640	2,713	N/A	81,813	24,579[1]	N/A
Available Storage[3]	907	1,136	2,400	26,700[4]	11,151	2,662

[1] Includes Capreol Wells.

[2] Production Capacity was confirmed with CGS staff, through discussions, for facilities that are not currently capable of operating to their rated design capacities.

[3] The available storage is the useful storage amount, based on the analysis of the tank and system's hydraulic gradelines.

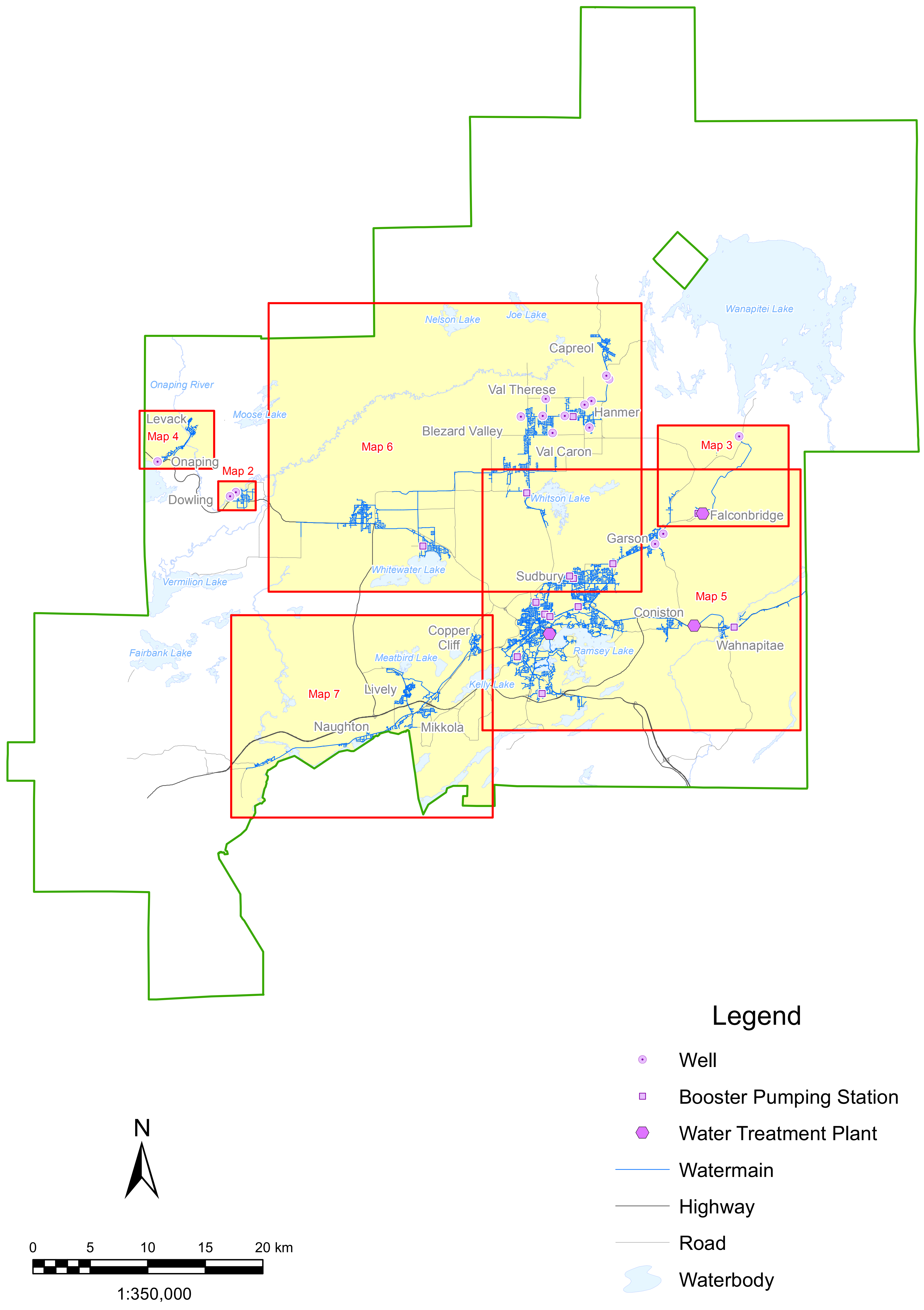
[4] Based on the City's current use of the tank, which is limited due to operational constraints. The design storage volume is 36,400 m^3/day.

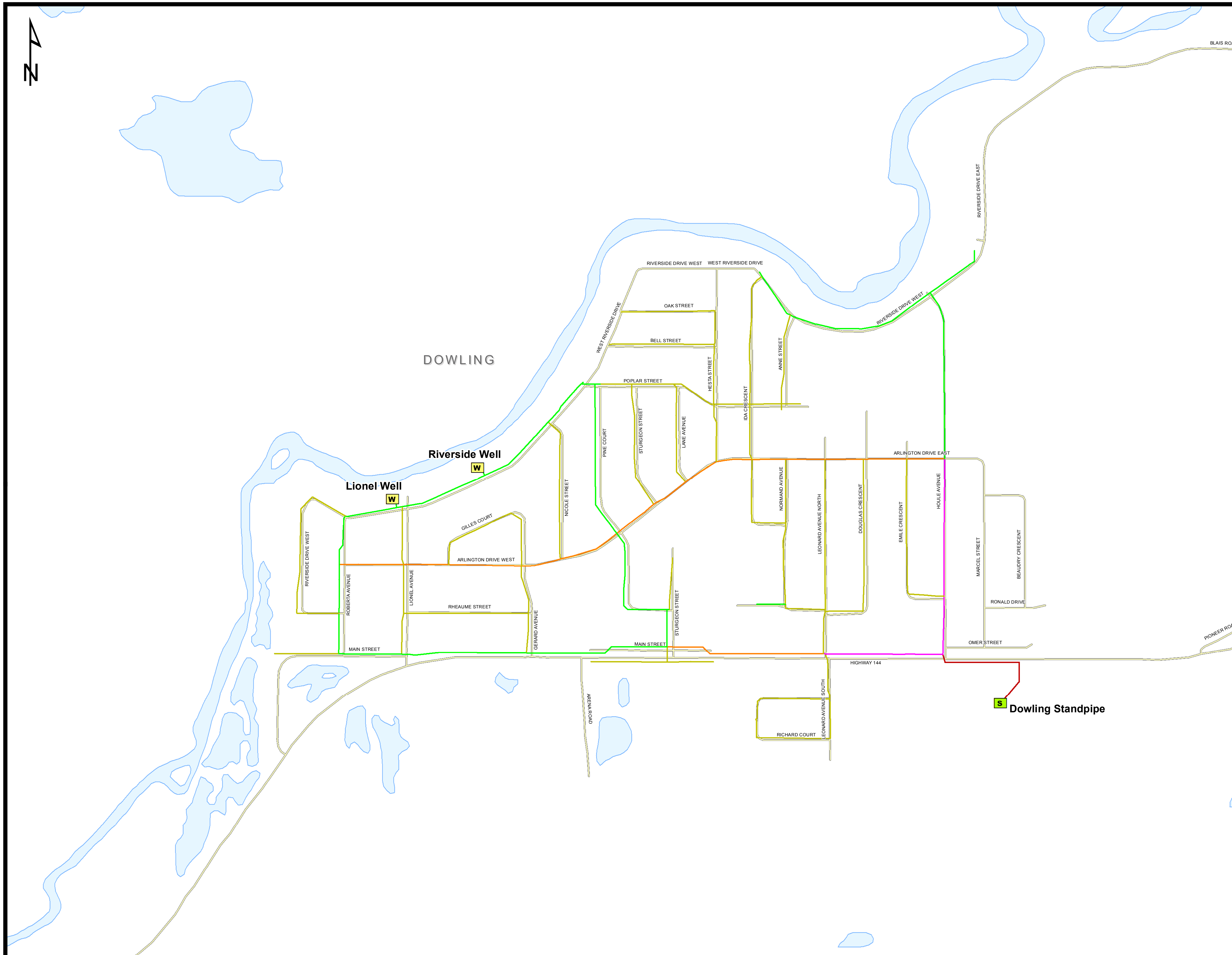
[5] The facility is owned and operated by a third party (Vale), and therefore the water supply is shared with the Vale.

EXHIBIT

1 WATER SYSTEMS AND PRESSURE ZONE MAPS

Map 1
Drinking Water System Key Map





Legend

- W Well
- S Storage Tank
- BPS Booster Pumping Station (BPS)
- WTP Water Treatment Plant (WTP)
- Road
- Waterbody

Pipe: Diamater (mm)

- <= 150
- <= 200
- <= 250
- <= 300
- <= 400
- <= 600
- > 600

Greater Grand Sudbury | WSP

Project No. 121-23026-00

April 04 2016

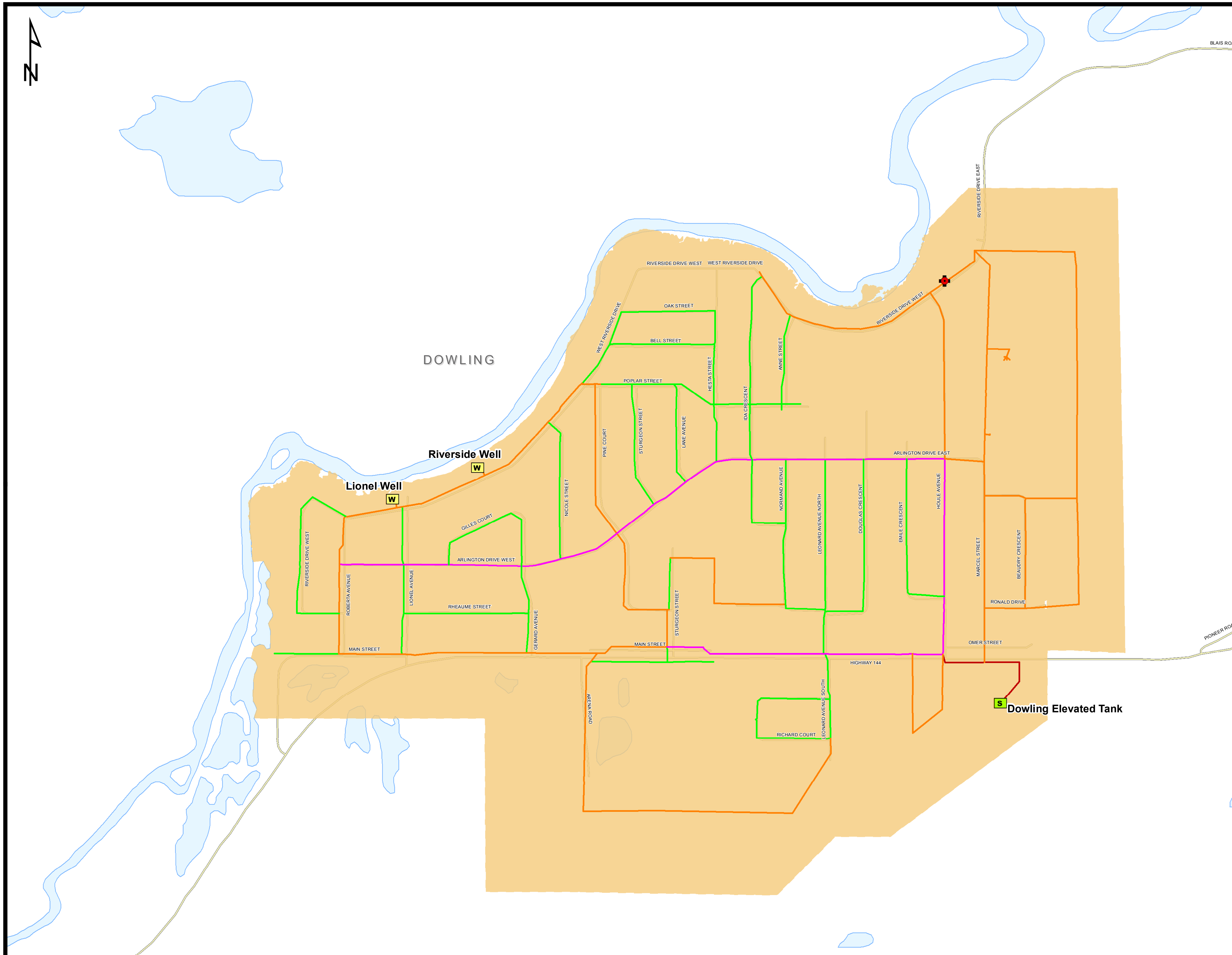
Sudbury Water and Wastewater Master Plan

0 100 200 300 400 500 m

1:10,000

Map 2a

Dowling Water Supply and Distribution System



Legend

- W — Well
- S — Storage Tank
- BPS — Booster Pumping Station (BPS)
- WTP — Water Treatment Plant (WTP)
- Hydrant Test
- Road
- Waterbody

Pipe: Diameter (mm)

- <= 50
- <= 150
- <= 200
- <= 300
- <= 400
- <= 600
- > 600

Pressure Zone (2041 MDD Alternative) (psi)

- dowling (60 - 70)

Greater Grand Sudbury | WSP

Project No. 121-23026-00

November 21 2016

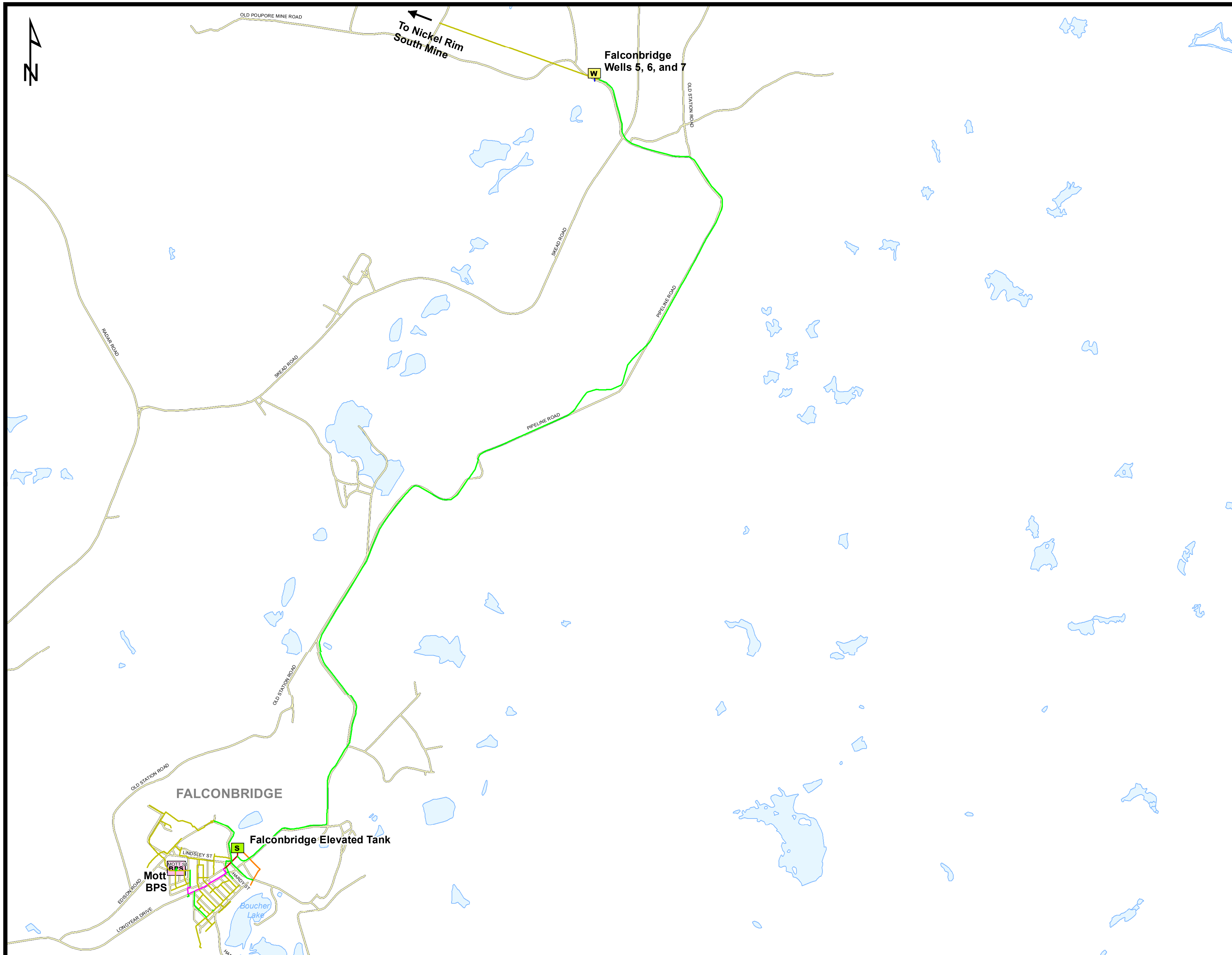
Sudbury Water and Wastewater Master Plan

0 100 200 300 400 500 m

1:10,000

Map 2b

Dowling Water System - Pressure Zone



Legend

- W Well
- S Storage Tank
- BPS Booster Pumping Station (BPS)
- WTP Water Treatment Plant (WTP)
- Road
- Waterbody

Pipe: Diamater (mm)

- <= 150
- <= 200
- <= 250
- <= 300
- <= 400
- <= 600
- > 600

Greater Sudbury | Grand Sudbury

WSP

Project No. 121-23026-00

April 04 2016

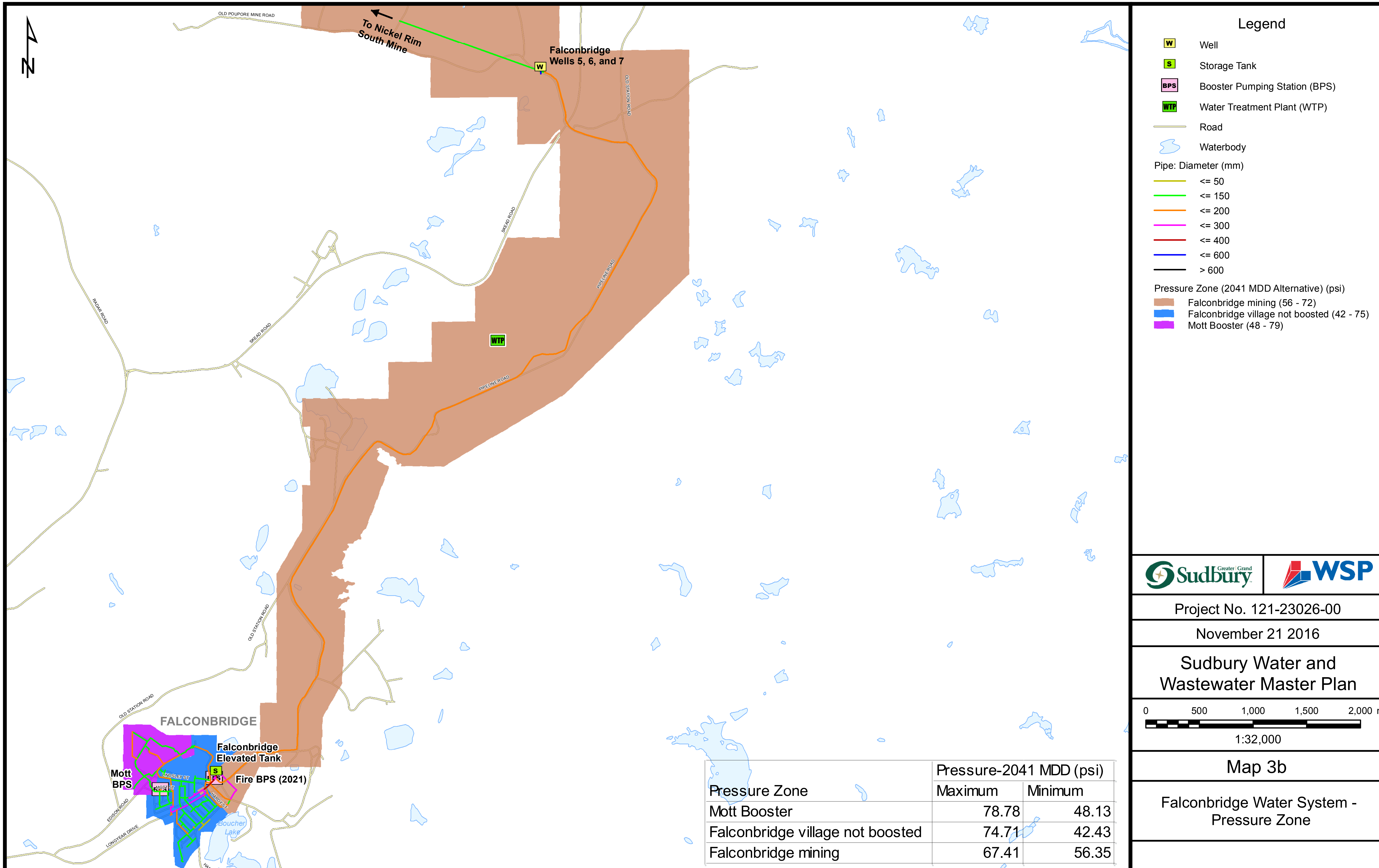
Sudbury Water and Wastewater Master Plan

0 500 1,000 1,500 2,000 m

1:32,000

Map 3a

Falconbridge Water Supply and Distribution System



Pressure Zone	Pressure-2041 MDD (psi)	
	Maximum	Minimum
Mott Booster	78.78	48.13
Falconbridge village not boosted	74.71	42.43
Falconbridge mining	67.41	56.35

Greater Grand Sudbury | WSP

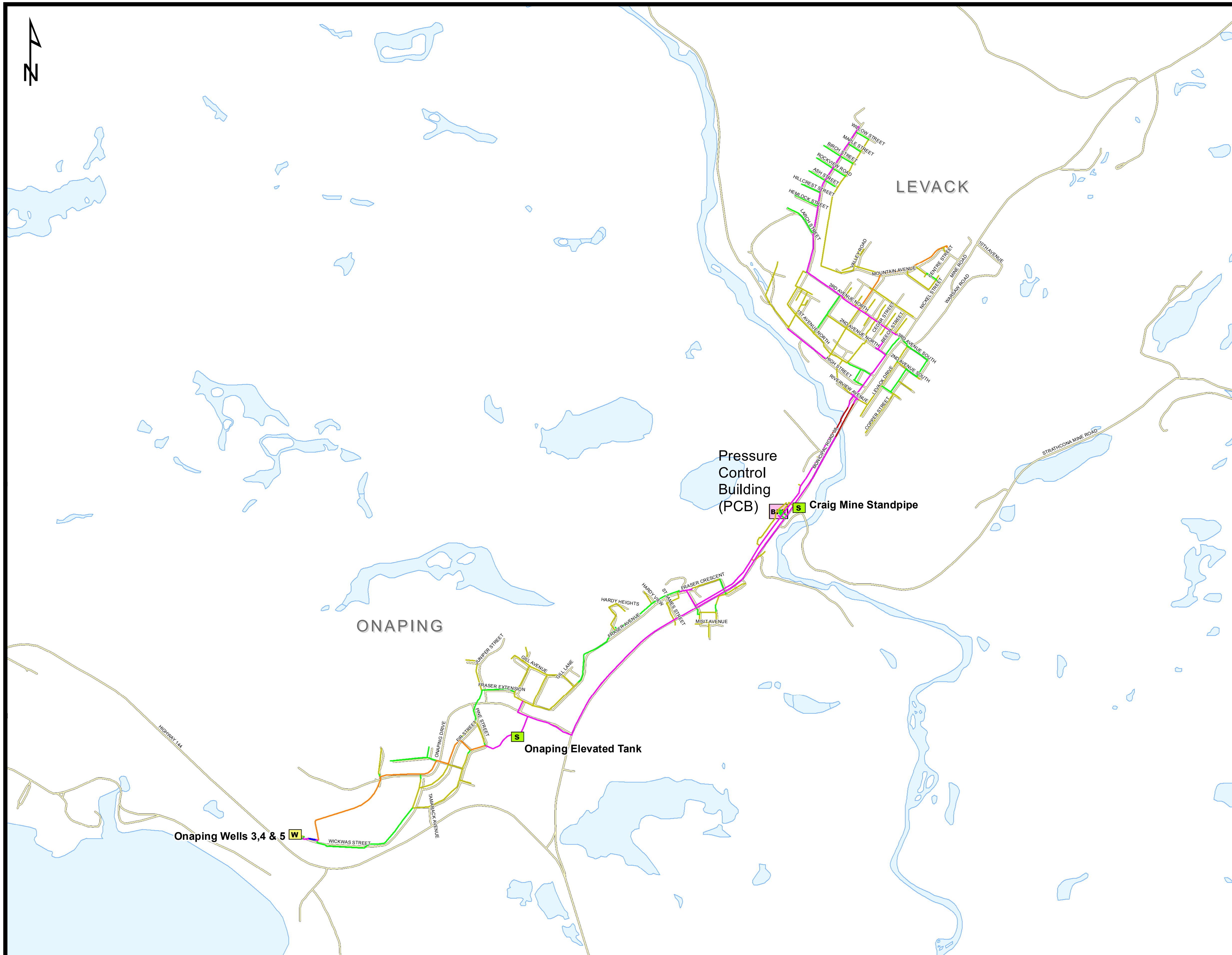
Project No. 121-23026-00

November 21 2016

Sudbury Water and Wastewater Master Plan

Map 3b

Falconbridge Water System - Pressure Zone



Legend

- W Well
- S Storage Tank
- BPS Booster Pumping Station (BPS)
- WTP Water Treatment Plant (WTP)
- Road
- Waterbody

Pipe: Diamater (mm)

- <= 150
- <= 200
- <= 250
- <= 300
- <= 400
- <= 600
- > 600

Greater Grand Sudbury | WSP

Project No. 121-23026-00

April 04 2016

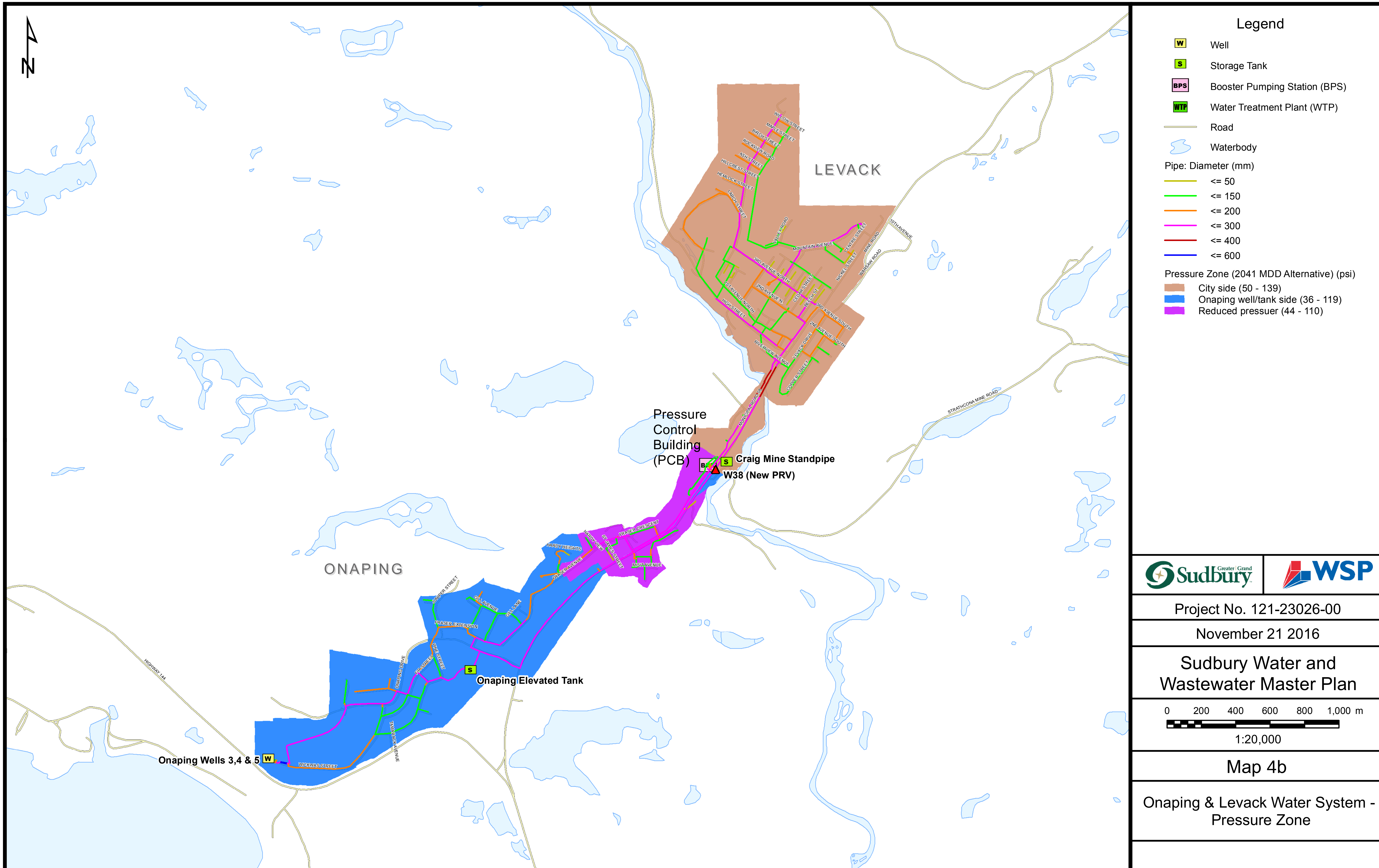
Sudbury Water and Wastewater Master Plan

0 200 400 600 800 1,000 m

1:20,000

Map 4a

Onaping - Levack Water Supply and Distribution System



Greater Sudbury | WSP

Project No. 121-23026-00

November 21 2016

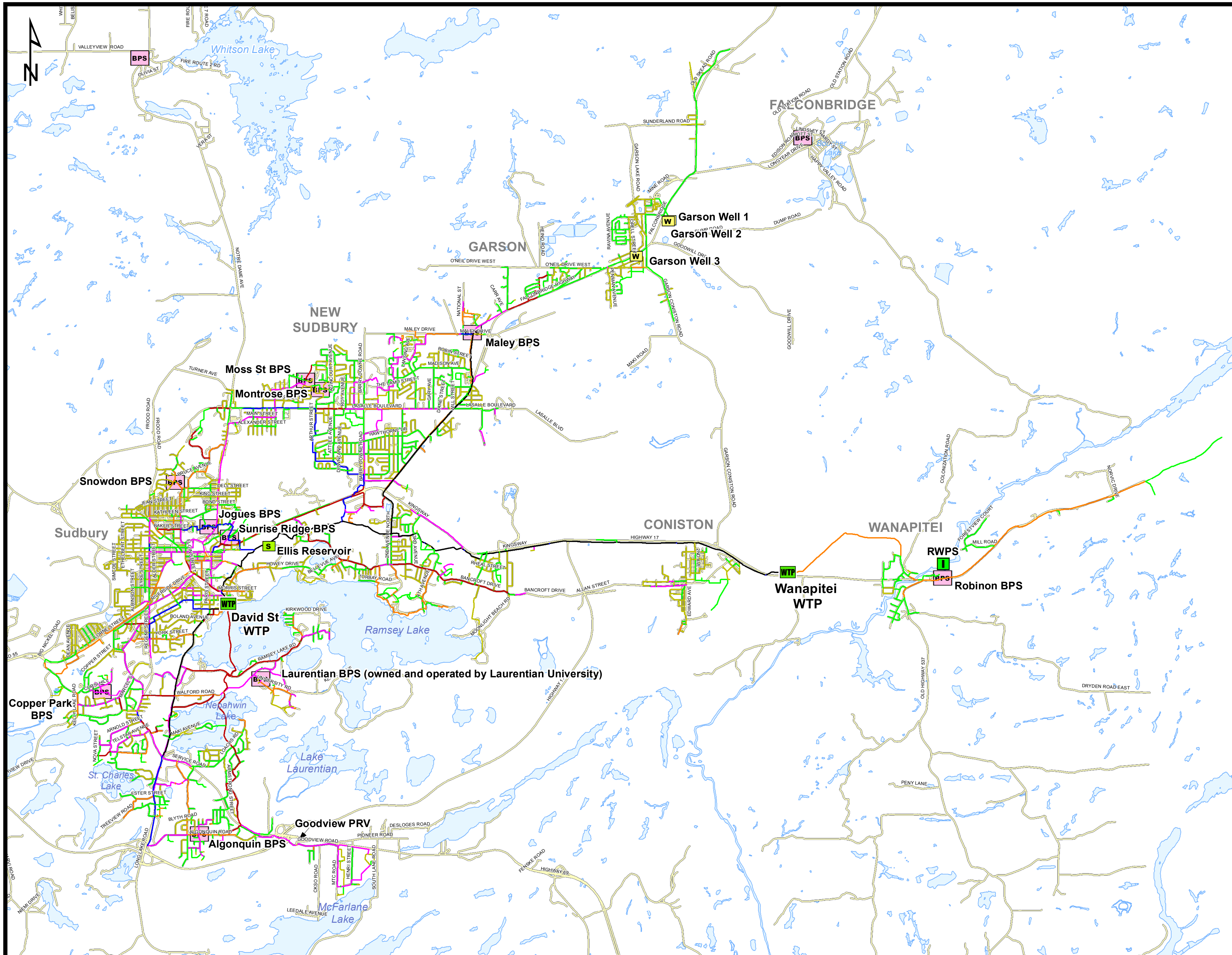
Sudbury Water and Wastewater Master Plan

0 200 400 600 800 1,000 m

1:20,000

Map 4b

Onaping & Levack Water System - Pressure Zone



Legend

- W Well
- S Storage Tank
- Raw Water Pumping Station (RWPS)
- BPS Booster Pumping Station (BPS)
- WTP Water Treatment Plant (WTP)
- Road
- Waterbody

Pipe: Diamater (mm)

- <= 150
- <= 200
- <= 250
- <= 300
- <= 400
- <= 600
- > 600

Greater Grand Sudbury | WSP

Project No. 121-23026-00

April 04 2016

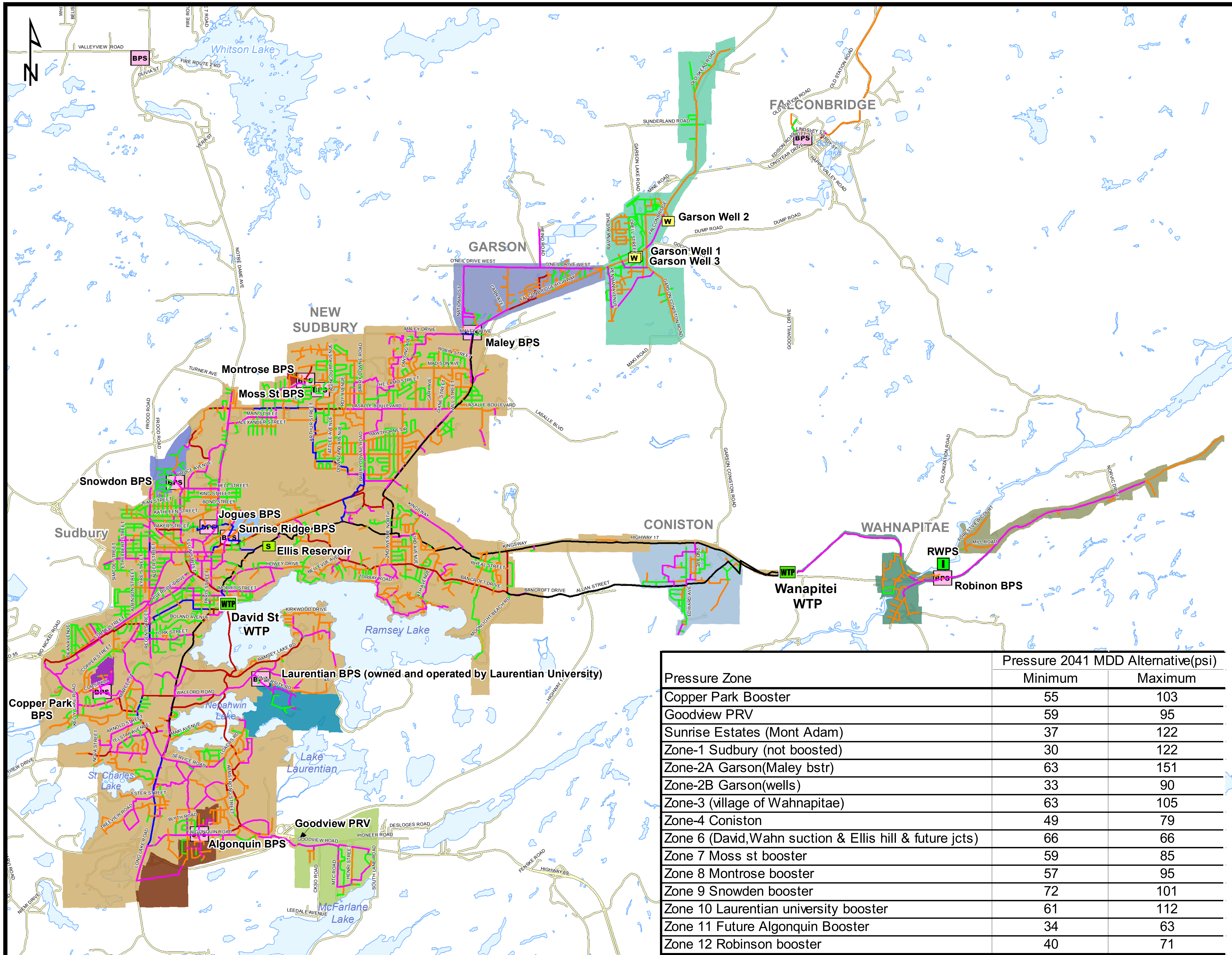
Sudbury Water and Wastewater Master Plan

0 1,000 2,000 3,000 4,000 5,000 m

1:85,000

Map 5a

Sudbury Water Supply and Distribution System



Pressure Zone	Pressure 2041 MDD Alternative(psi)	
	Minimum	Maximum
Copper Park Booster	55	103
Goodview PRV	59	95
Sunrise Estates (Mont Adam)	37	122
Zone-1 Sudbury (not boosted)	30	122
Zone-2A Garson(Maley bstr)	63	151
Zone-2B Garson(wells)	33	90
Zone-3 (village of Wahnapitae)	63	105
Zone-4 Coniston	49	79
Zone 6 (David,Wahn suction & Ellis hill & future jcts)	66	66
Zone 7 Moss st booster	59	85
Zone 8 Montrose booster	57	95
Zone 9 Snowden booster	72	101
Zone 10 Laurentian university booster	61	112
Zone 11 Future Algonquin Booster	34	63
Zone 12 Robinson booster	40	71

Legend

- W Well
- S Storage Tank
- Raw Water Pumping Station (RWPS)
- BPS Booster Pumping Station (BPS)
- WTP Water Treatment Plant (WTP)
- Road
- Waterbody

Pipe: Diameter (mm)

- <= 50
- <= 150
- <= 200
- <= 300
- <= 400
- <= 600
- > 600

Pressure Zone

- Copper Park Booster (55-103.4psi)
- Goodview PRV (59.5-94.8psi)
- Sunrise Estates (Mont Adam)
- Zone-1 Sudbury (not boosted)
- Zone-2A Garson(Maley bstr)
- Zone-2B Garson(wells)
- Zone-3 (village of Wahnapitae)
- Zone-4 Coniston
- Zone 6 (David,Wahn suction & Ellis hill & future jcts)
- Zone 7 Moss st booster
- Zone 8 Montrose booster
- Zone 9 Snowden booster
- Zone 10 Laurentian university booster
- Zone 11 Future Algonquin Booster
- Zone 12 Robinson booster

Project No. 121-23026-00

November 21 2016

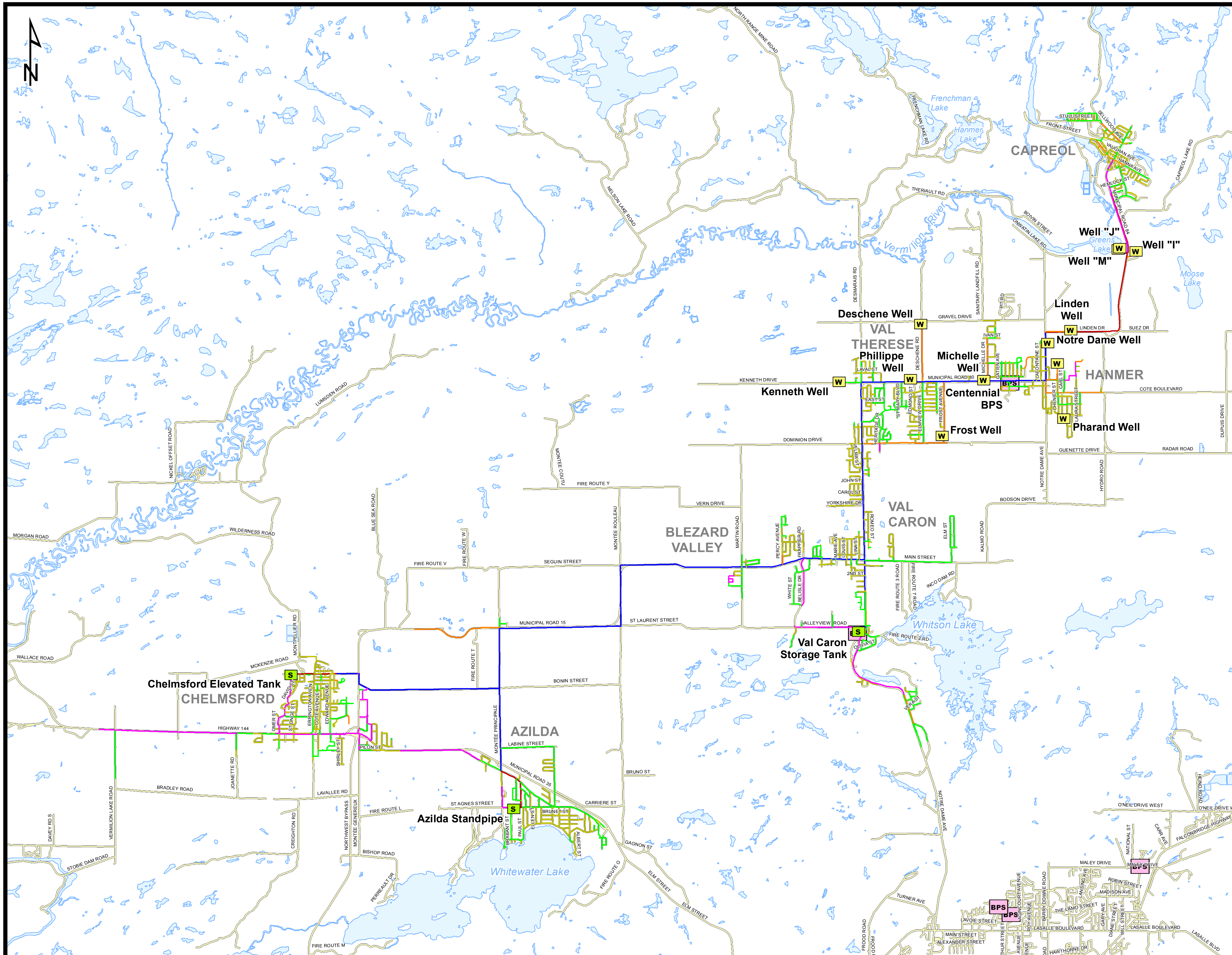
Sudbury Water and Wastewater Master Plan

0 1,000 2,000 3,000 4,000 5,000 m

1:85,000

Map 5b

Sudbury Water System - Pressure Zone



Legend

- W — Well
- S — Storage Tank
- BPS — Booster Pumping Station (BPS)
- WTP — Water Treatment Plant (WTP)
- Road
- Waterbody

Pipe: Diamater (mm)

- <= 150
- <= 200
- <= 250
- <= 300
- <= 400
- <= 600
- > 600

Greater Sudbury | WSP

Project No. 121-23026-00

April 04 2016

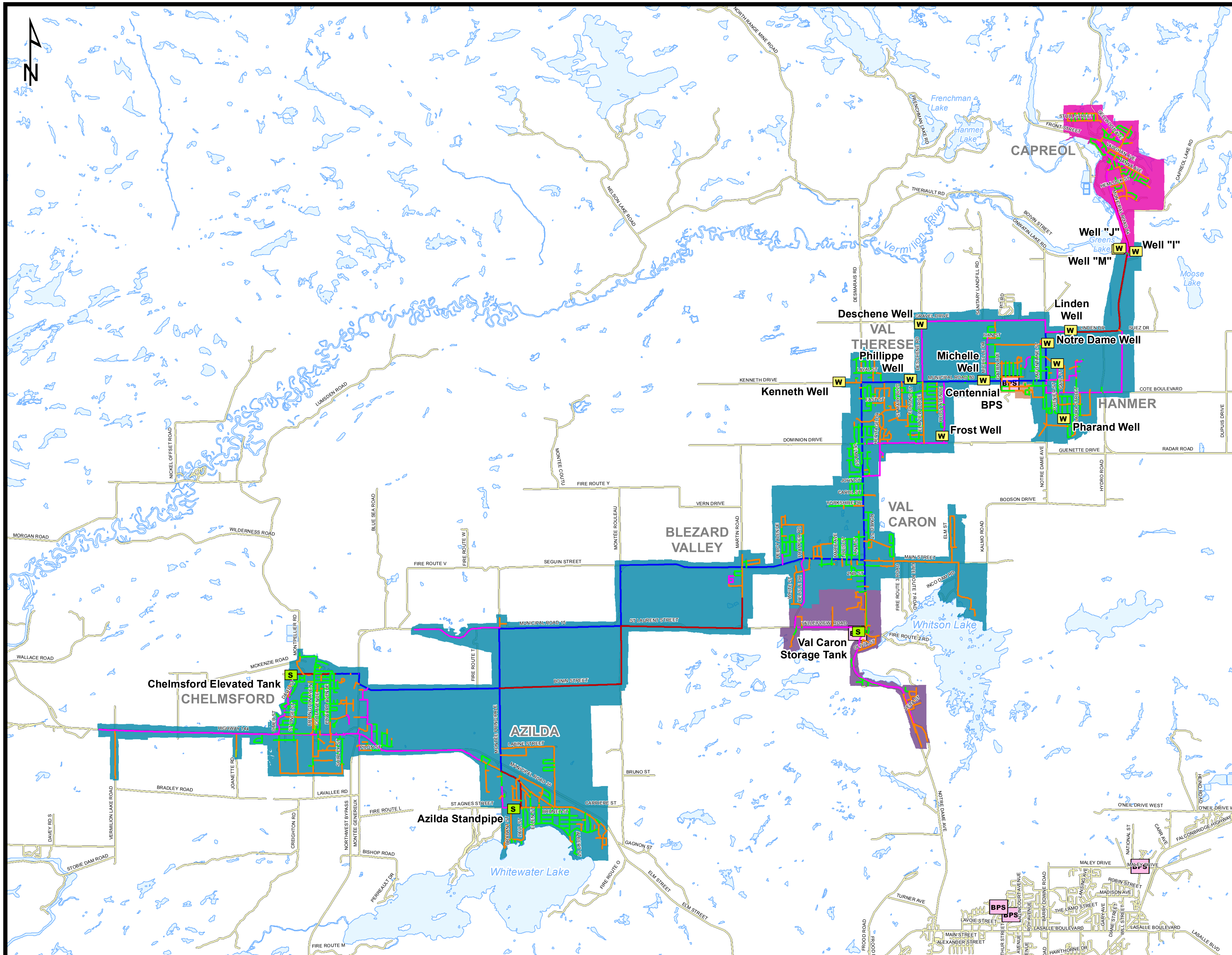
Sudbury Water and Wastewater Master Plan

0 1,000 2,000 3,000 4,000 5,000 m

1:100,000

Map 6a

Valley Water Supply and Distribution System



Legend

- W — Well
- S — Storage Tank
- BPS — Booster Pumping Station (BPS)
- WTP — Water Treatment Plant (WTP)
- Road
- Waterbody

Pipe: Diameter (mm)

- <= 50
- <= 150
- <= 200
- <= 300
- <= 400
- <= 600
- > 600

Pressure Zone (2041 MDD Alternative) (psi)

- Capreol booster (61 - 95)
- Centennial booster (55 - 78)
- McCrae Heights booster (58 - 104)
- Valley Not Boosted (19 - 89)

Greater Grand Sudbury | WSP

Project No. 121-23026-00

November 21 2016

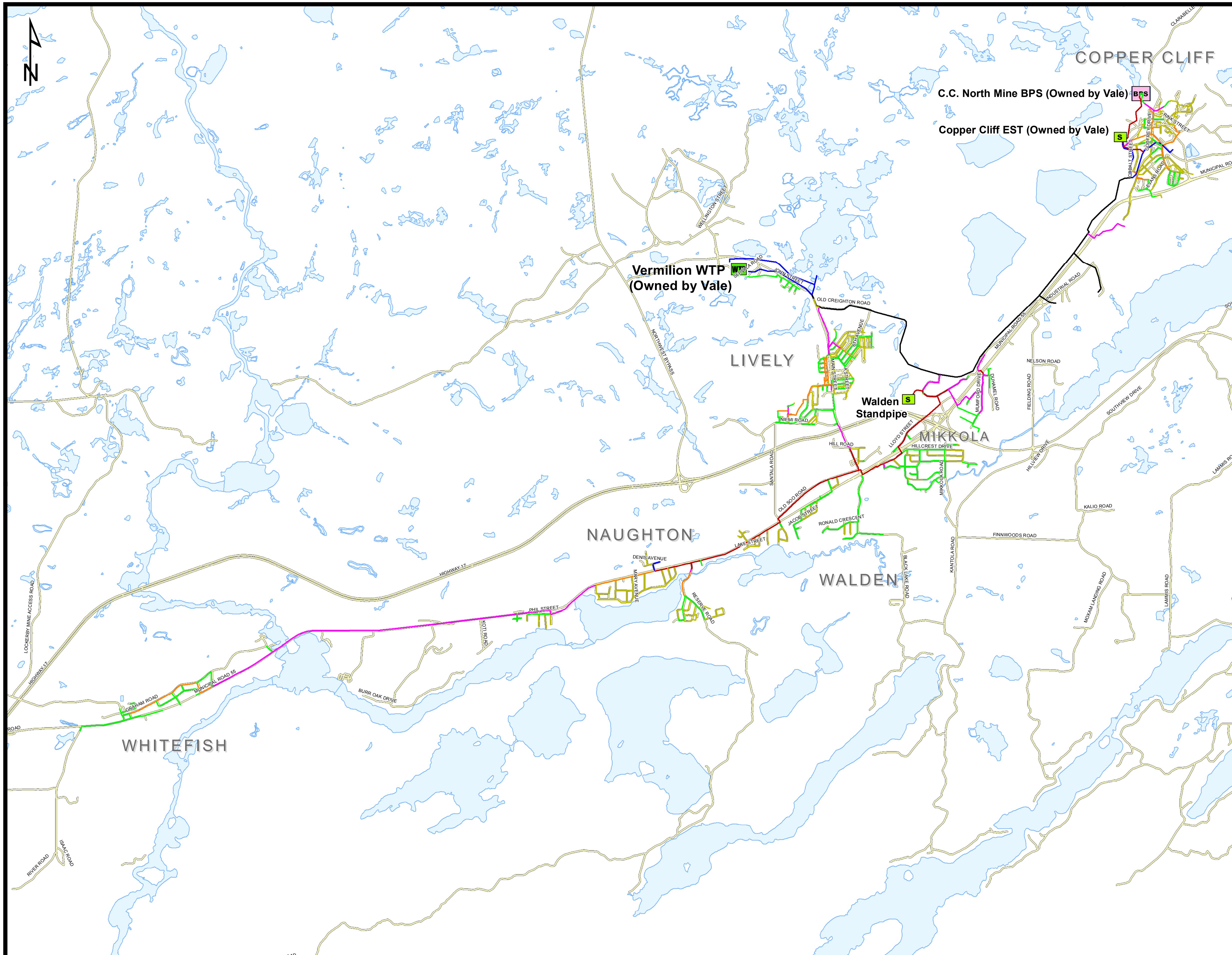
Sudbury Water and Wastewater Master Plan

0 1,000 2,000 3,000 4,000 5,000 m

1:100,000

Map 6b

Valley Water System - Pressure Zone



Legend

- Well
- Storage Tank
- Booster Pumping Station (BPS)
- Water Treatment Plant (WTP)
- Road
- Waterbody

Pipe: Diamater (mm)

- <= 150
- <= 200
- <= 250
- <= 300
- <= 400
- <= 600
- > 600

Greater Grand Sudbury | WSP

Project No. 121-23026-00

April 04 2016

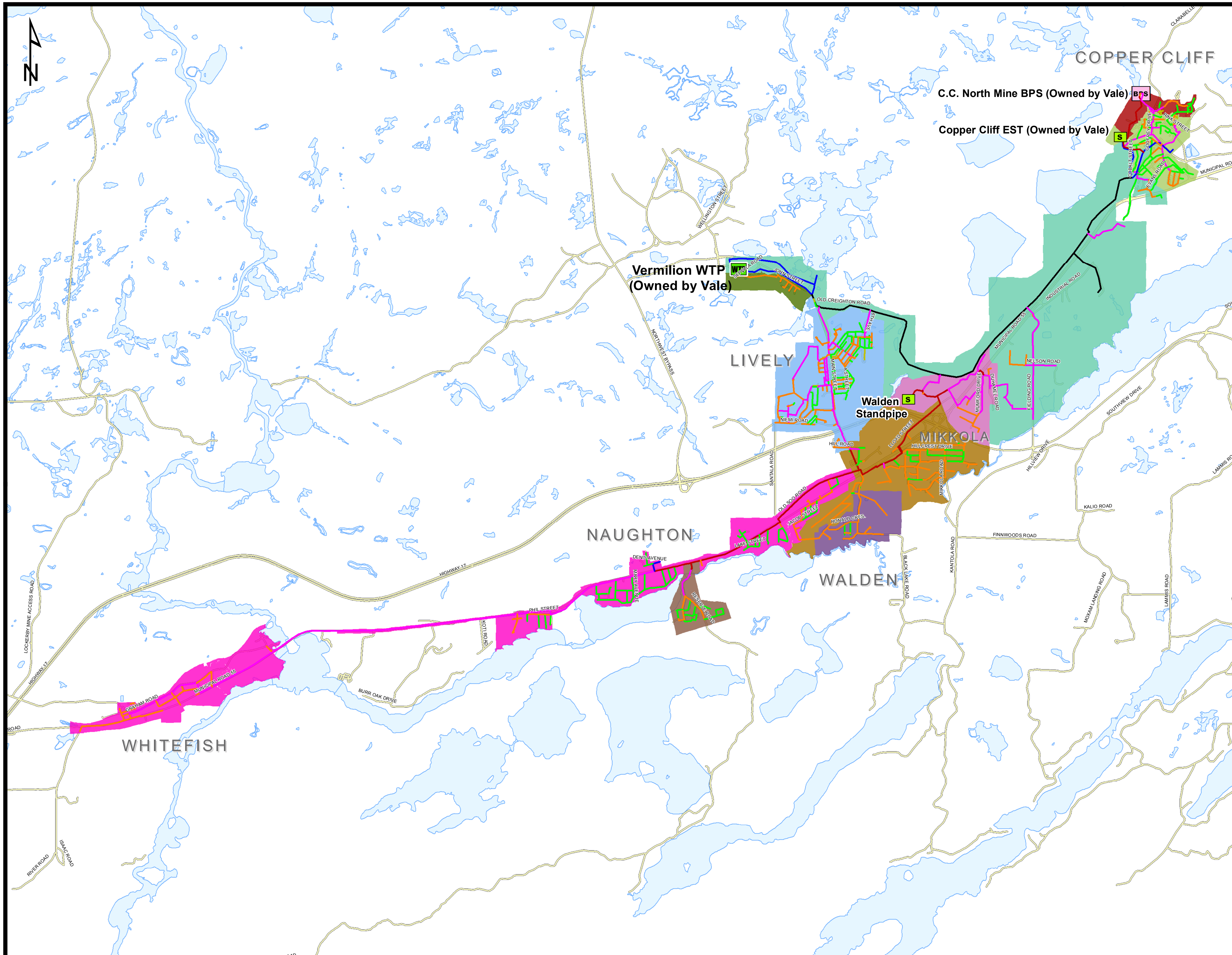
Sudbury Water and Wastewater Master Plan

0 1,000 2,000 3,000 4,000 m

1:70,000

Map 7a

Vermilion Water Supply and Distribution System



Legend

- W Well
- S Storage Tank
- BPS Booster Pumping Station (BPS)
- WTP Water Treatment Plant (WTP)
- Road
- Waterbody

Pipe: Diameter (mm)

- <= 50
- <= 150
- <= 200
- <= 300
- <= 400
- <= 600
- > 600

Pressure Zone (2041 MDD Alternative) (psi)

- Black Lk Rd (46 - 74)
- Copper Cliff (29 - 86)
- Dogpatch (54 - 76)
- Inco (40 - 94)
- Lively (40 - 89)
- Mikkola (45 - 83)
- North Mine Bstr (48 - 82)
- Old Soo PRV (53 - 78)
- Walden Industrial (63 - 94)
- Witefish Lake First Nationl (69 - 78)

Project No. 121-23026-00

November 21 2016

Sudbury Water and Wastewater Master Plan

0 1,000 2,000 3,000 4,000 m

1:70,000

Map 7b

Vermilion Water System - Pressure Zone

APPENDIX

A STORAGE CALCULATIONS

Dowling

Population	1,773		
Fire Flow	150	L/s	
Duration	2	hours	
Average Historical Max. Day Demand	1,048	m^3/d	(Max day demand for 2013 was atypical and therefore omitted from the average)
Available Storage	907	m^3	

MOECC A + B + C calculation was not applied because there is available pumping capacity.

Falconbridge

A+B+C Storage Calculation

Population	707	
Fire Flow	150	L/s
Duration	2	hours
Average Historical Max. Day Demand	2,350	m^3/d
Available Storage	1,136	m^3

A, Fire Storage	1,080,000	L	1,080	m^3
B, Equalization	261,000	L	261	m^3
C, Emergency	335,250	L	335	m^3
Total	**1,676,250**	**L**	**1,676**	**m^3**
Surplus/Deficit			- 540	m^3

There is a storage volume deficit of approximately 540 m^3 in Falconbridge.

Onaping/Levack

A+B+C Storage Calculation

Population	2,112			
Fire Flow	150	L/s		
Duration	2	hours		
Average Historical Max. Day Demand	2,853	m^3/d		
Available Storage	2,400	m^3		
A, Fire Storage	1,080,000	L	1,080	m^3
B, Equalization	713,250	L	713	m^3
C, Emergency	448,313	L	448	m^3
Total	**2,241,563**	**L**	**2,242**	**m^3**
Surplus/Deficit			158	m^3

There is a storage volume surplus of approximately 158 m^3 in Onaping/Levack.

Sudbury

Includes Sudbury, Garson, Wahnapitae, and Coniston

A+B+C Storage Calculation

Population	94,868			
Fire Flow	150	L/s		
Duration	2	hours		
Average Historical Max. Day Demand	59,601	m^3/d		
Available Storage	26,700	m^3	(does not include reservoir storage at WTPs)	
A, Fire Storage	1,080,000	L	1,080	m^3
B, Equalization	14,900,250	L	14,900	m^3
C, Emergency	3,995,063	L	3,995	m^3
Total	**19,975,313**	**L**	**19,975**	**m^3**
Surplus/Deficit			6,725	m^3

There is a storage volume surplus of approximately 6,725 m^3 in Sudbury.

Valley

Includes Azilda, Capreol, Chelmsford, and Valley East

A+B+C Storage Calculation

Population	36,382				
Fire Flow	150	L/s			
Duration	2	hours			
Average Historical Max. Day Demand	14,760	m^3/d			
Available Storage	11,151	m^3			
A, Fire Storage	1,080,000	L	1,080	m^3	
B, Equalization	3,690,000	L	3,690	m^3	
C, Emergency	1,192,500	L	1,193	m^3	
Total	**5,962,500**	**L**	**5,963**	**m^3**	There is a storage volume <u>surplus</u> of approximately
Surplus/Deficit			5,189	m^3	5,189 m^3 in Valley.

Vermilion

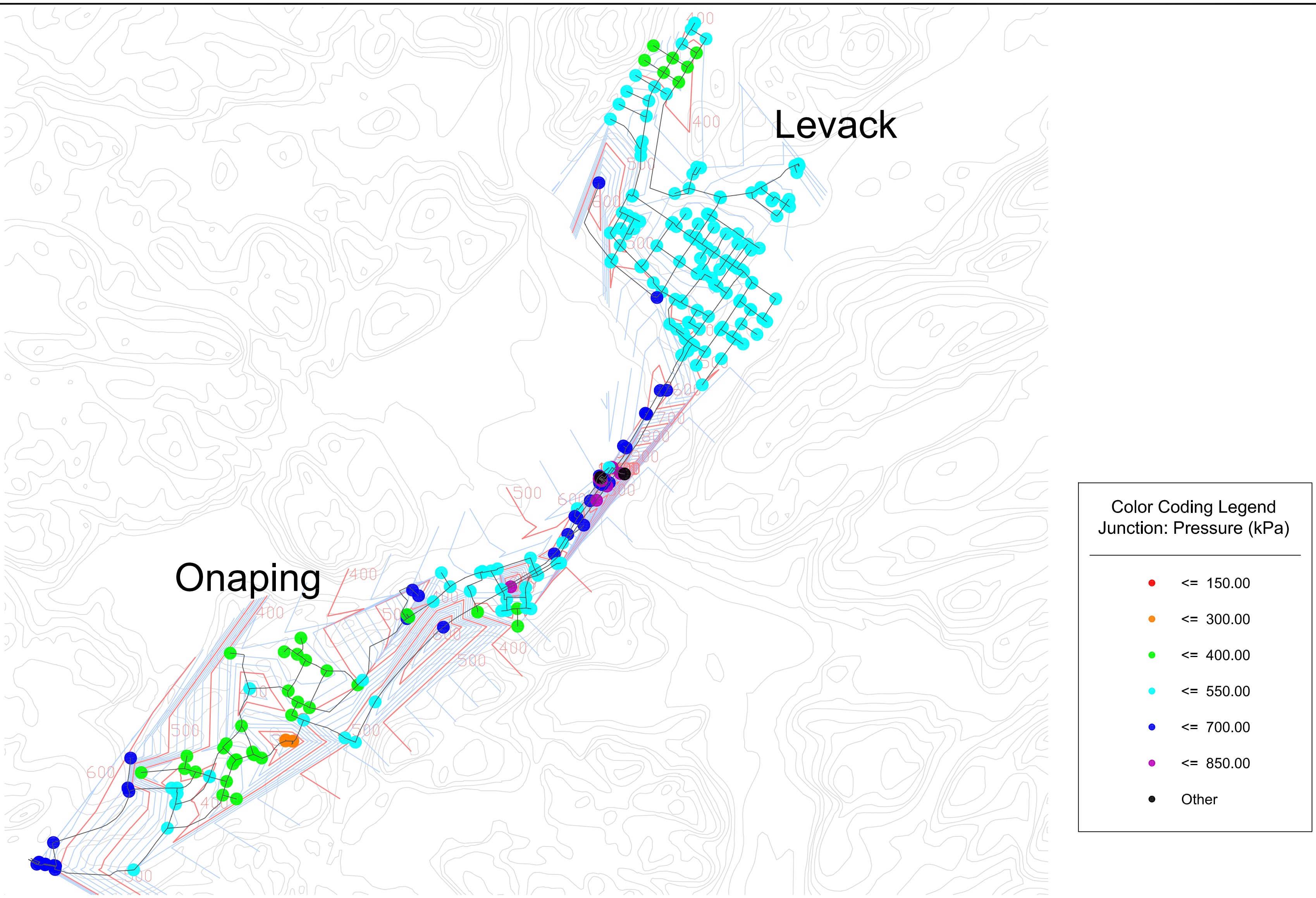
Includes Copper Cliff, Lively, Naughton, and Whitefish

A+B+C Storage Calculation

Population	10,359				
Fire Flow	150	L/s			
Duration	2	hours			
Average Historical Max. Day Demand	7,712	m^3/d	(estimated using billing records for average day flow and max day factor from MOE design guidelines)		
Available Storage	2,662	m^3	(Estimated using the engineering drawings for the Walden Standpipe)		
A, Fire Storage	1,080,000	L	1,080	m^3	
B, Equalization	1,928,000	L	1,928	m^3	
C, Emergency	752,000	L	752	m^3	
Total	**3,760,000**	**L**	**3,760**	**m^3**	There is a storage volume <u>deficit</u> of approximately
Surplus/Deficit			- 1,098	m^3	1,098 m^3 in Vermilion.

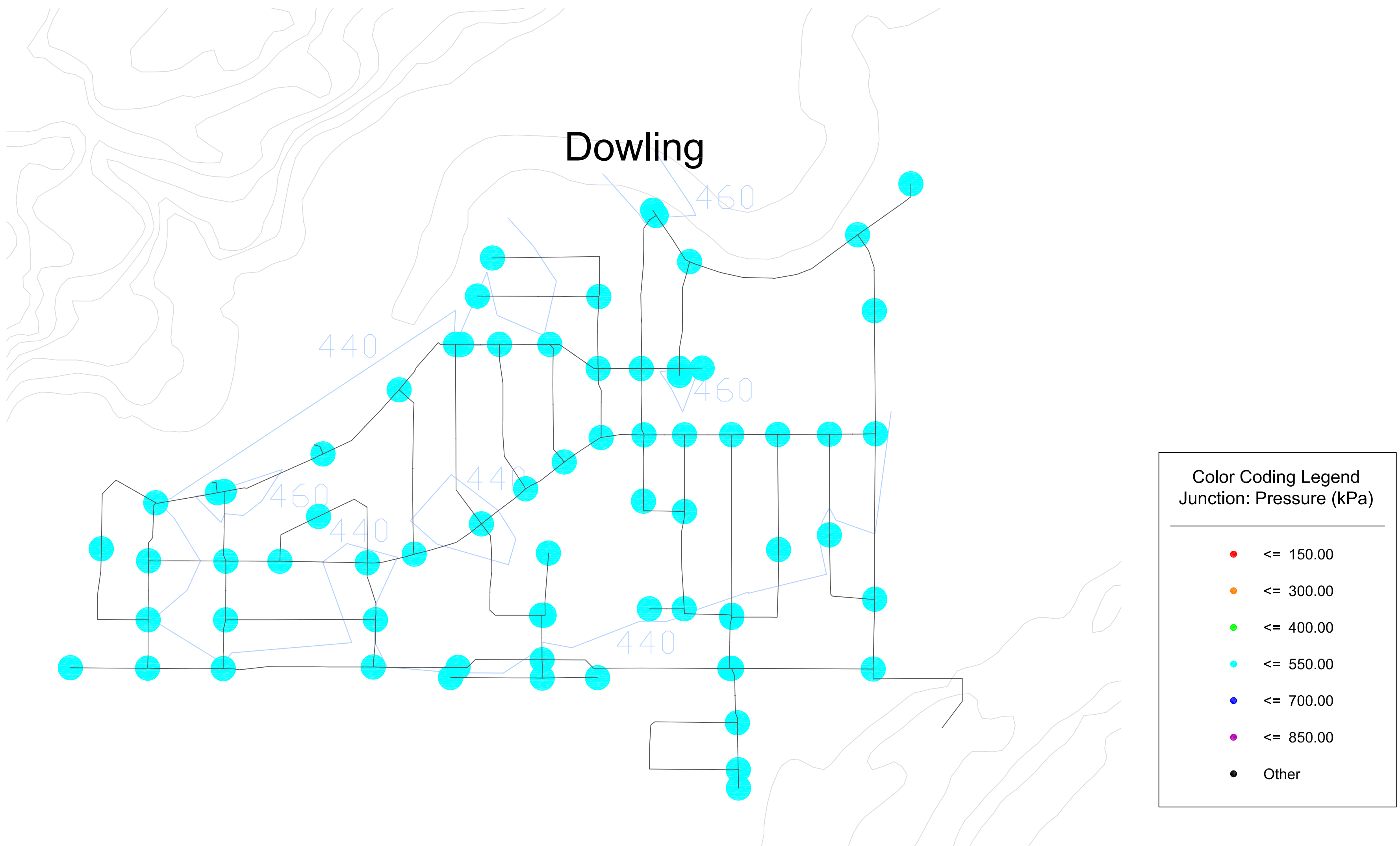
APPENDIX

B MODELED SYSTEM RESPONSES TO FLOW SCENARIOS



Legend	February 2015	Scale: N.T.S.	Project: 121-23026-00	**Water System Pressure (Existing Average Day Demand)**
	WSP			Figure 1.1

S:\MA\12\121-23026-00 Sudbury W & WW Master Plan\3. Engineering\4. Water Modelling\3-4-8_REPORT\Figures\Fig 01-Pressure_Avg Day Demand.dwg



Legend

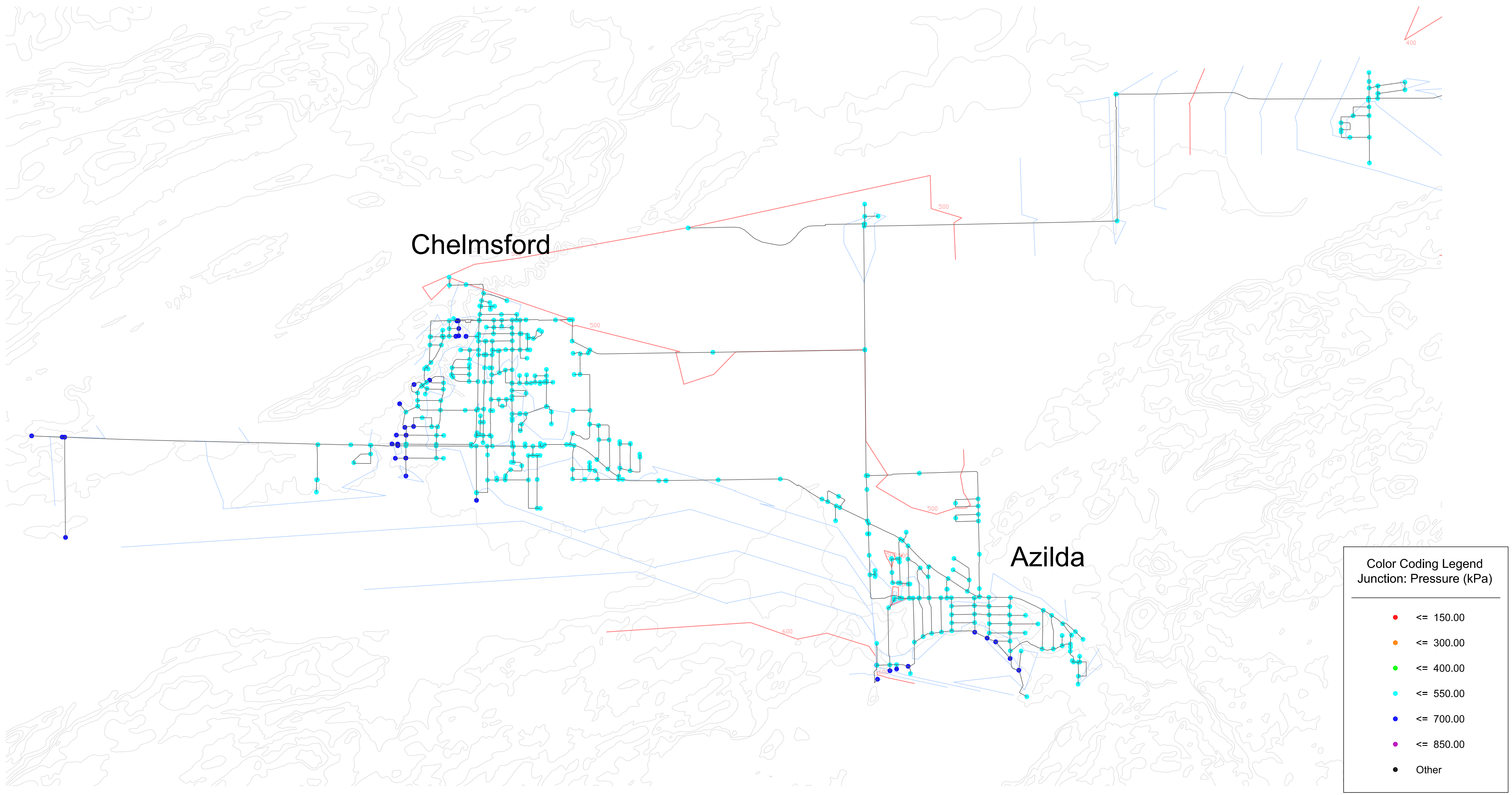
February 2015	Scale: N.T.S.	Project: 121-23026-00

WSP

Water System Pressure (Existing Average Day Demand)

Figure 1.2

S:\MA\12\121-23026-00 Sudbury W & WW Master Plan\3. Engineering\4. Water Modelling\3-4-8_REPORT\Figures\Fig 01-Pressure_Avg Day Demand.dwg



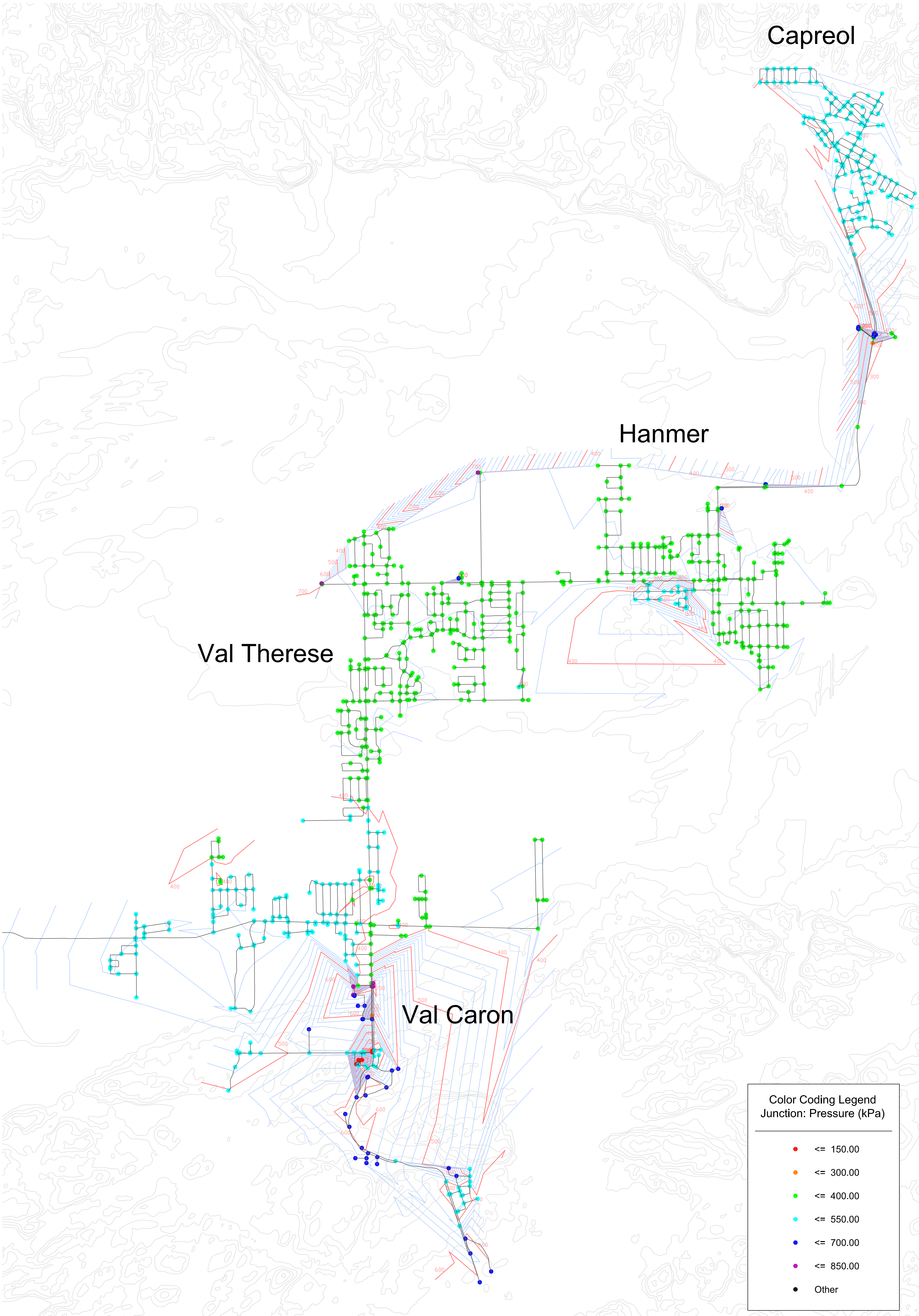
Legend

February 2015	Scale: N.T.S.	Project: 121-23026-00

Water System Pressure (Existing Average Day Demand)

Figure 1.3

S:\MA\12\121-23026-00 Sudbury W & WW Master Plan\3. Engineering\4. Water Modelling\3-4-8_REPORT\Figures\Fig 01-Pressure_Avg Day Demand.dwg



Legend

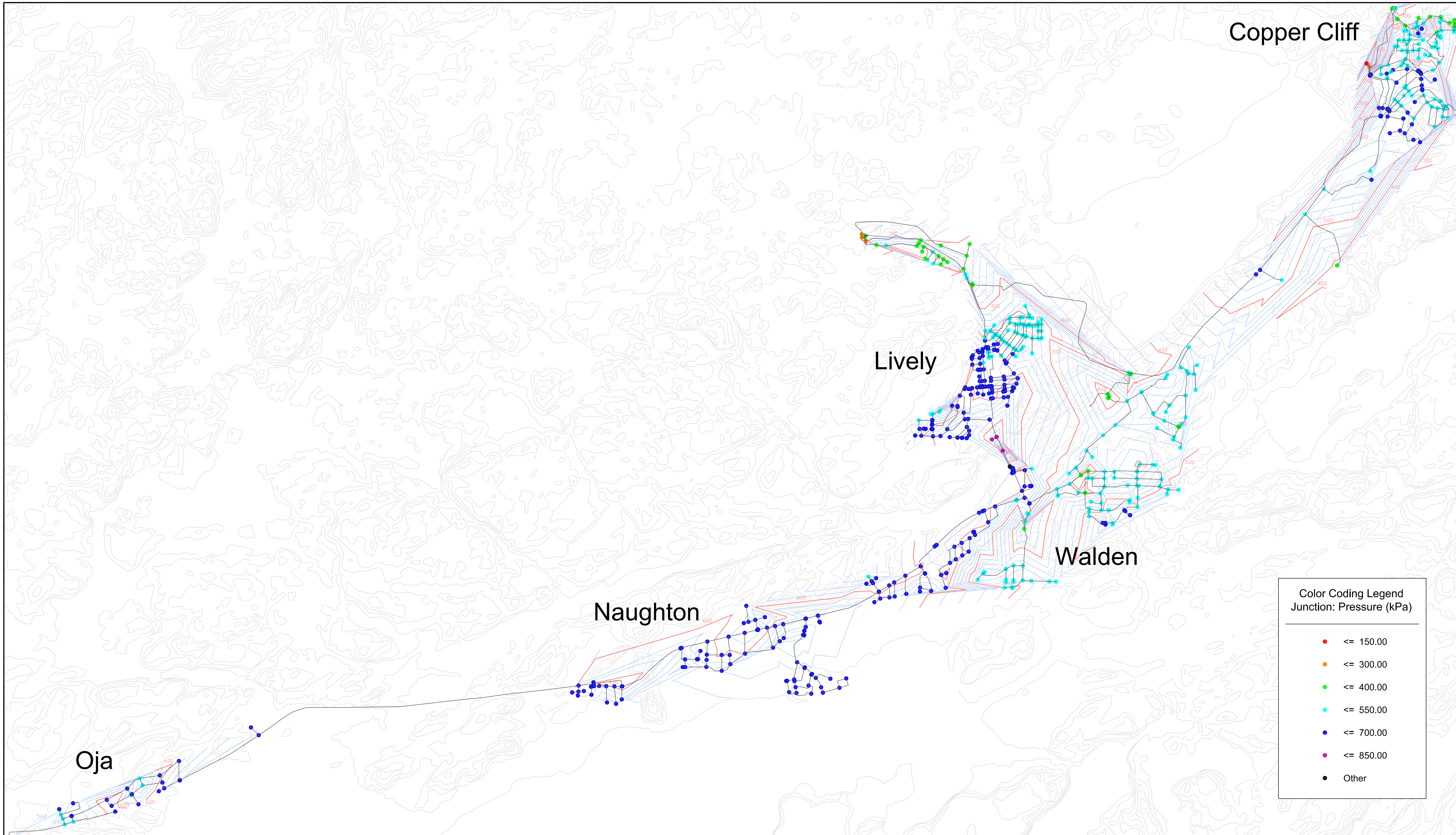
February 2015 | Scale: N.T.S. | Project: 121-23026-00

WSP

Water System Pressure (Existing Average Day Demand)

Figure 1.4

S:\MA\12\121-23026-00 Sudbury W & WW Master Plan\3. Engineering\4. Water Modelling\3-4-8_REPORT\Figures\Fig 01-Pressure_Avg Day Demand.dwg



Legend

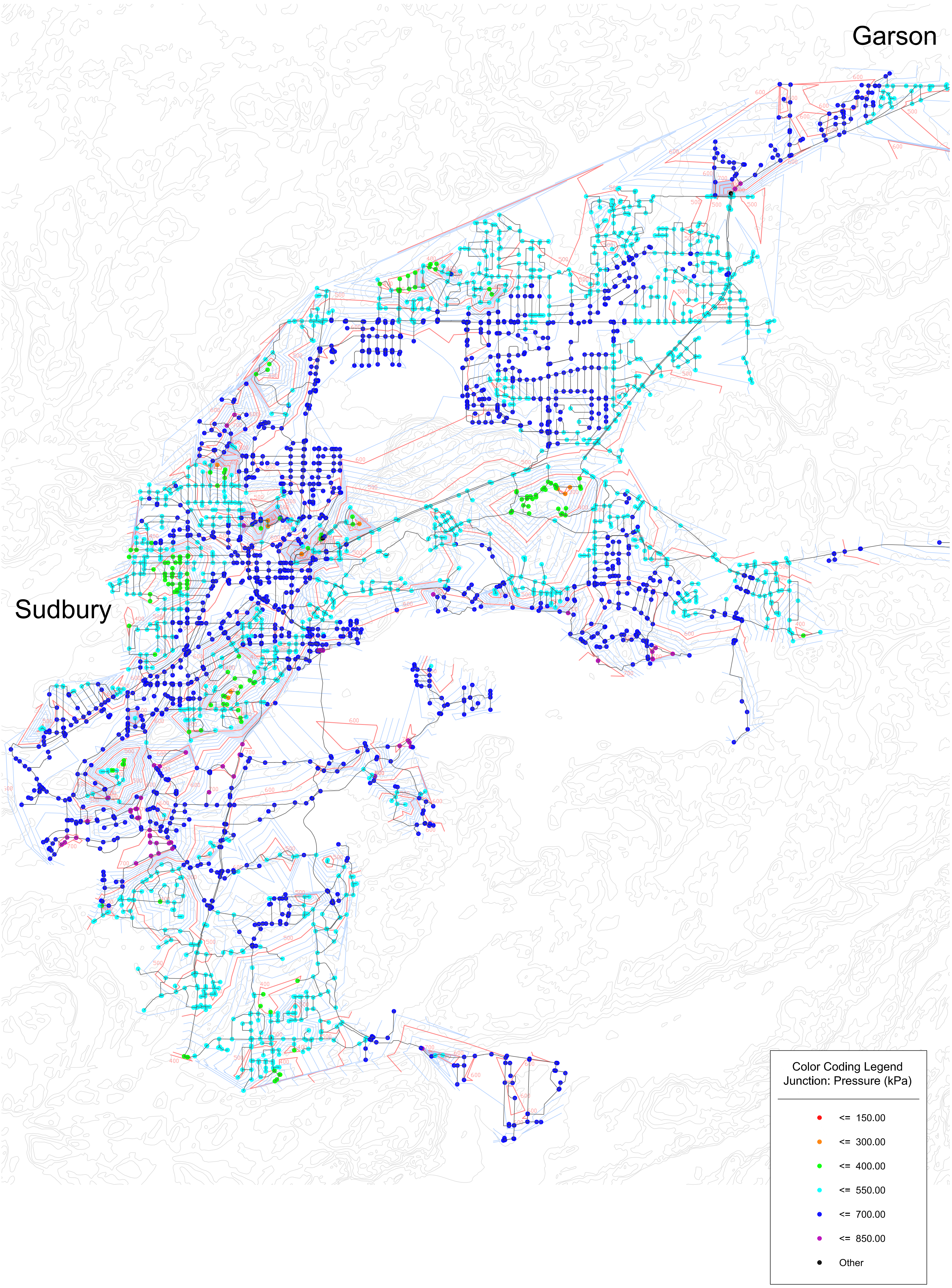
February 2015 | Scale: N.T.S. | Project: 121-23026-00

WSP

Water System Pressure (Existing Average Day Demand)

Figure 1.5

S:\MA\12\121-23026-00 Sudbury W & WW Master Plan\3. Engineering\4. Water Modelling\3-4-8_REPORT\Figures\Fig 01-Pressure_Avg Day Demand.dwg



Legend

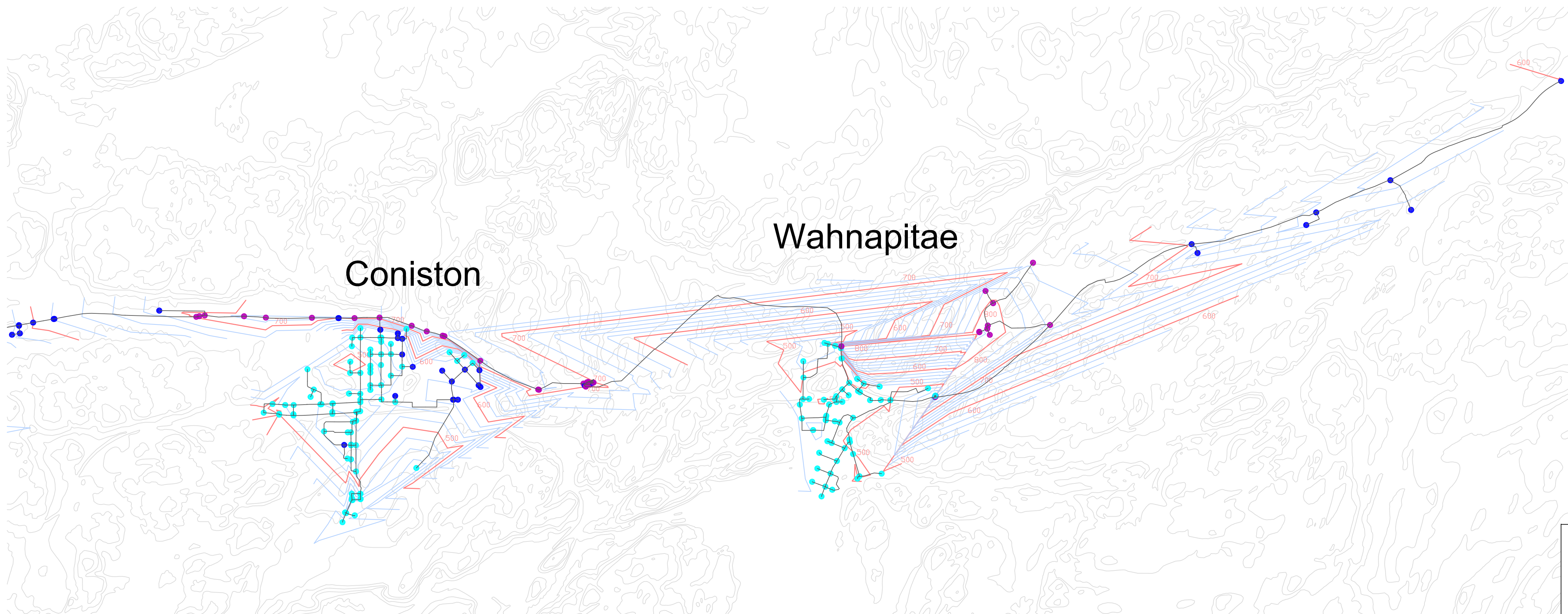
February 2015	Scale: N.T.S.	Project: 121-23026-00

WSP

Water System Pressure (Existing Average Day Demand)

Figure 1.6

S:\MA\12\121-23026-00 Sudbury W & WW Master Plan\3. Engineering\4. Water Modelling\3-4-8_REPORT\Figures\Fig 01-Pressure_Avg Day Demand.dwg



Color Coding Legend
Junction: Pressure (kPa)

- <= 150.00
- <= 300.00
- <= 400.00
- <= 550.00
- <= 700.00
- <= 850.00
- Other

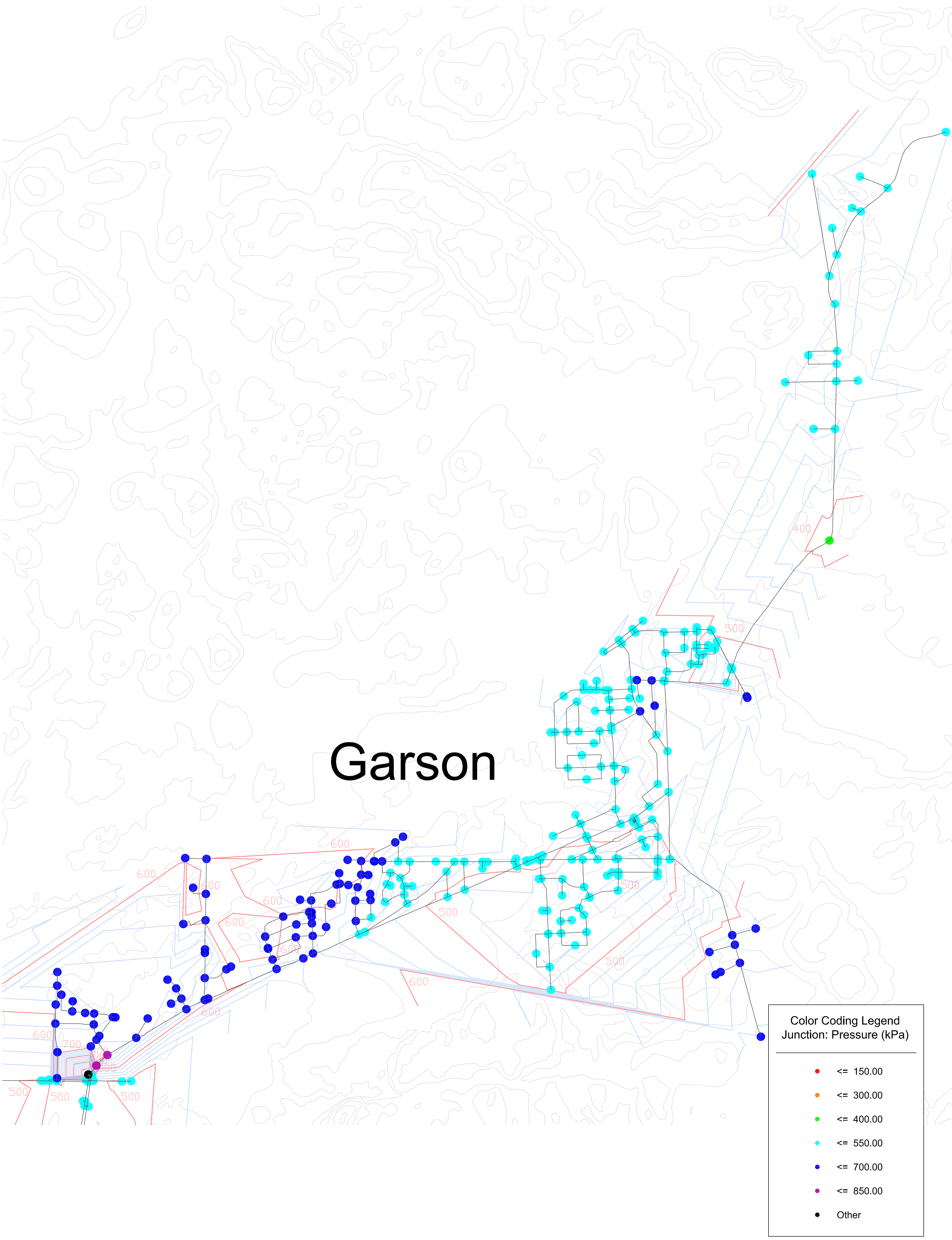
Legend

February 2015 | Scale: N.T.S. | Project: 121-23026-00

Water System Pressure (Existing Average Day Demand)

Figure 1.7

S:\MA\12\121-23026-00 Sudbury W & WW Master Plan\3. Engineering\4. Water Modelling\3-4-8_REPORT\Figures\Fig 01-Pressure_Avg Day Demand.dwg



Legend

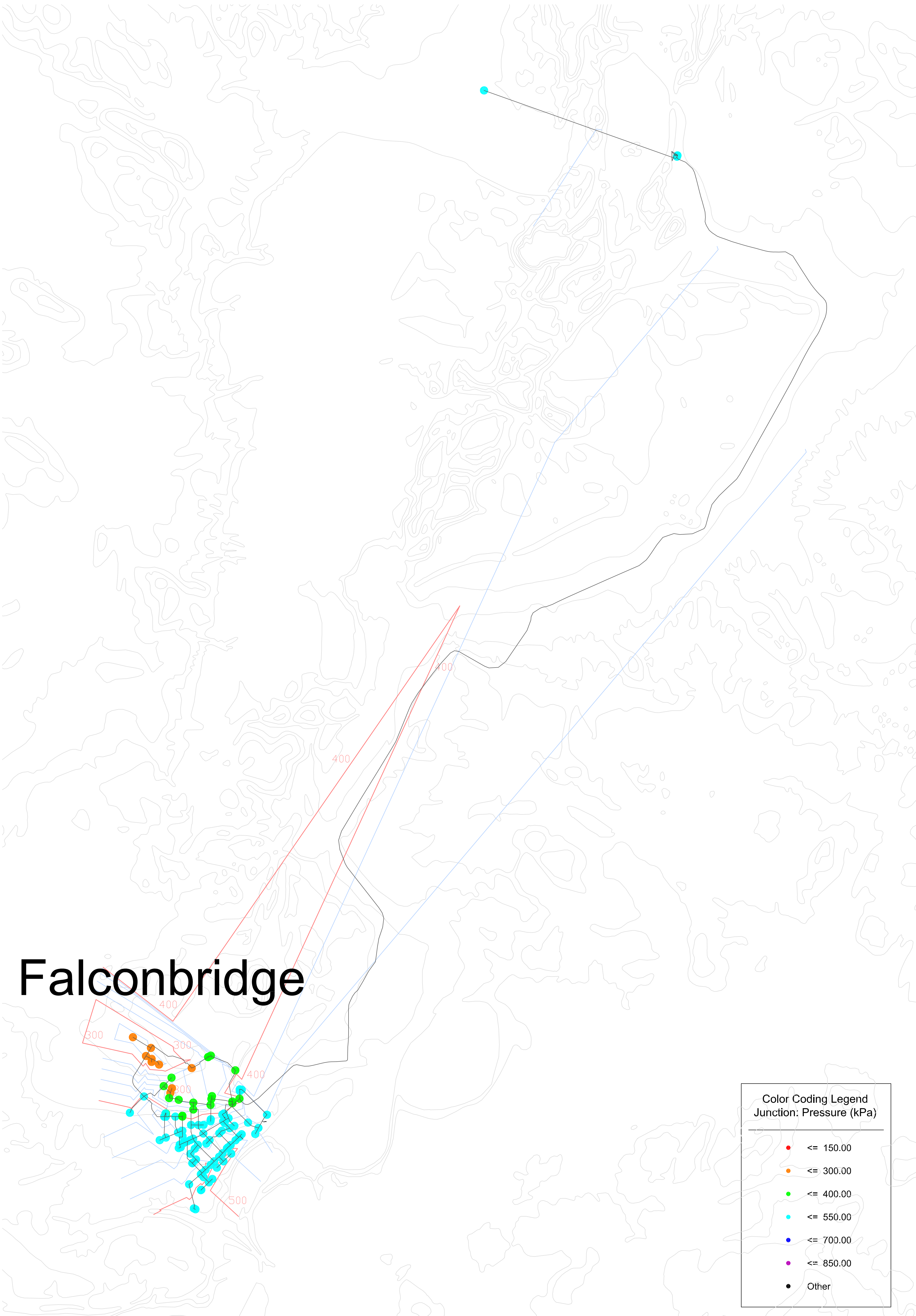
February 2015	Scale: N.T.S.	Project: 121-23026-00

WSP

Water System Pressure (Existing Average Day Demand)

Figure 1.8

S:\MA\12\121-23026-00 Sudbury W & WW Master Plan\3. Engineering\4. Water Modelling\3-4-8_REPORT\Figures\Fig 01-Pressure_Avg Day Demand.dwg



Legend

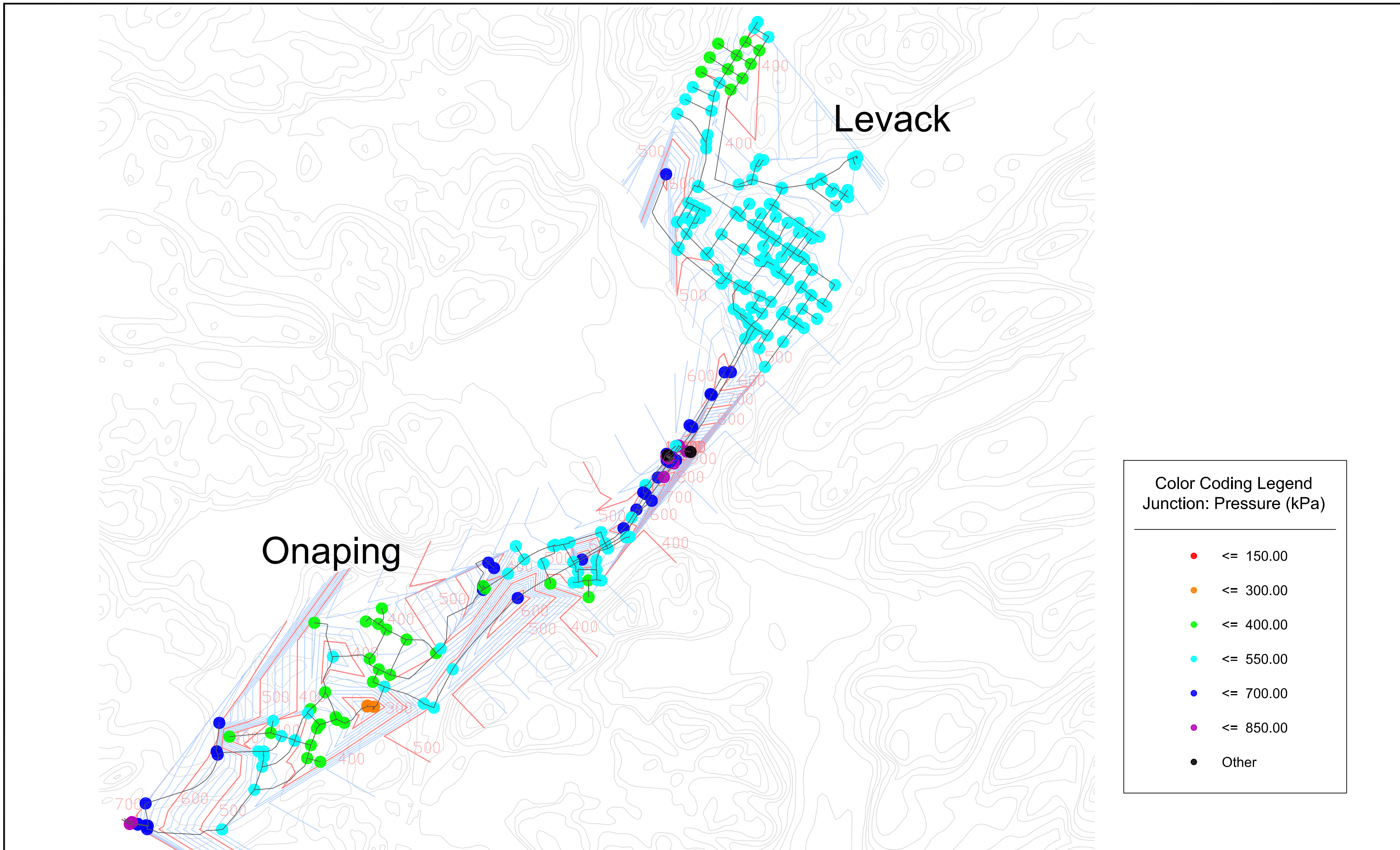
February 2015 | Scale: N.T.S. | Project: 121-23026-00

WSP

Water System Pressure (Existing Average Day Demand)

Figure 1.9

S:\MA\12\121-23026-00 Sudbury W & WW Master Plan\3. Engineering\4. Water Modelling\3-4-8_REPORT\Figures\Fig 01-Pressure_Avg Day Demand.dwg



Legend

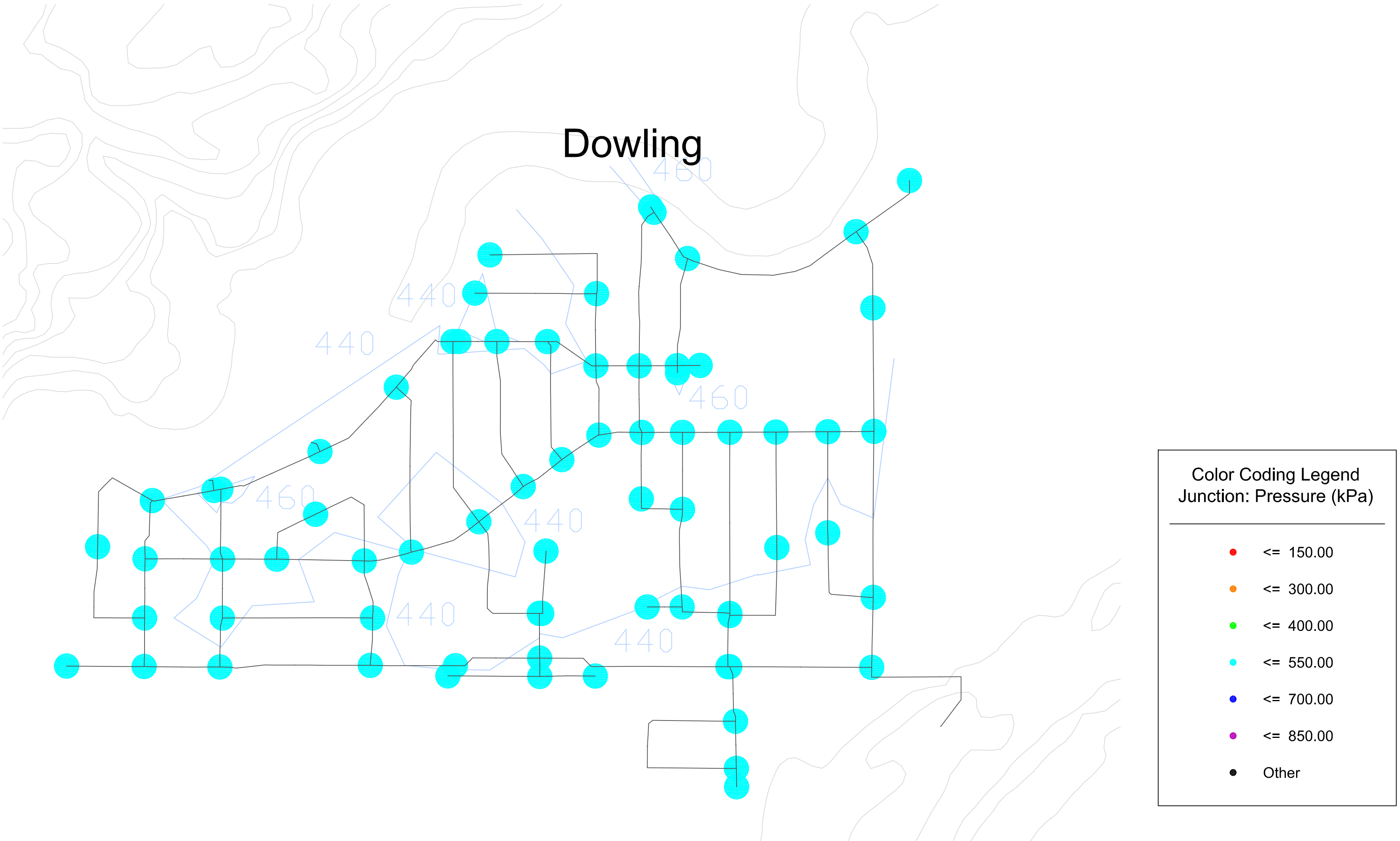
February 2015	Scale: N.T.S.	Project: 121-23026-00

WSP

Water System Pressure (Existing Maximum Day Demand)

Figure 2.1

S:\MA\12\121-23026-00 Sudbury W & WW Master Plan\3. Engineering\4. Water Modelling\3-4-8_REPORT\Figures\Fig 02-Pressure_Max Day Demand.dwg



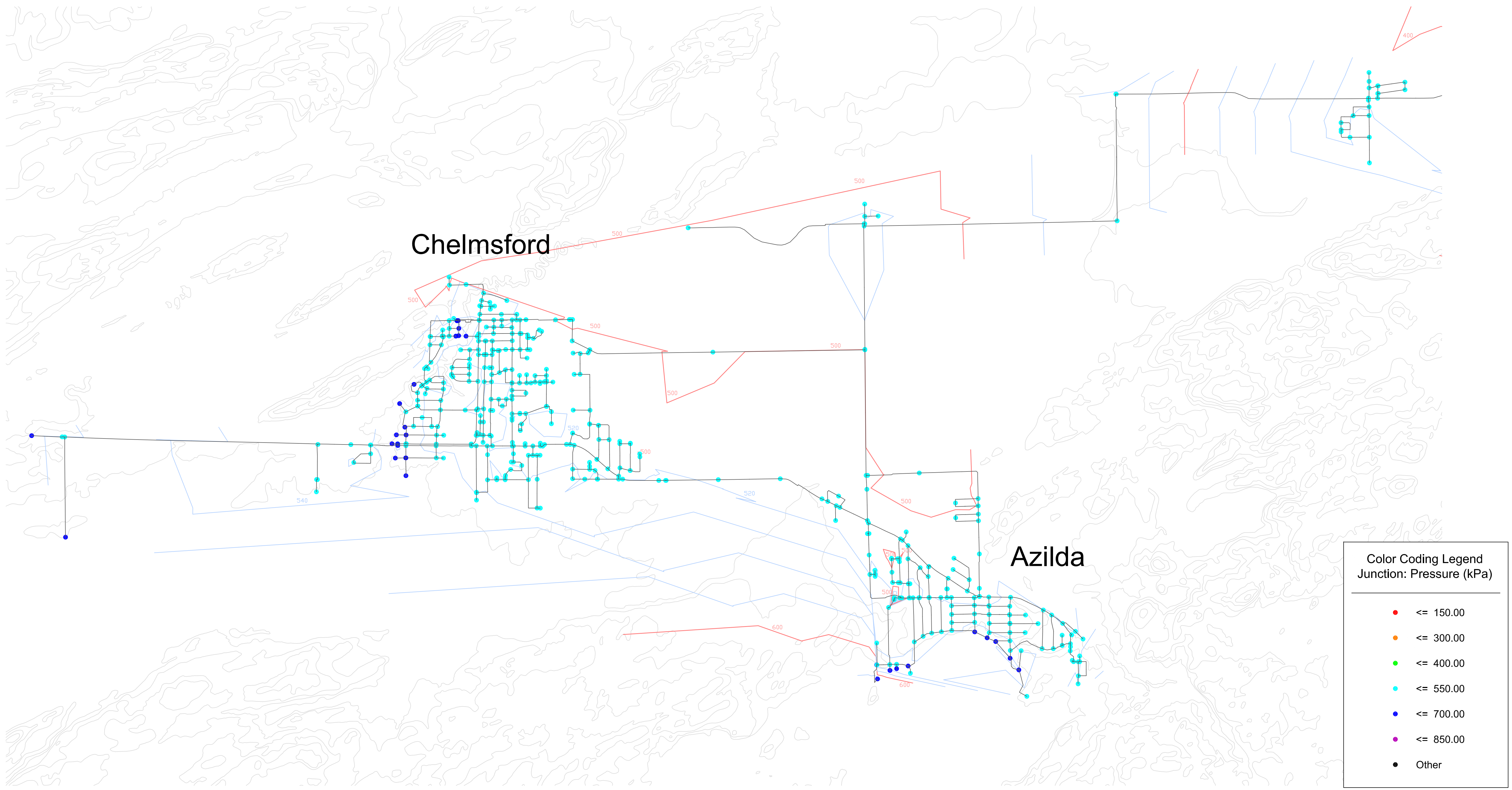
Legend

February 2015	Scale: N.T.S.	Project: 121-23026-00

Water System Pressure (Existing Maximum Day Demand)

Figure 2.2

S:\MA\12\121-23026-00 Sudbury W & WW Master Plan\3. Engineering\4. Water Modelling\3-4-8_REPORT\Figures\Fig 02-Pressure_Max Day Demand.dwg



Legend

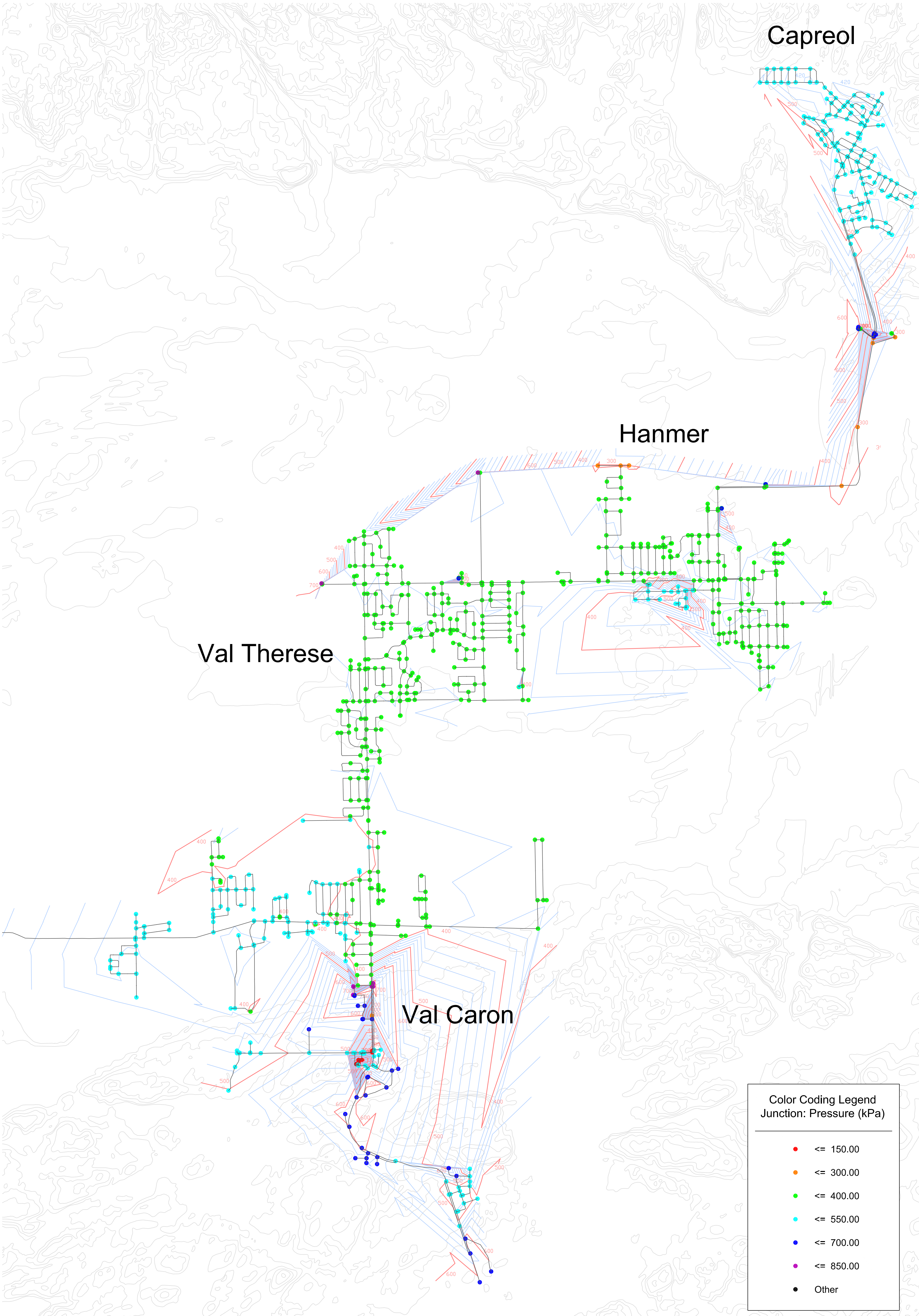
February 2015	Scale: N.T.S.	Project: 121-23026-00

WSP

Water System Pressure (Existing Maximum Day Demand)

Figure 2.3

S:\MA\12\121-23026-00 Sudbury W & WW Master Plan\3. Engineering\4. Water Modelling\3-4-8_REPORT\Figures\Fig 02-Pressure_Max Day Demand.dwg



Legend

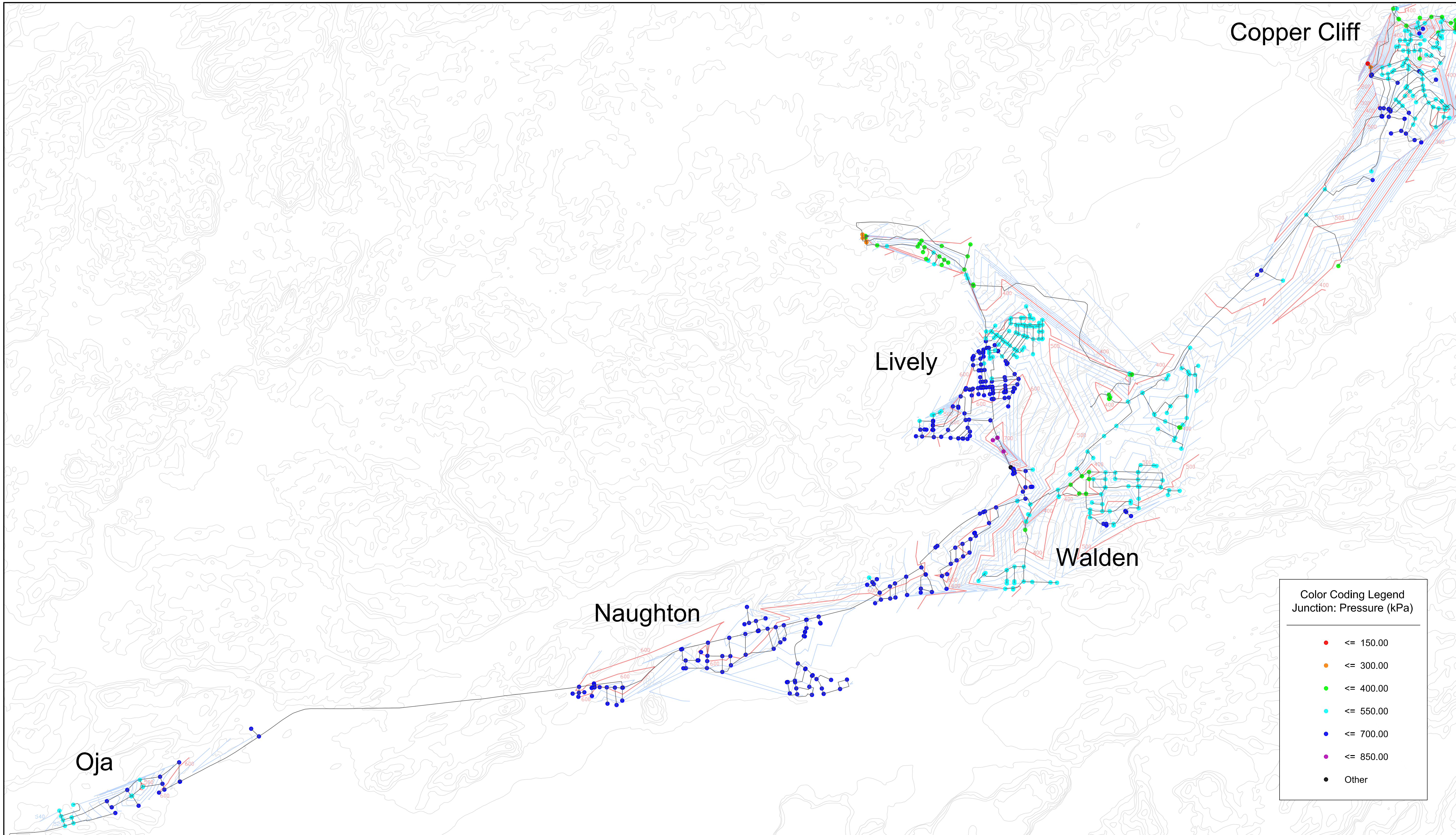
February 2015	Scale: N.T.S.	Project: 121-23026-00

WSP

Water System Pressure (Existing Maximum Day Demand)

Figure 2.4

S:\MA\12\121-23026-00 Sudbury W & WW Master Plan\3. Engineering\4. Water Modelling\3-4-8_REPORT\Figures\Fig 02-Pressure_Max Day Demand.dwg



Legend

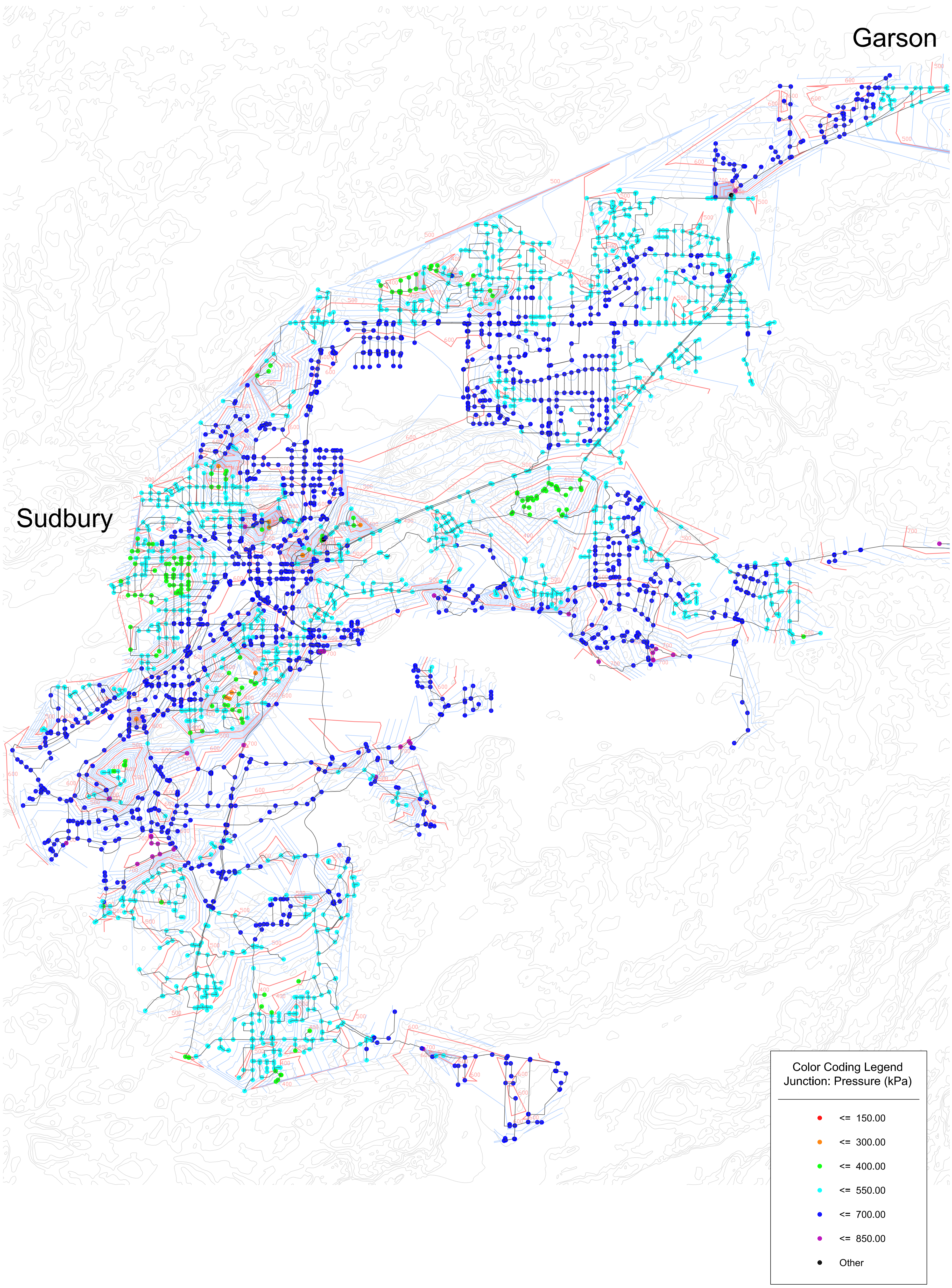
February 2015	Scale: N.T.S.	Project: 121-23026-00

WSP

Water System Pressure (Existing Maximum Day Demand)

Figure 2.5

S:\MA\12\121-23026-00 Sudbury W & WW Master Plan\3. Engineering\4. Water Modelling\3-4-8_REPORT\Figures\Fig 02-Pressure_Max Day Demand.dwg



Legend

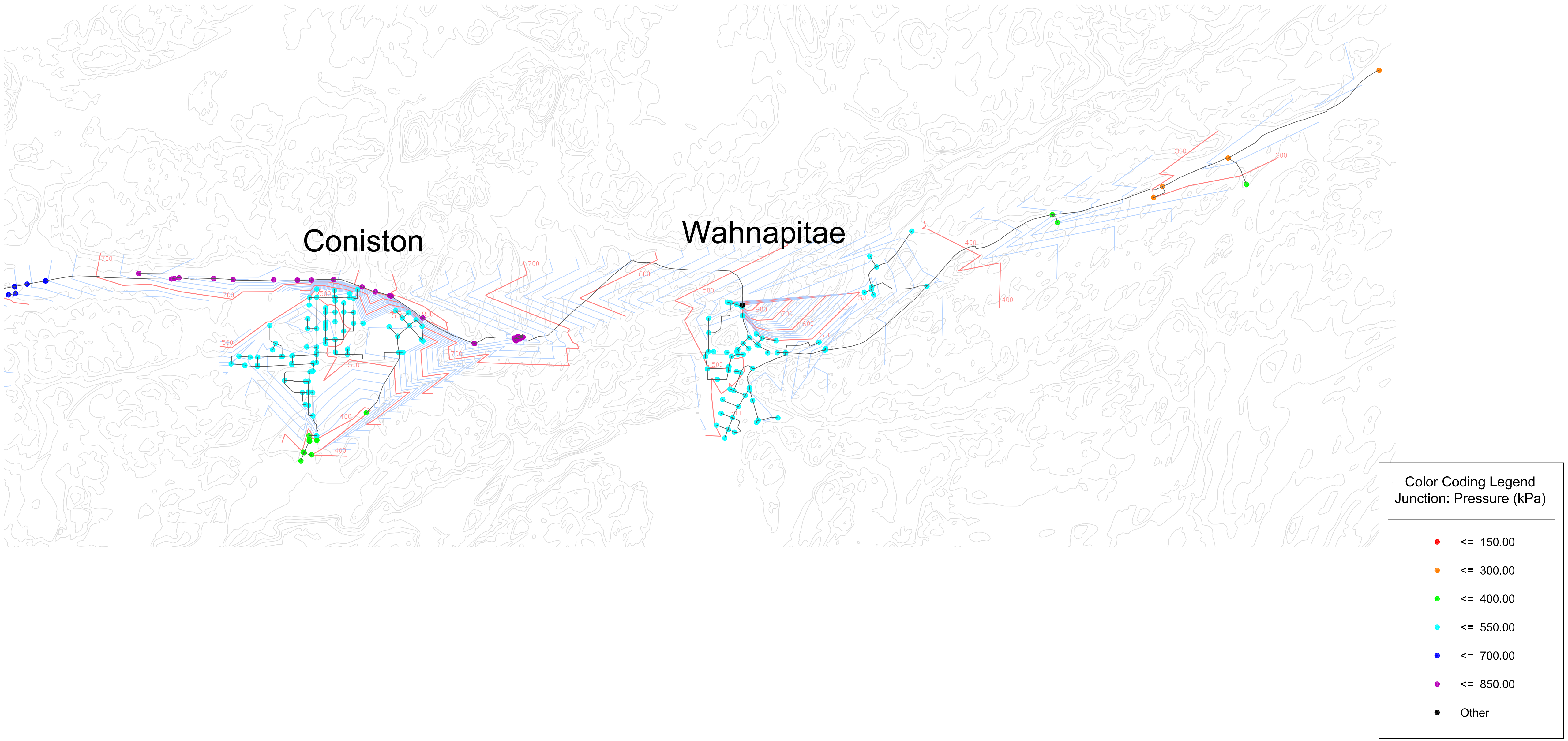
February 2015	Scale: N.T.S.	Project: 121-23026-00

WSP

Water System Pressure (Existing Maximum Day Demand)

Figure 2.6

S:\MA\12\121-23026-00 Sudbury W & WW Master Plan\3. Engineering\4. Water Modelling\3-4-8_REPORT\Figures\Fig 02-Pressure_Max Day Demand.dwg



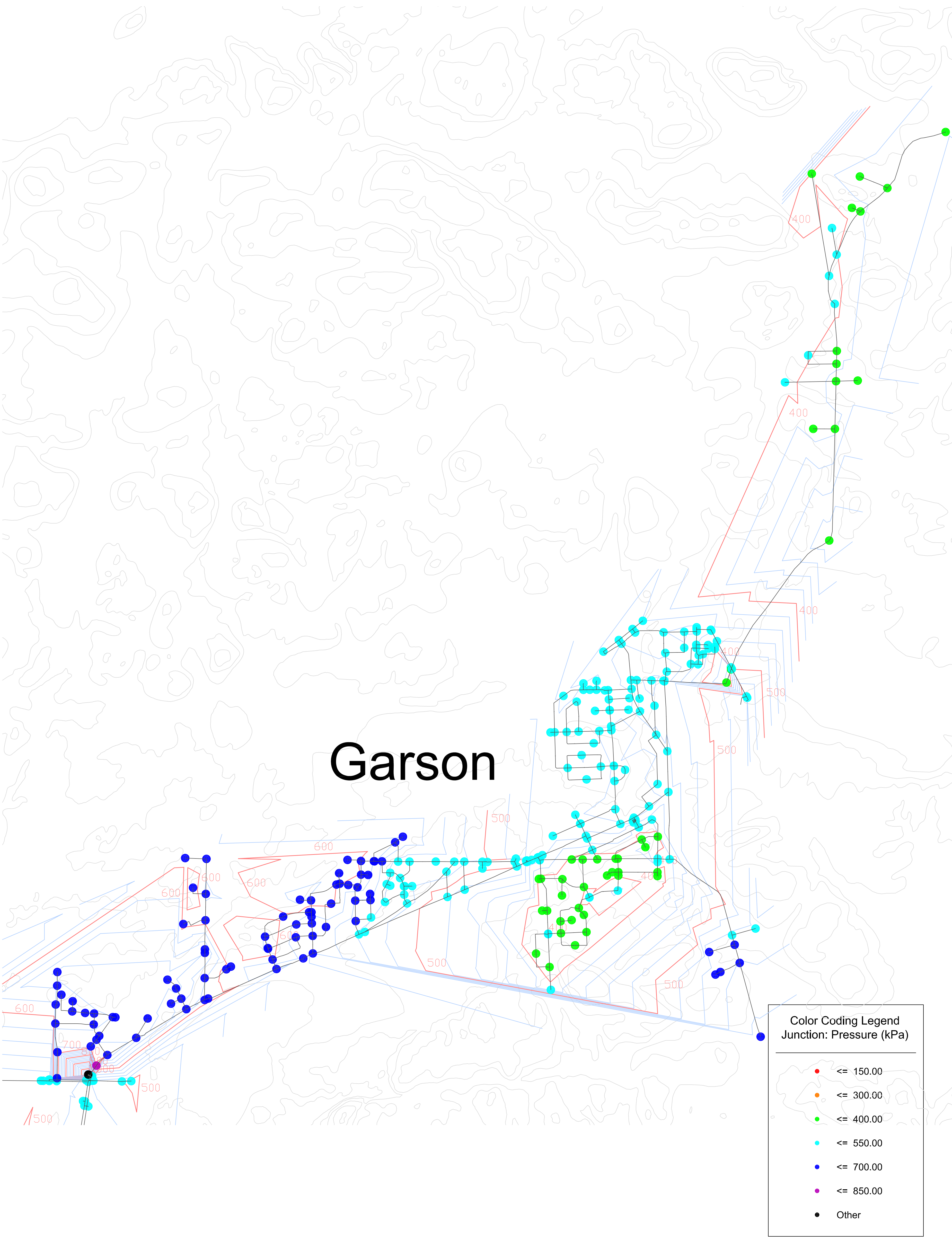
Legend

February 2015	Scale: N.T.S.	Project: 121-23026-00

Water System Pressure (Existing Maximum Day Demand)

Figure 2.7

S:\MA\12\121-23026-00 Sudbury W & WW Master Plan\3. Engineering\4. Water Modelling\3-4-8_REPORT\Figures\Fig 02-Pressure_Max Day Demand.dwg



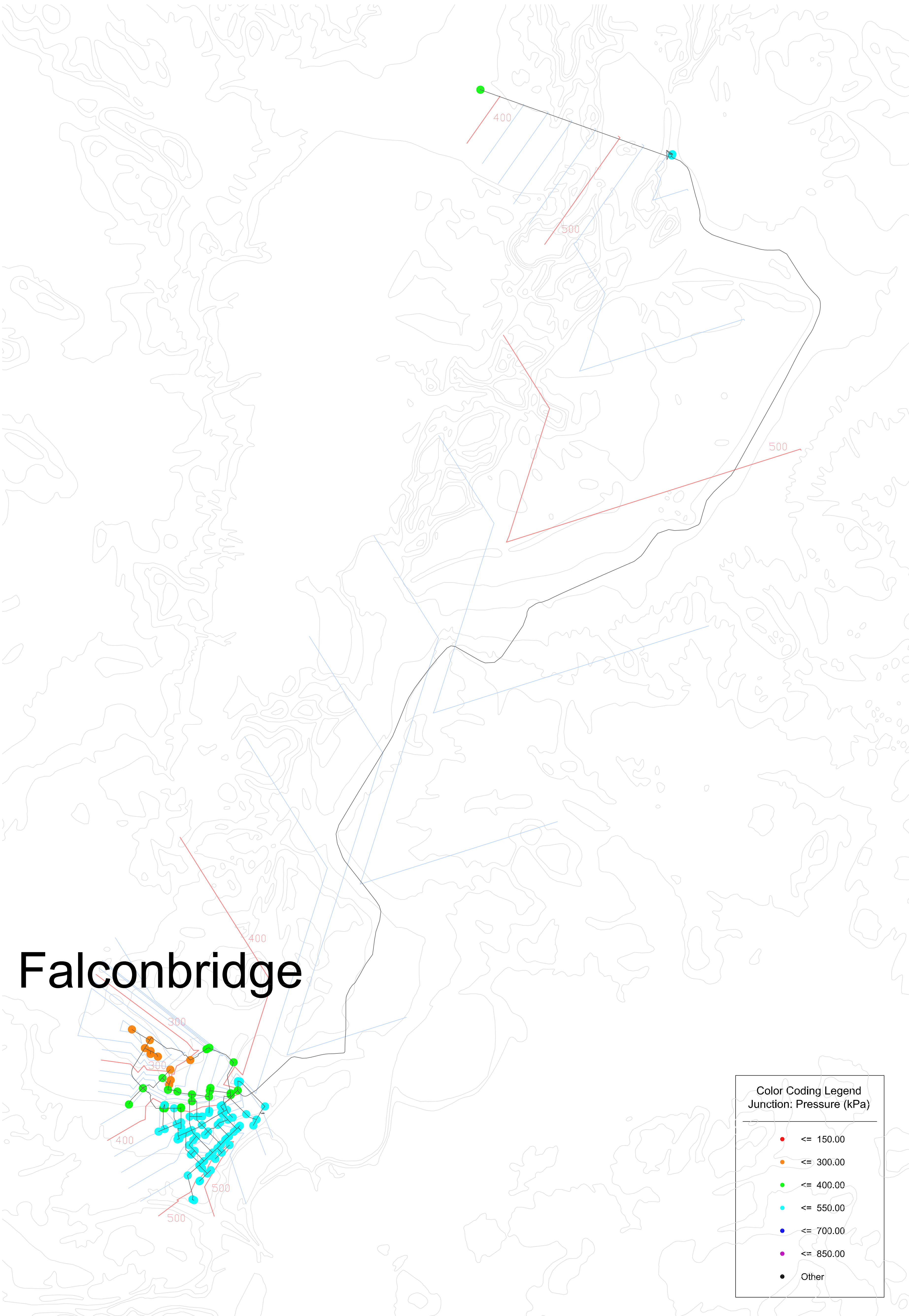
Legend

February 2015	Scale: N.T.S.	Project: 121-23026-00

Water System Pressure (Existing Maximum Day Demand)

Figure 2.8

S:\MA\12\121-23026-00 Sudbury W & WW Master Plan\3. Engineering\4. Water Modelling\3-4-8_REPORT\Figures\Fig 02-Pressure_Max Day Demand.dwg



Legend

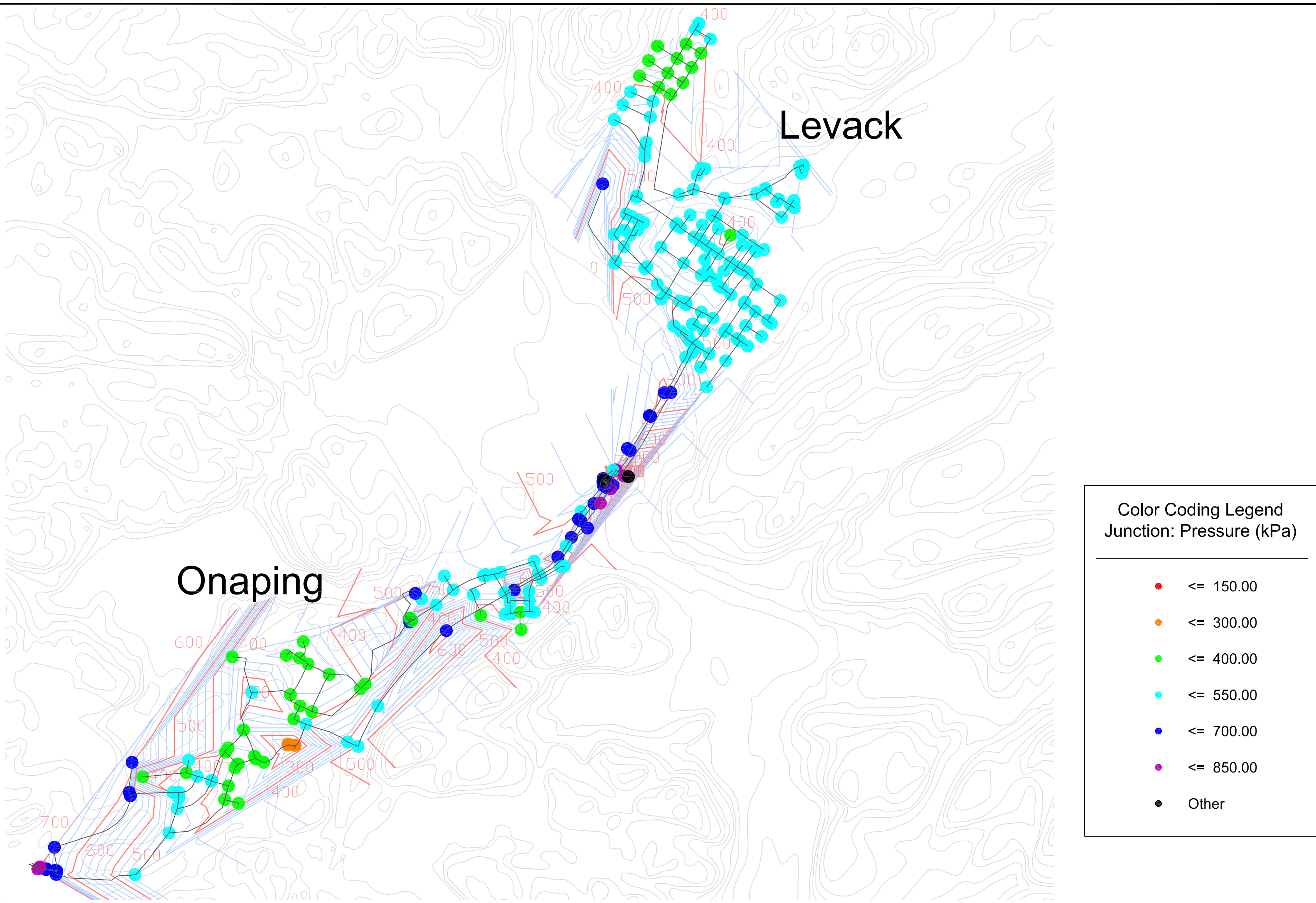
February 2015	Scale: N.T.S.	Project: 121-23026-00

WSP

Water System Pressure (Existing Maximum Day Demand)

Figure 2.9

S:\MA\12\121-23026-00 Sudbury W & WW Master Plan\3. Engineering\4. Water Modelling\3-4-8_REPORT\Figures\Fig 02-Pressure_Max Day Demand.dwg



Legend

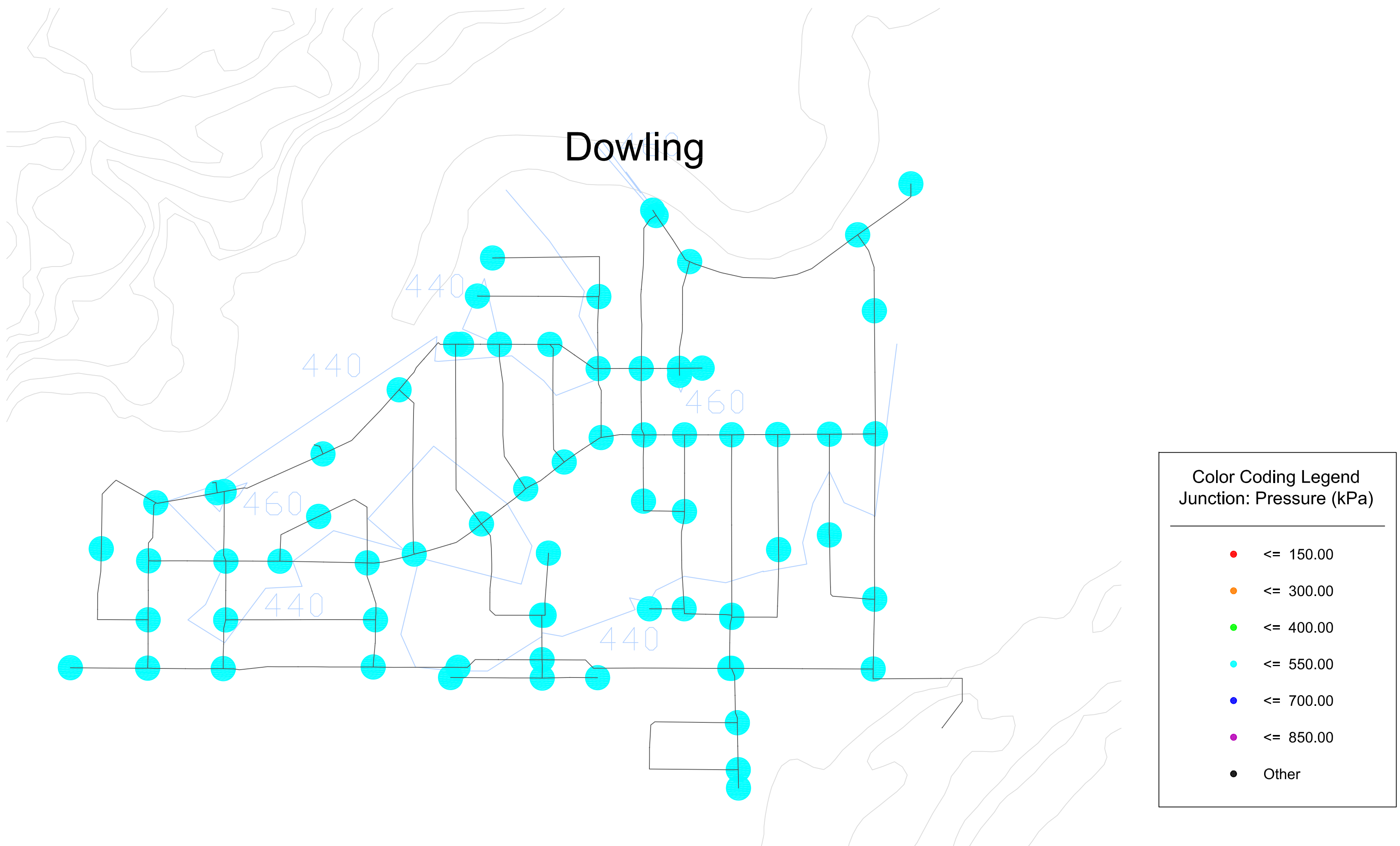
February 2015	Scale: N.T.S.	Project: 121-23026-00

WSP

Water System Pressure (Existing Peak Hour Demand)

Figure 3.1

S:\MA\12\121-23026-00 Sudbury W & WW Master Plan\3. Engineering\4. Water Modelling\3-4-8_REPORT\Figures\Fig 03-Pressure_Peak Hr Demand.dwg



Legend

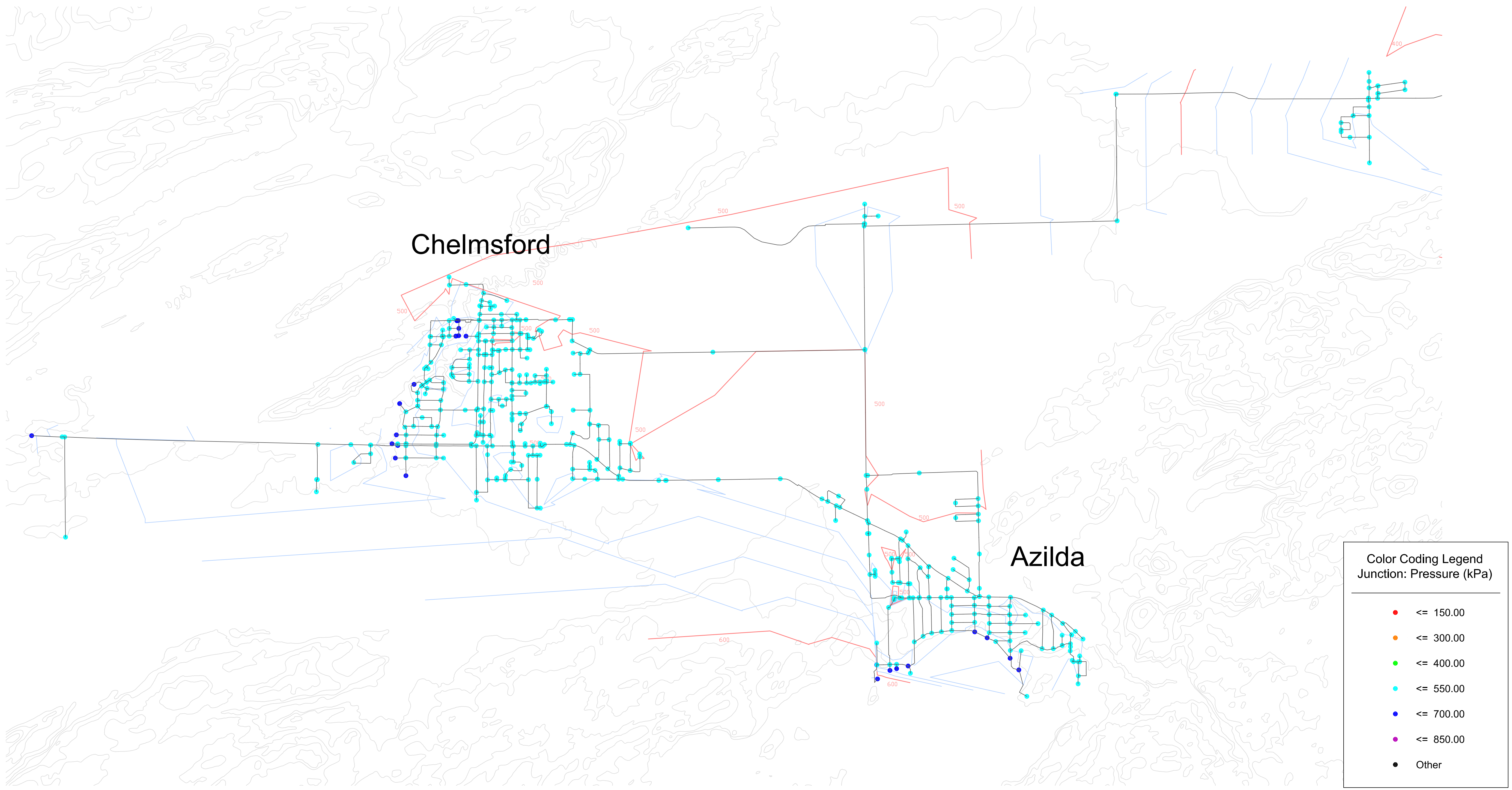
February 2015	Scale: N.T.S.	Project: 121-23026-00

WSP

Water System Pressure (Existing Peak Hour Demand)

Figure 3.2

S:\MA\12\121-23026-00 Sudbury W & WW Master Plan\3. Engineering\4. Water Modelling\3-4-8_REPORT\Figures\Fig 03-Pressure_Peak Hr Demand.dwg



Legend

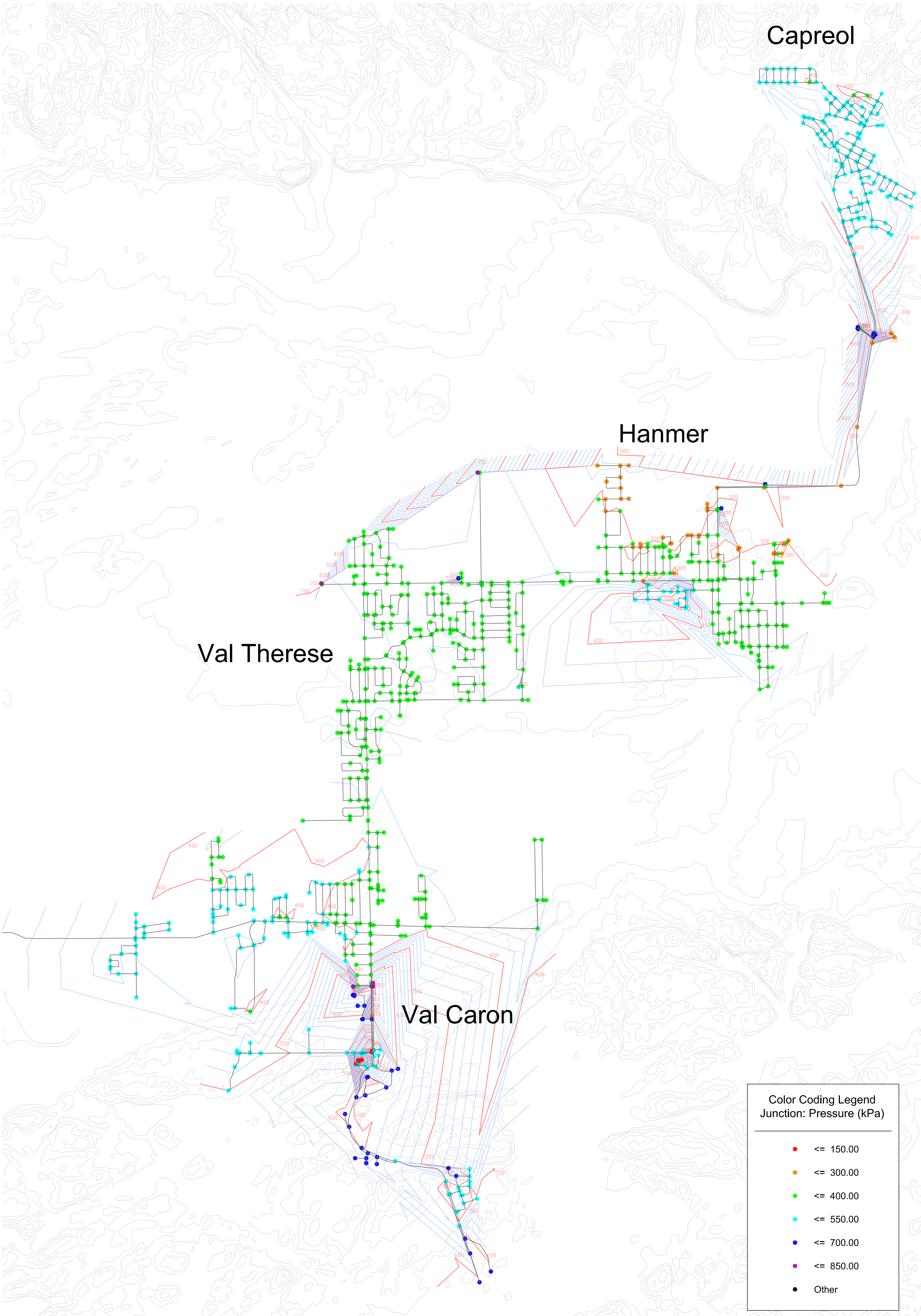
February 2015	Scale: N.T.S.	Project: 121-23026-00

WSP

Water System Pressure (Existing Peak Hour Demand)

Figure 3.3

S:\MA\12\121-23026-00 Sudbury W & WW Master Plan\3. Engineering\4. Water Modelling\3-4-8_REPORT\Figures\Fig 03-Pressure_Peak Hr Demand.dwg



Legend

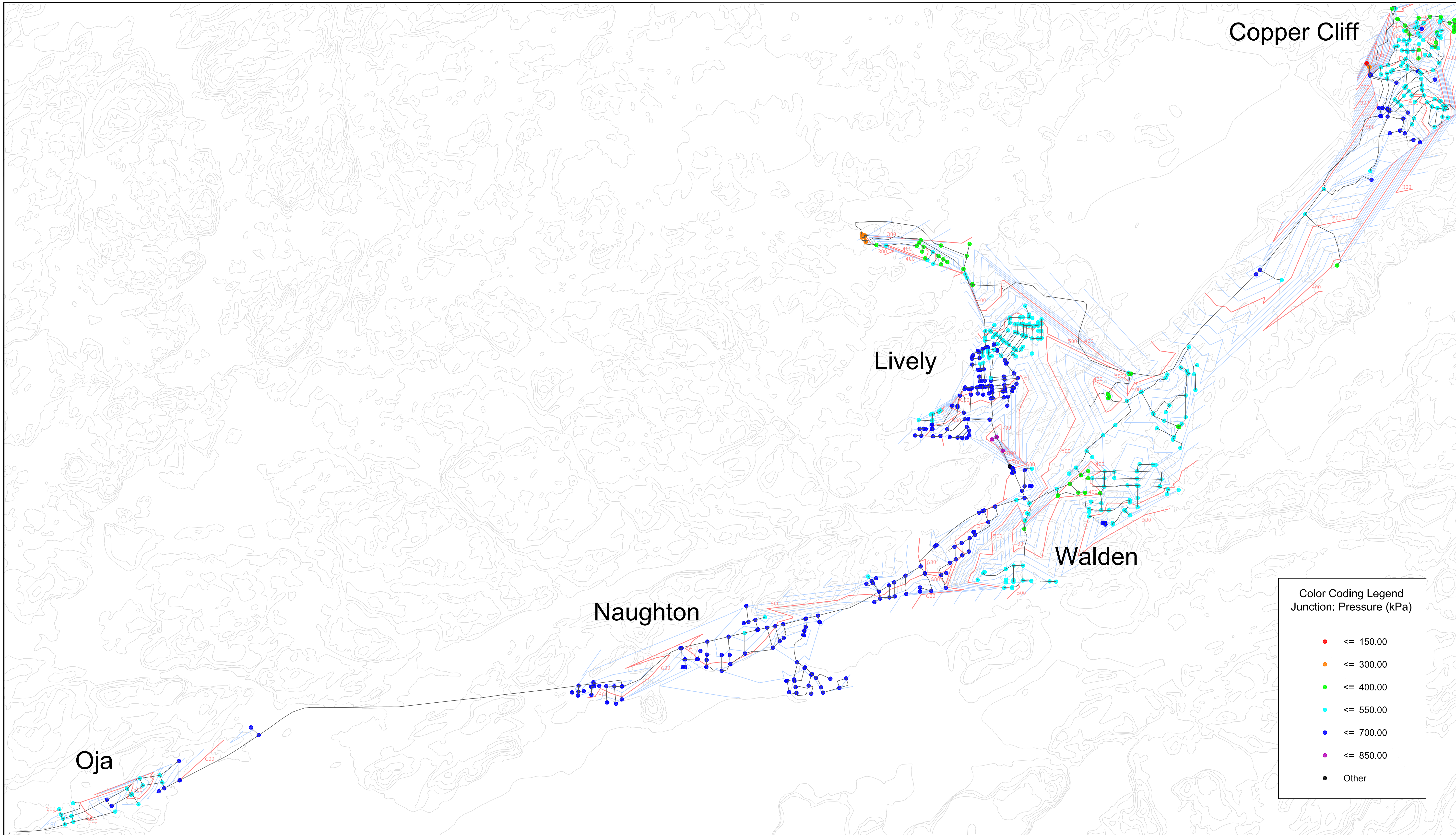
February 2015	Scale: N.T.S.	Project: 121-23026-00

WSP

Water System Pressure (Existing Peak Hour Demand)

Figure 3.4

S:\MA\12\121-23026-00 Sudbury W & WW Master Plan\3. Engineering\4. Water Modelling\3-4-8_REPORT\Figures\Fig 03-Pressure_Peak Hr Demand.dwg



Legend

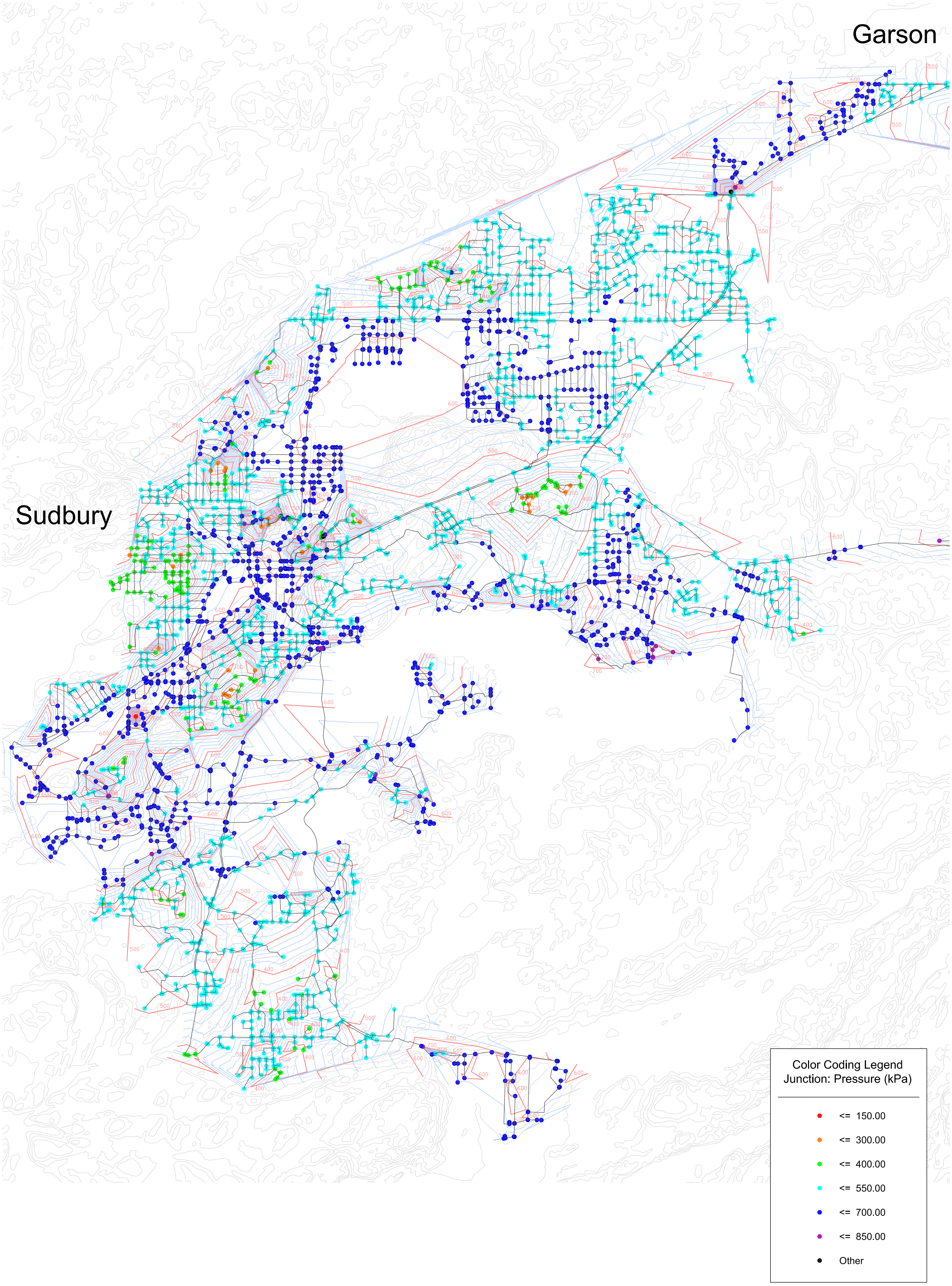
February 2015	Scale: N.T.S.	Project: 121-23026-00

WSP

Water System Pressure (Existing Peak Hour Demand)

Figure 3.5

S:\MA\12\121-23026-00 Sudbury W & WW Master Plan\3. Engineering\4. Water Modelling\3-4-8_REPORT\Figures\Fig 03-Pressure_Peak Hr Demand.dwg



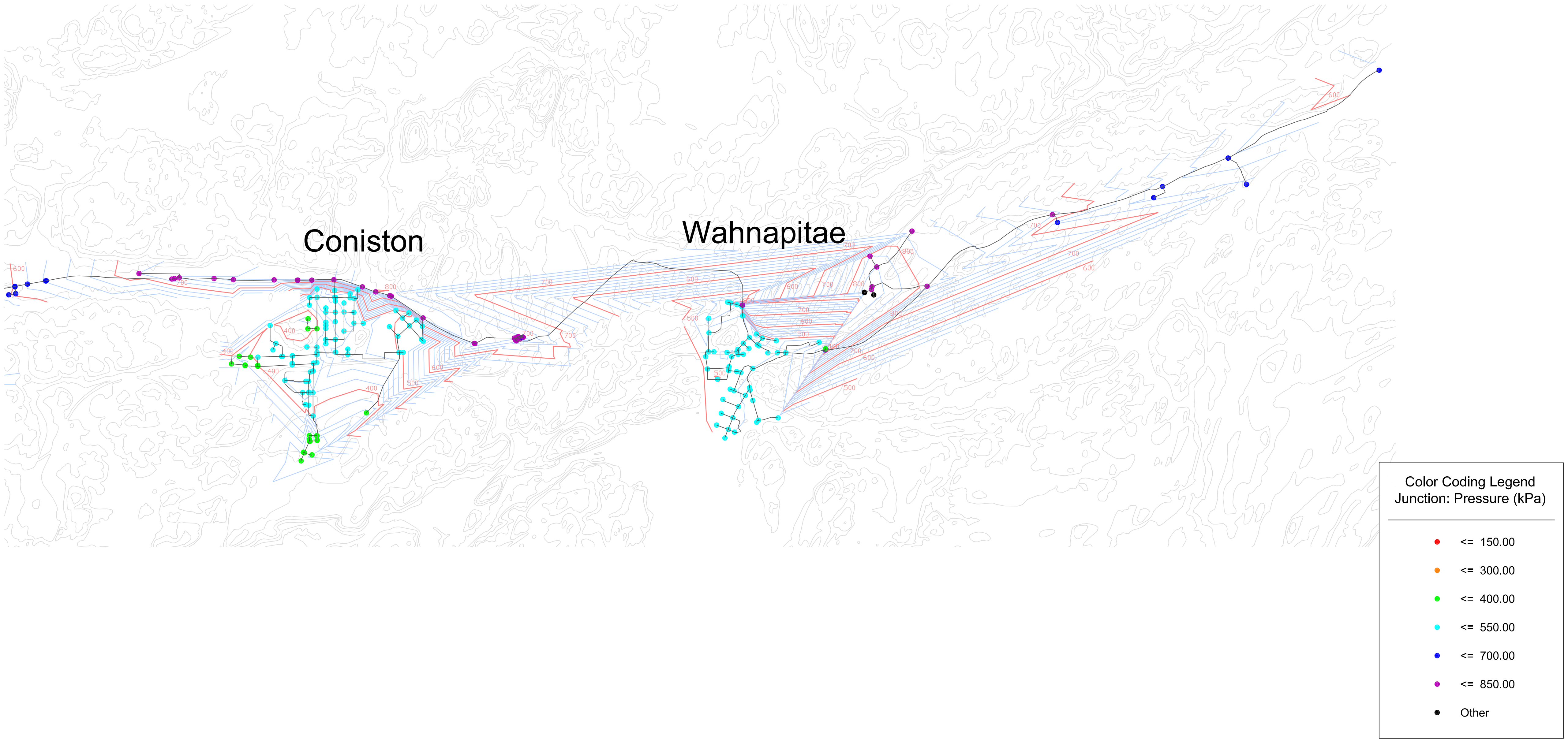
Legend

February 2015	Scale: N.T.S.	Project: 121-23026-00

WSP

Water System Pressure (Existing Peak Hour Demand)

Figure 3.6



Legend

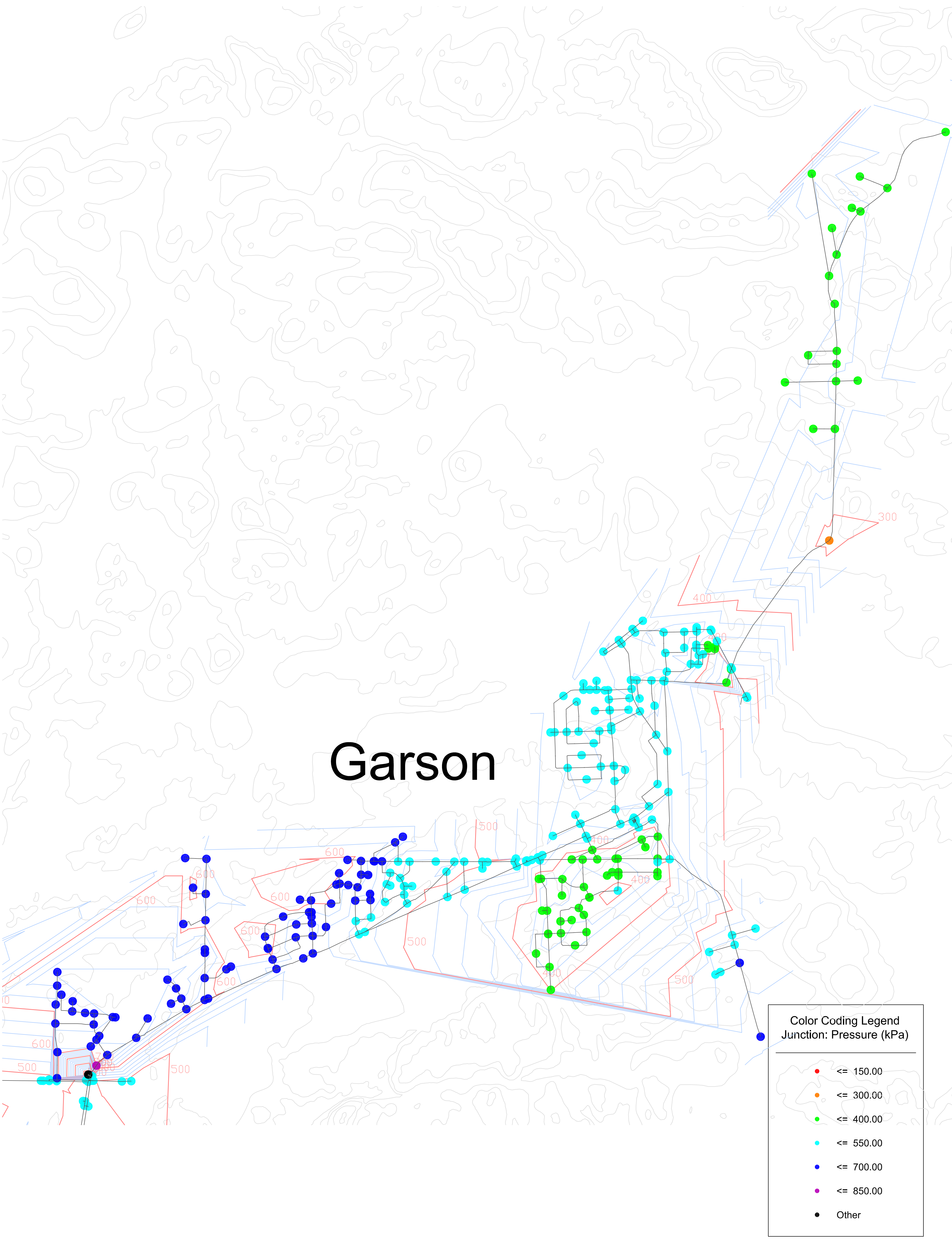
February 2015	Scale: N.T.S.	Project: 121-23026-00

WSP

Water System Pressure (Existing Peak Hour Demand)

Figure 3.7

S:\MA\12\121-23026-00 Sudbury W & WW Master Plan\3. Engineering\4. Water Modelling\3-4-8_REPORT\Figures\Fig 03-Pressure_Peak Hr Demand.dwg



Legend

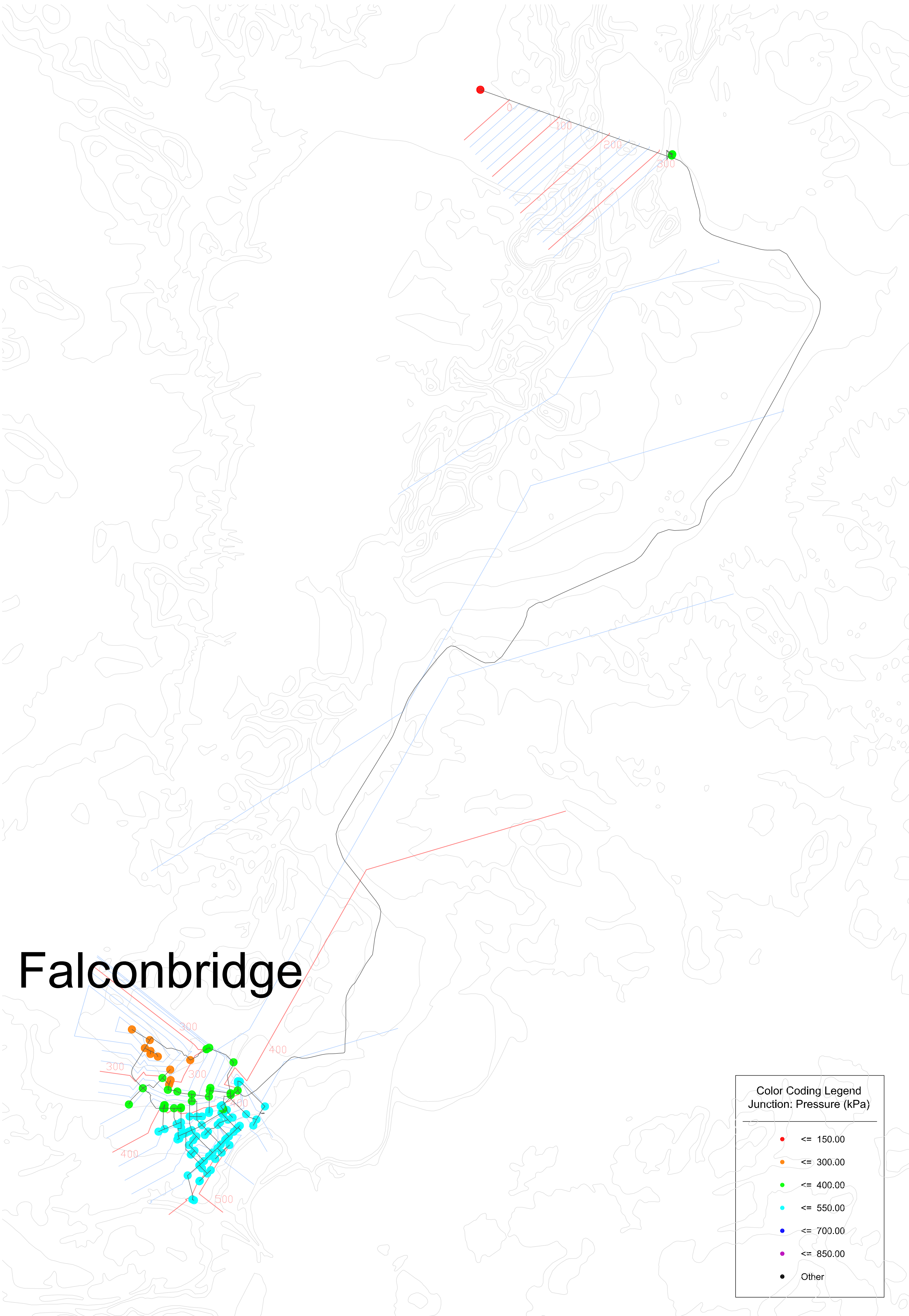
February 2015	Scale: N.T.S.	Project: 121-23026-00

WSP

Water System Pressure (Existing Peak Hour Demand)

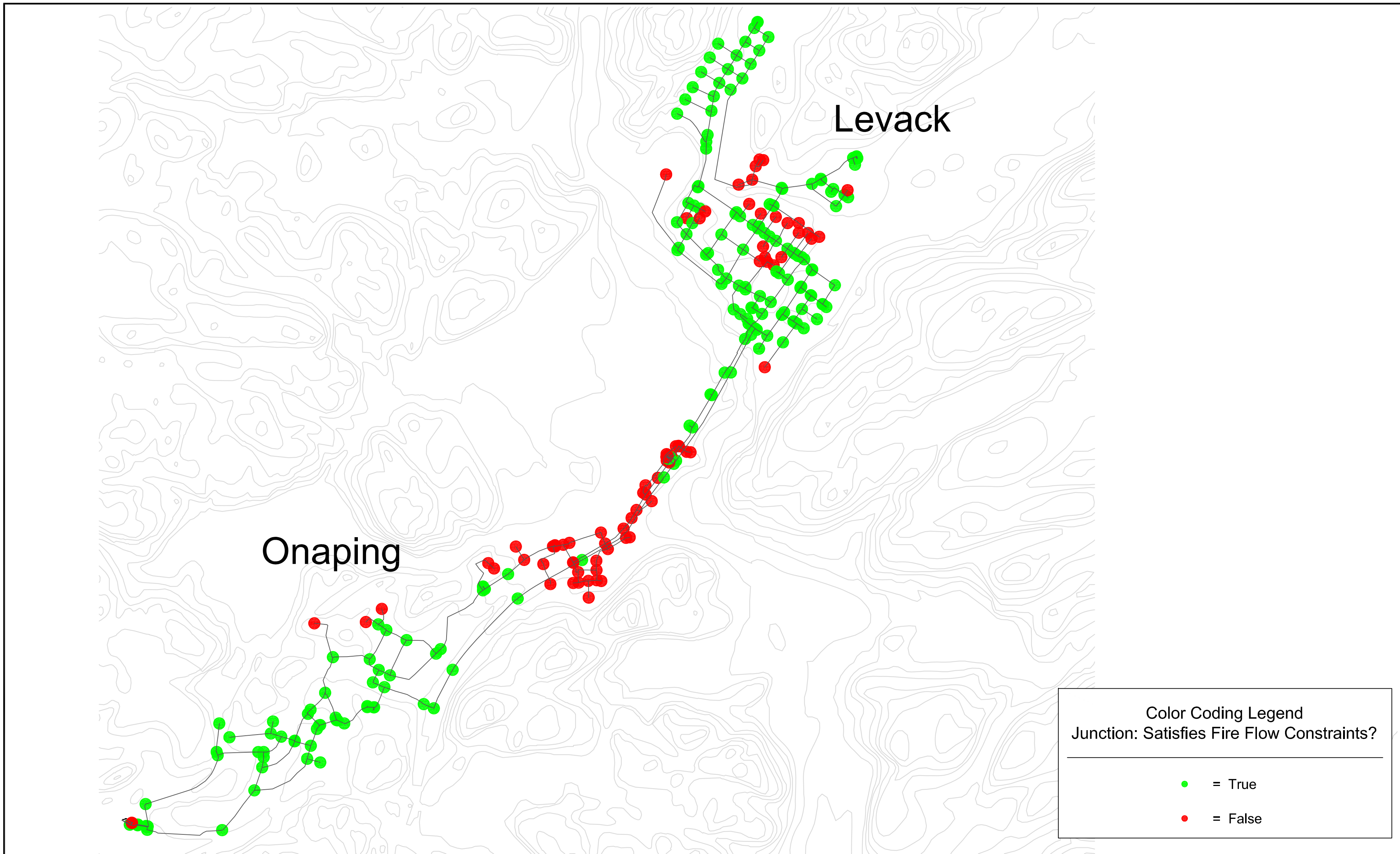
Figure 3.8

S:\MA\12\121-23026-00 Sudbury W & WW Master Plan\3. Engineering\4. Water Modelling\3-4-8_REPORT\Figures\Fig 03-Pressure_Peak Hr Demand.dwg



Legend	February 2015	Scale: N.T.S.	Project: 121-23026-00	Water System Pressure (Existing Peak Hour Demand)
	WSP			Figure 3.9

S:\MA\12\121-23026-00 Sudbury W & WW Master Plan\3. Engineering\4. Water Modelling\3-4-8_REPORT\Figures\Fig 03-Pressure_Peak Hr Demand.dwg



Legend

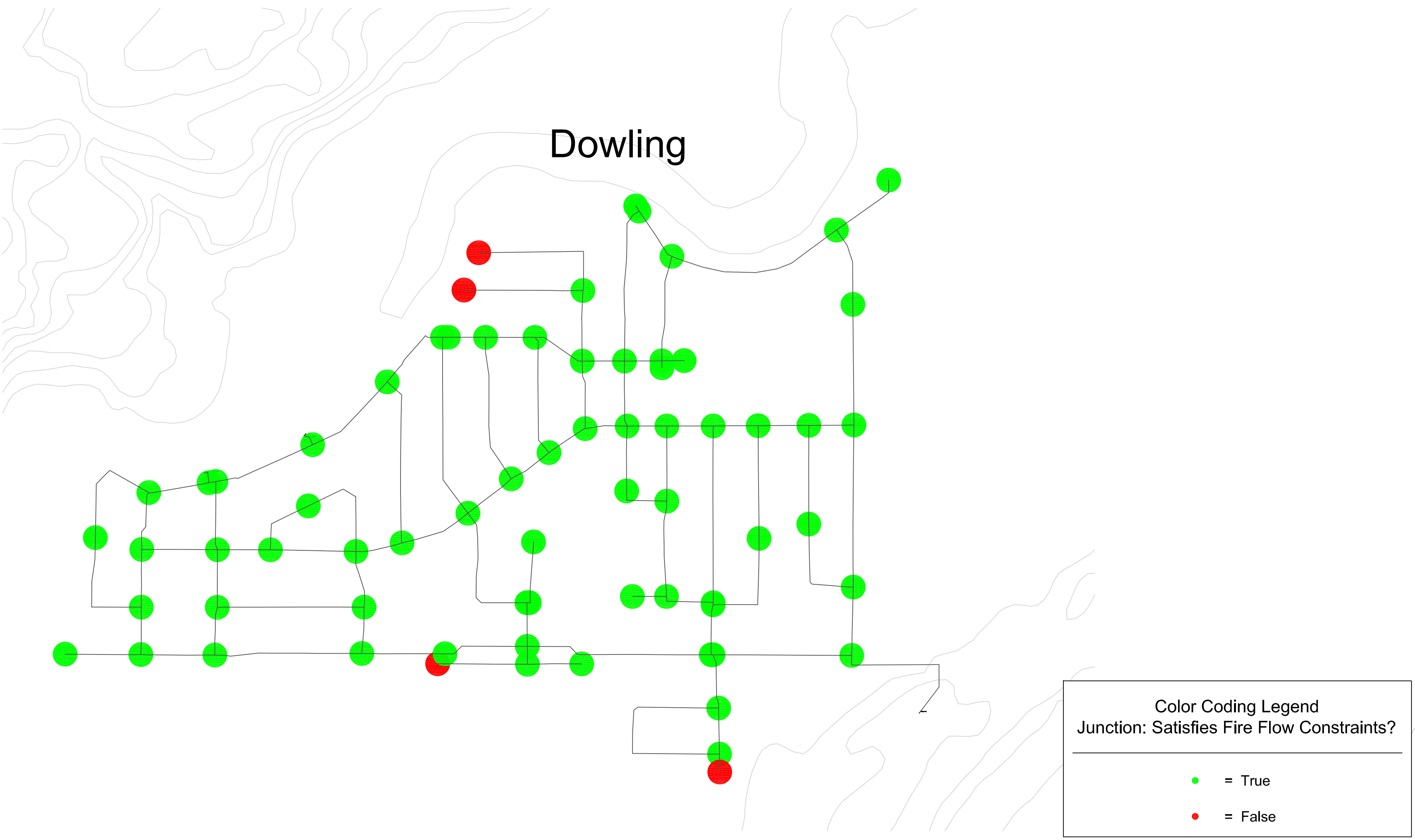
February 2015	Scale: N.T.S.	Project: 121-23026-00

WSP

Fire Flow (Existing Maximum Day Demand)

Figure 4.1

S:\MA\12\121-23026-00 Sudbury W & WW Master Plan\3. Engineering\4. Water Modelling\3-4-8_REPORT\Figures\Fig 04-Fire Flow_Max Day Demand.dwg



Legend

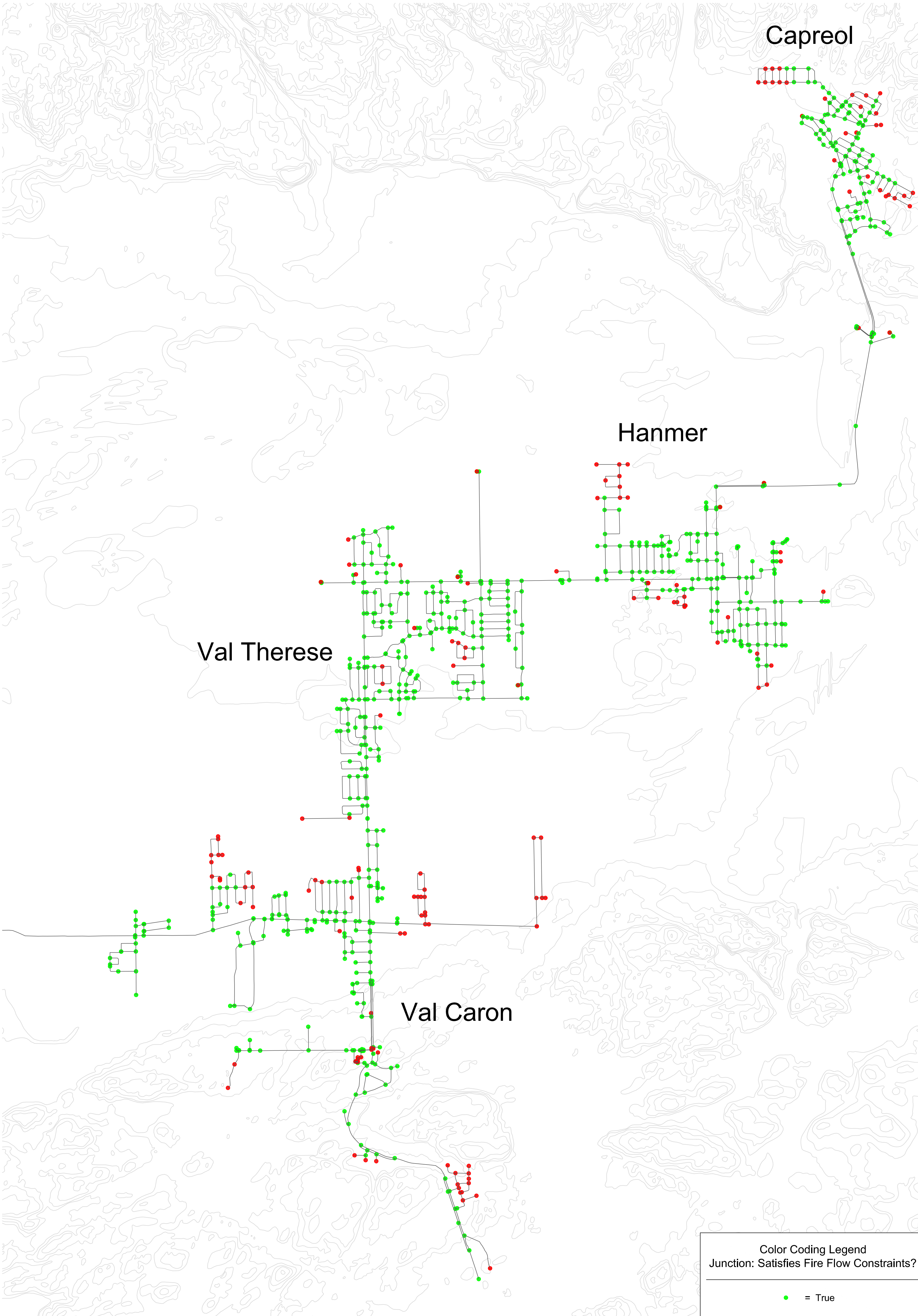
February 2015	Scale: N.T.S.	Project: 121-23026-00

WSP

Fire Flow (Existing Maximum Day Demand)

Figure 4.2

S:\MA\12\121-23026-00 Sudbury W & WW Master Plan\3. Engineering\4. Water Modelling\3-4-8_REPORT\Figures\Fig 04-Fire Flow_Max Day Demand.dwg



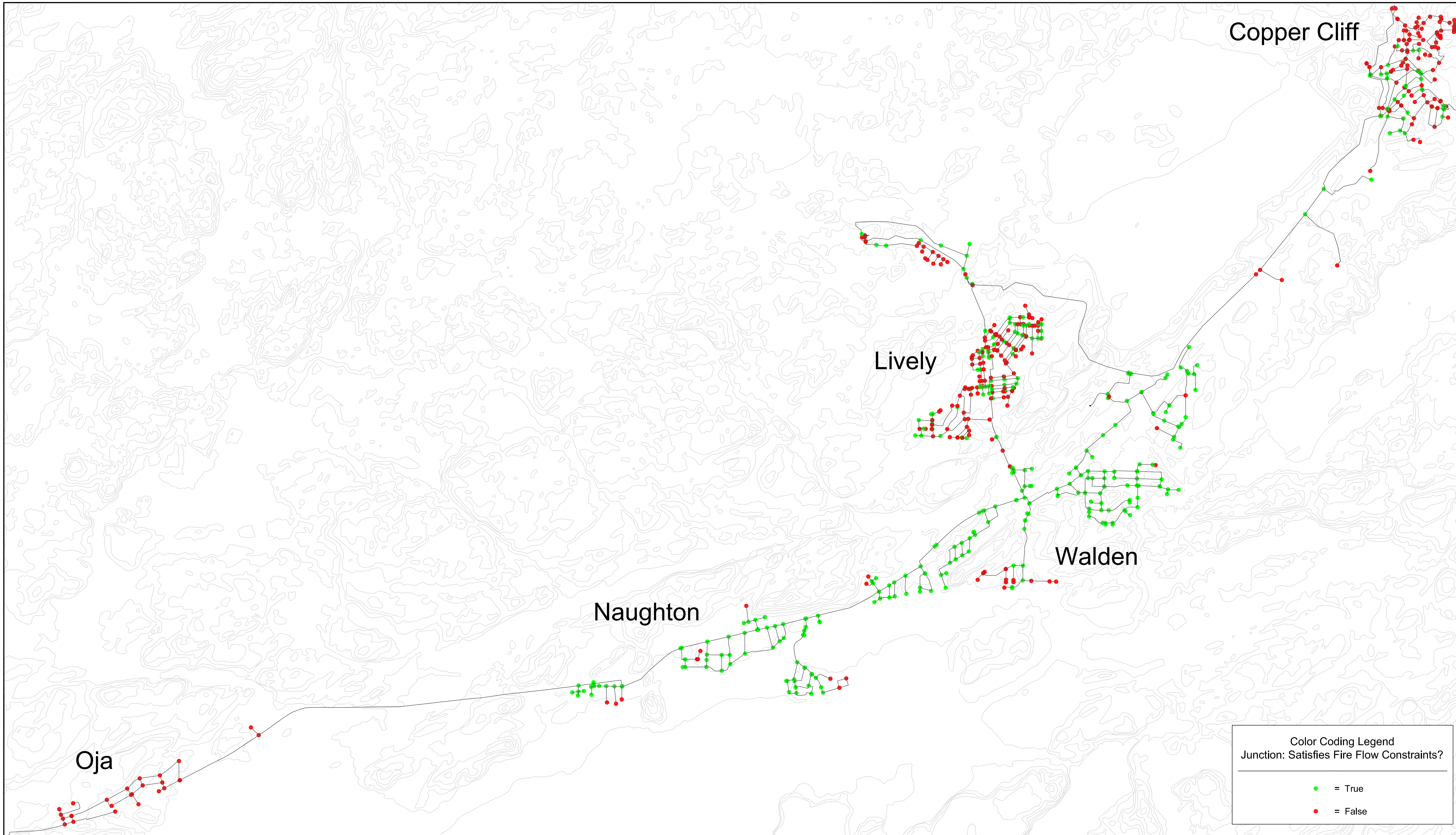
Legend

February 2015	Scale: N.T.S.	Project: 121-23026-00

Fire Flow (Existing Maximum Day Demand)

Figure 4.4

S:\MA\12\121-23026-00 Sudbury W & WW Master Plan\3. Engineering\4. Water Modelling\3-4-8_REPORT\Figures\Fig 04-Fire Flow_Max Day Demand.dwg



Legend

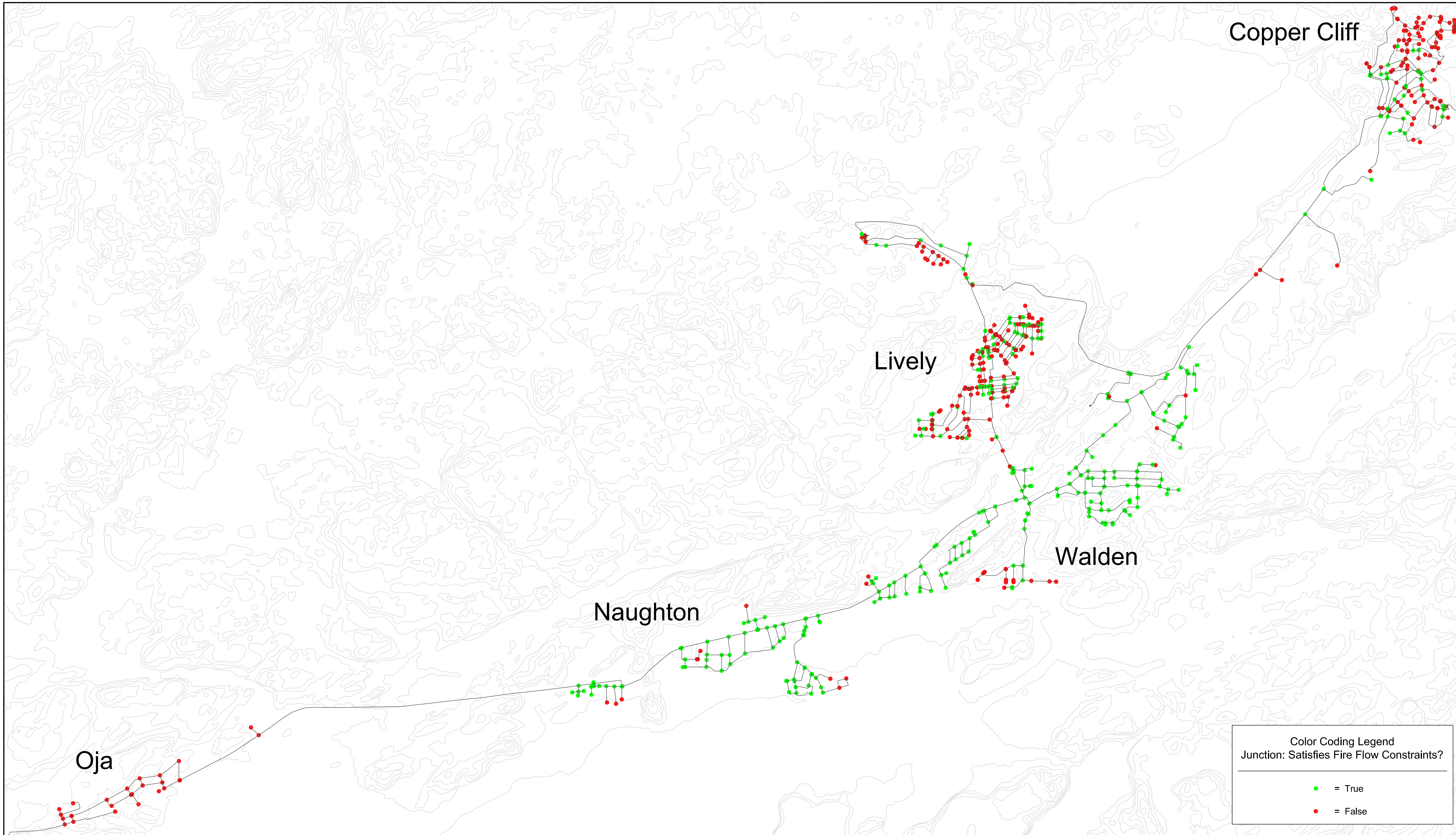
May 2014	Scale: N.T.S.	Project: 121-23026-00

WSP

Fire Flow (Existing Maximum Day Demand)

Figure 4.4

\\serv-mrk-data2\PROJECT\MA\12\121-23026-00 Sudbury W & WW Master Plan\3. Engineering\4. Water Modelling\Working Models\Figures\Fig 04-Fire Flow_Max Day Demand.dwg



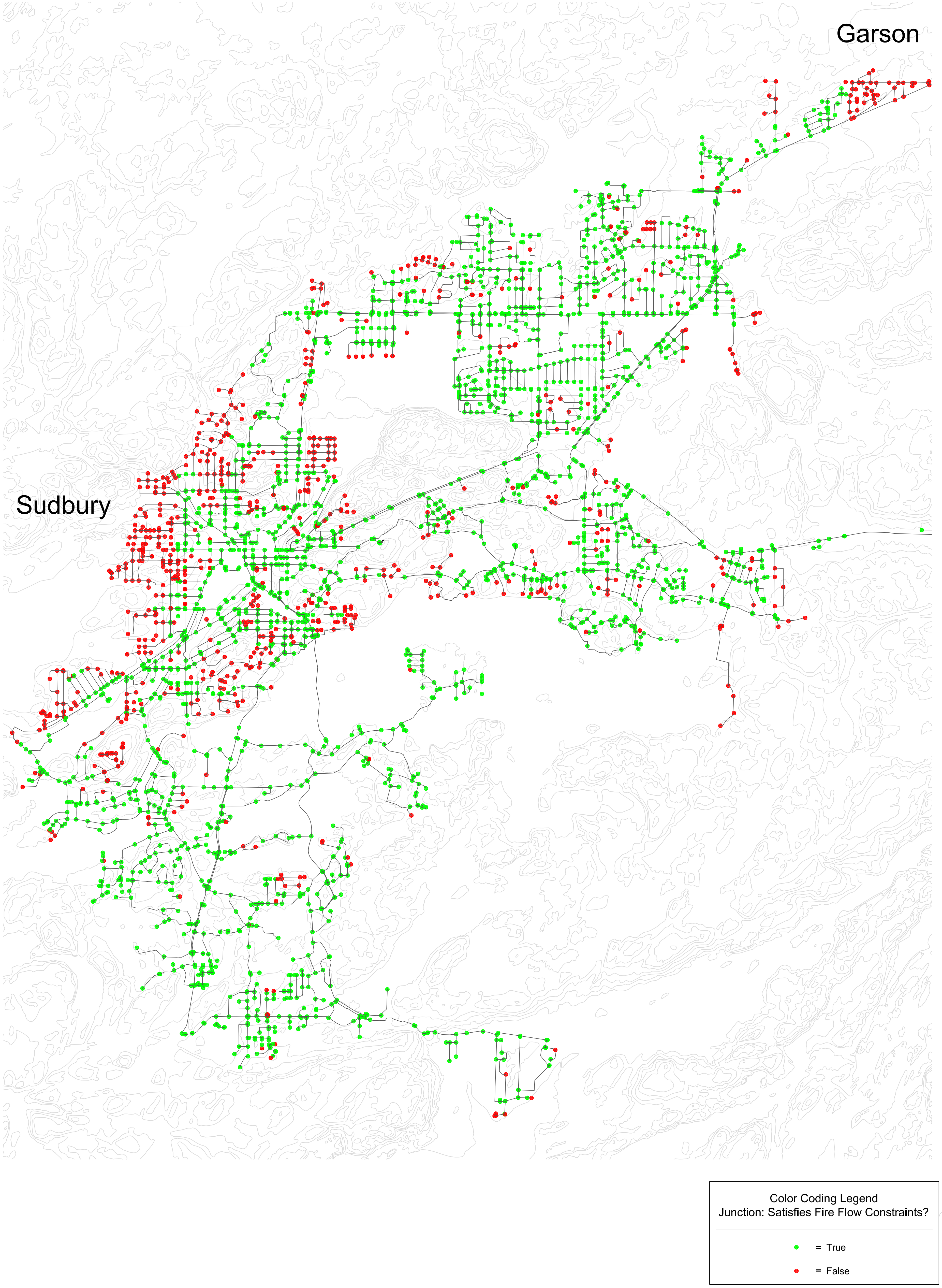
Legend

February 2015	Scale: N.T.S.	Project: 121-23026-00

Fire Flow (Existing Maximum Day Demand)

Figure 4.5

S:\MA\12\121-23026-00 Sudbury W & WW Master Plan\3. Engineering\4. Water Modelling\3-4-8_REPORT\Figures\Fig 04-Fire Flow_Max Day Demand.dwg



Legend

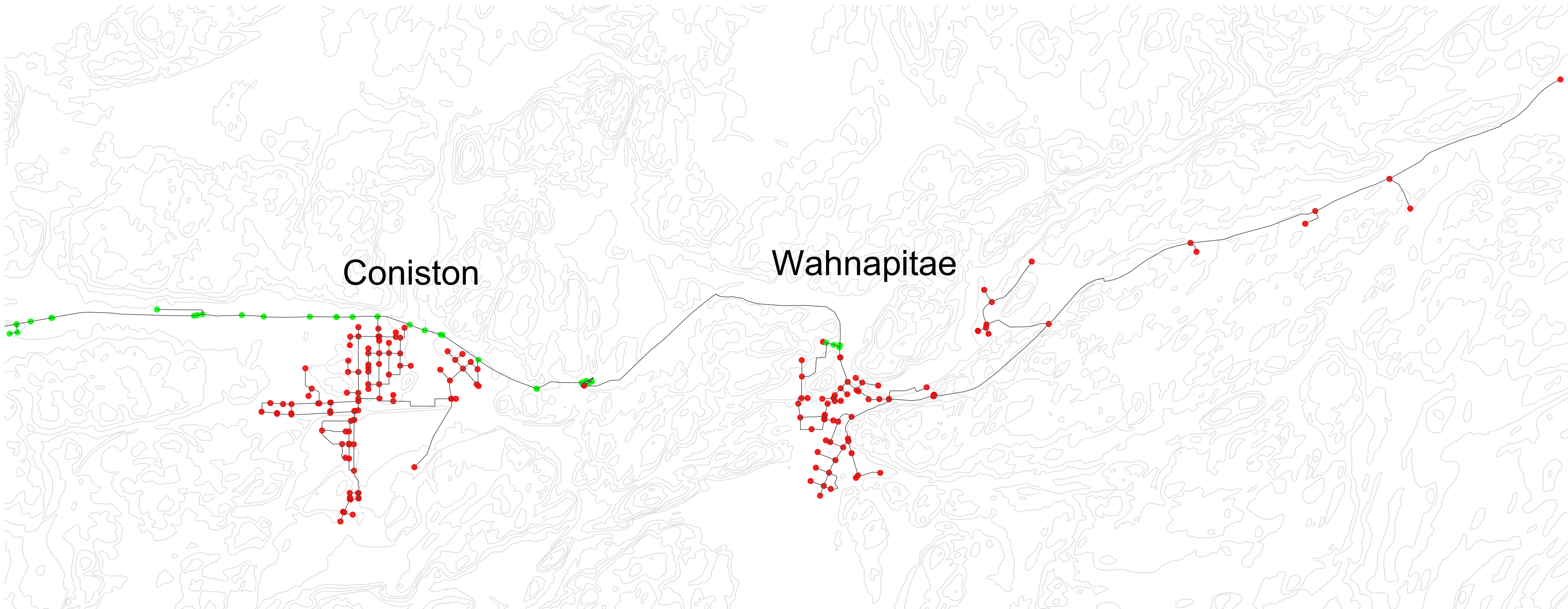
February 2015	Scale: N.T.S.	Project: 121-23026-00

WSP

Fire Flow (Existing Maximum Day Demand)

Figure 4.6

S:\MA\12\121-23026-00 Sudbury W & WW Master Plan\3. Engineering\4. Water Modelling\3-4-8_REPORT\Figures\Fig 04-Fire Flow_Max Day Demand.dwg



Legend

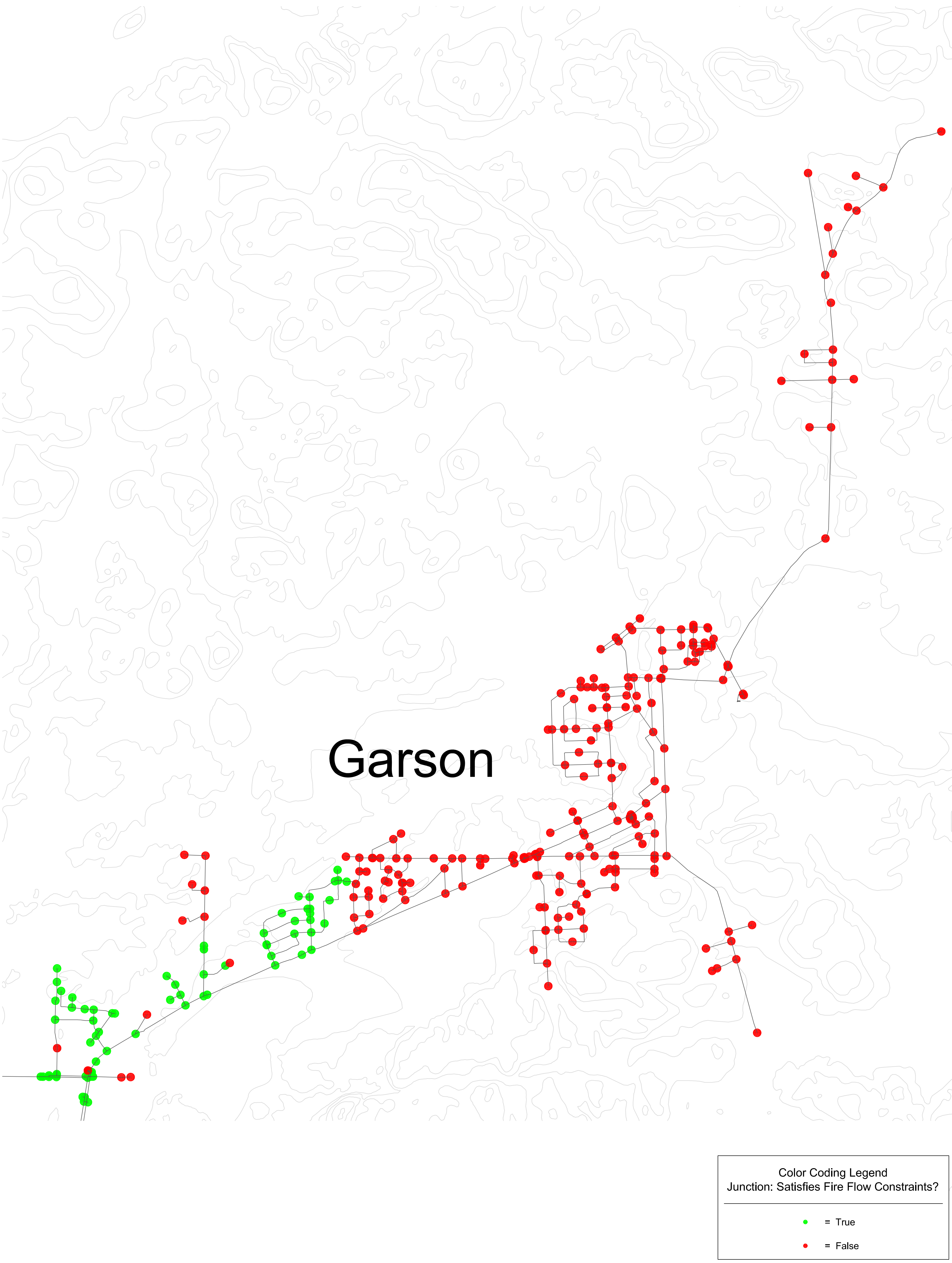
February 2015	Scale: N.T.S.	Project: 121-23026-00

WSP

Fire Flow (Existing Maximum Day Demand)

Figure 4.7

S:\MA\12\121-23026-00 Sudbury W & WW Master Plan\3. Engineering\4. Water Modelling\3-4-8_REPORT\Figures\Fig 04-Fire Flow_Max Day Demand.dwg



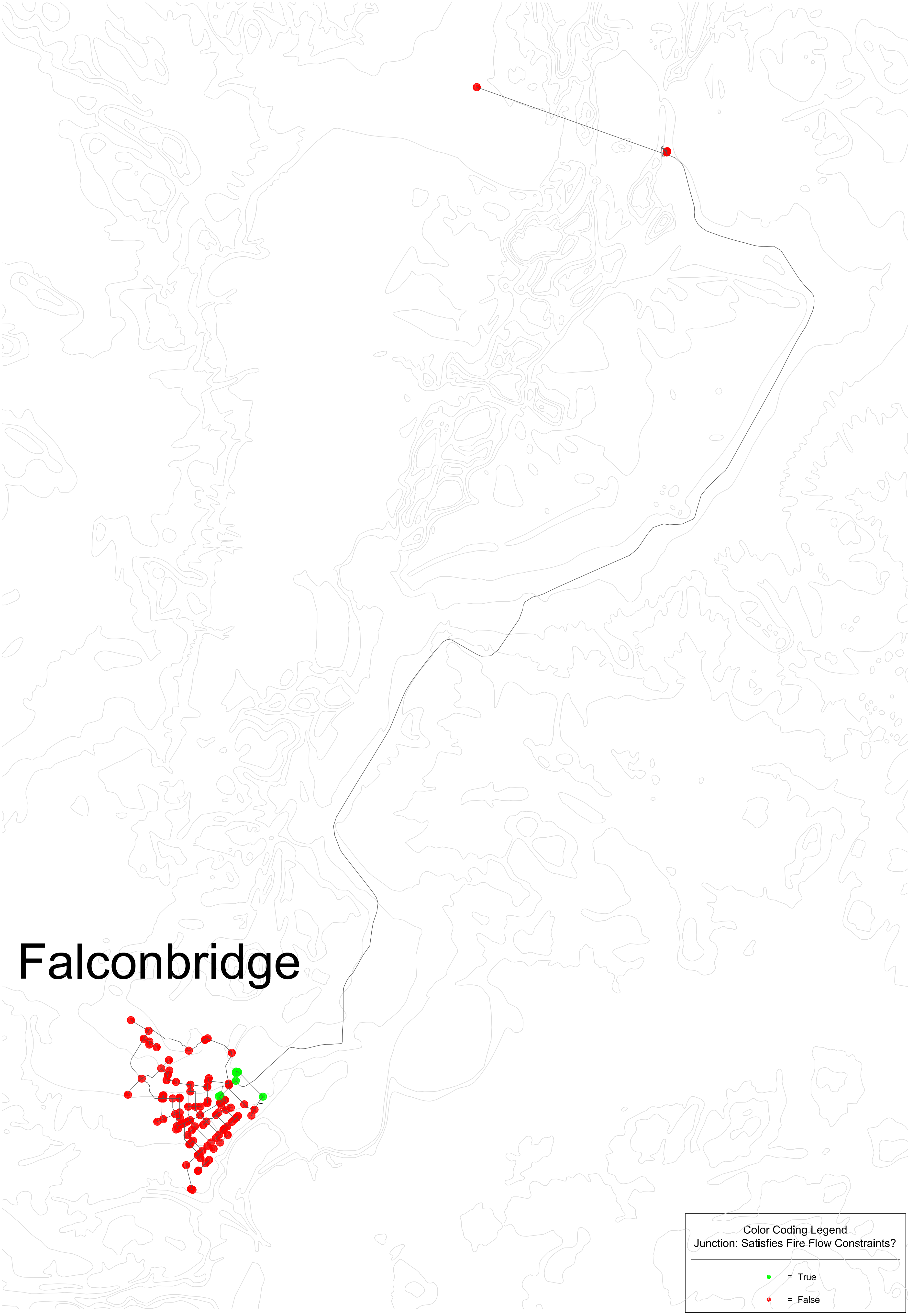
Legend

February 2015	Scale: N.T.S.	Project: 121-23026-00

Fire Flow (Existing Maximum Day Demand)

Figure 4.8

S:\MA\12\121-23026-00 Sudbury W & WW Master Plan\3. Engineering\4. Water Modelling\3-4-8_REPORT\Figures\Fig 04-Fire Flow_Max Day Demand.dwg



Legend	February 2015	Scale: N.T.S.	Project: 121-23026-00	Fire Flow (Existing Maximum Day Demand)
	WSP			Figure 4.9

S:\MA\12\121-23026-00 Sudbury W & WW Master Plan\3. Engineering\4. Water Modelling\3-4-8_REPORT\Figures\Fig 04-Fire Flow_Max Day Demand.dwg

CITY OF GREATER SUDBURY WATER AND WASTEWATER MASTER PLAN

BASELINE REVIEW REPORT FOR WASTEWATER SYSTEMS

CITY OF GREATER SUDBURY

DRAFT

PROJECT NO.: 121-23026-00
DATE: SEPTEMBER 2014

WSP
100 COMMERCE VALLEY DRIVE WEST
THORNHILL, ON, CANADA L3T 0A1

TEL.: +1 905 882-1100
FAX: +1 905 882-0055
WSP.COM

TABLE OF CONTENTS

1 INTRODUCTION 1

2 REGULATORY REQUIREMENTS 2

2.1 The Planning Act, 1990 2

2.1.1 Provincial Policy Statement, 2014 2

2.2 Clean Water Act, 2006 3

2.3 Wastewater System Effluent Regulations, 2012 3

2.4 MOE Guideline F-5 4

2.5 MOE Guidelines B-1 and B-2 4

3 WASTEWATER SYSTEMS OVERVIEW 5

3.1 Lift Stations 5

3.2 Wastewater Treatment Plants 5

4 AZILDA WASTEWATER SYSTEM 6

4.1 Lift Stations 6

4.1.1 Bypasses and Spills 7

4.1.2 Recent and Proposed Near Term Upgrades 7

4.2 Wastewater Treatment Plant 7

4.2.1 Unit Process Description 7

4.2.2 Effluent Criteria 9

4.2.3 Bypasses and Spills 9

4.2.4 Recent and Proposed Near Term Upgrades 9

5 CAPREOL WASTEWATER SYSTEM 10

5.1 Lift Stations 10

5.1.1 Bypasses and Spills 10

5.1.2 Recent and Proposed Near Term Upgrades 11

5.2 Lagoon 11

5.2.1 Unit Process Description 11

5.2.2 Effluent Criteria 11
5.2.3 Bypasses and Spills 11
5.2.4 Recent and Proposed Near Term Upgrades 12

6 CHELMSFORD WASTEWATER SYSTEM 13

6.1 Lift Stations 13
6.1.1 Bypasses and Spills 14
6.1.2 Recent and Proposed Near Term Upgrades 14

6.2 Wastewater Treatment Plant 14
6.2.1 Unit Process Description 15
6.2.2 Effluent Criteria 17
6.2.3 Bypasses and Spills 17
6.2.4 Recent and Proposed Near Term Upgrades 17

7 CONISTON WASTEWATER SYSTEM 18

7.1 Lift Stations 18
7.1.1 Bypasses and Spills 18
7.1.2 Recent and Proposed Near Term Upgrades 19

7.2 Wastewater Treatment Plant 19
7.2.1 Unit Process Description 19
7.2.2 Effluent Criteria 19
7.2.3 Bypasses and Spills 19
7.2.4 Recent and Proposed Near Term Upgrades 20

8 COPPER CLIFF WASTEWATER SYSTEM 21

8.1 Lift Stations 21
8.1.1 Bypasses and Spills 21
8.1.2 Recent and Proposed Near Term Upgrades 21

8.2 Wastewater Treatment Plant 22

9 DOWLING WASTEWATER SYSTEM 23

9.1 Lift Stations 23
9.1.1 Bypasses and Spills 23

9.1.2 Recent and Proposed Near Term Upgrades 23

9.2 Wastewater Treatment Plant 23

9.2.1 Unit Process Description 24

9.2.2 Effluent Criteria 24

9.2.3 Bypasses and Spills 24

9.2.4 Recent and Proposed Near Term Upgrades 24

10 FALCONBRIDGE WASTEWATER SYSTEM 25

10.1 Wastewater Treatment Plant 25

10.1.1 Unit Process Description 25

10.1.2 Effluent Criteria 25

10.1.3 Bypasses and Spills 26

10.1.4 Recent and Proposed Near Term Upgrades 26

11 GARSON WASTEWATER SYSTEM 27

11.1 Lift Stations 27

11.1.1 Bypasses and Spills 28

11.1.2 Recent and Proposed Near Term Upgrades 28

11.2 Wastewater Treatment Plant 28

11.2.1 Bypasses and Spills 28

11.2.2 Recent and Proposed Near Term Upgrades 28

12 LEVACK WASTEWATER SYSTEM 29

12.1 Lift Stations 29

12.1.1 Bypasses and Spills 29

12.1.2 Recent and Proposed Near Term Upgrades 29

12.2 Wastewater Treatment Plant 29

12.2.1 Unit Process Description 30

12.2.2 Effluent Criteria 31

12.2.3 Bypasses and Spills 31

12.2.4 Recent and Proposed Near Term Upgrades 31

13 LIVELY/WALDEN WASTEWATER SYSTEM 32

13.1 Lift Stations 32

13.1.1 Bypasses and Spills....33
13.1.2 Recent and Proposed Near Term Upgrades....34

13.2 Lively Wastewater Treatment Plant....34

13.2.1 Unit Process Description....34
13.2.2 Effluent Criteria....35
13.2.3 Bypasses and Spills....36
13.2.4 Recent and Proposed Near Term Upgrades....36

13.3 Walden Wastewater Treatment Plant....37

13.3.1 Unit Process Description....37
13.3.2 Effluent Criteria....38
13.3.3 Bypasses and Spills....38
13.3.4 Recent and Proposed Near Term Upgrades....39

14 SUDBURY WASTEWATER SYSTEM....40

14.1 Lift Stations....40

14.1.1 Bypasses and Spills....42
14.1.2 Recent and Proposed Near Term Upgrades....44

14.2 Wastewater Treatment Plant....44

14.2.1 Unit Process Description....44
14.2.2 Effluent Criteria....46
14.2.3 Bypasses and Spills....47
14.2.4 Recent and Proposed Near Term Upgrades....49

15 VALLEY EAST WASTEWATER SYSTEM....50

15.1 Lift Stations....50

15.1.1 Bypasses and Spills....51
15.1.2 Recent and Proposed Near Term Upgrades....51

15.2 Wastewater Treatment Plant....51

15.2.1 Unit Process Description....51
15.2.2 Effluent Criteria....53
15.2.3 Bypasses and Spills....53
15.2.4 Recent and Proposed Near Term Upgrades....53

16 WAHNAPITAE WASTEWATER SYSTEM 54

16.1 Lift Stations 54

16.1.1 Bypasses and Spills 54

16.1.2 Recent and Proposed Near Term Upgrades 54

16.2 Lagoon 54

16.2.1 Unit Process Description 55

16.2.2 Effluent Criteria 55

16.2.3 Bypasses and Spills 55

16.2.4 Recent and Proposed Near Term Upgrades 55

TABLES

TABLE 4-1 AZILDA LIFT STATION FORCEMAIN SIZES 6
TABLE 4-2 AZILDA WWTP UNIT PROCESS DESIGN DATA 8
TABLE 4-3 AZILDA WWTP EFFLUENT OBJECTIVES AND COMPLIANCE CRITERIA 9
TABLE 5-1 CAPREOL LIFT STATION FORCEMAIN SIZES 10
TABLE 5-2 CAPREOL LAGOON EFFLUENT OBJECTIVES AND COMPLIANCE CRITERIA 11
TABLE 6-1 CHELMSFORD LIFT STATION FORCEMAIN SIZES 13
TABLE 6-2 REPORTED SPILLS IN THE CHELMSFORD WASTEWATER SYSTEM 14
TABLE 6-3 CHELMSFORD WWTP UNIT PROCESS DESIGN DATA 16
TABLE 6-4 CHELMSFORD WWTP EFFLUENT OBJECTIVES AND COMPLIANCE CRITERIA 17
TABLE 7-1 CONISTON LIFT STATION FORCEMAIN SIZES 18
TABLE 7-2 REPORTED SPILLS IN THE CONISTON WASTEWATER SYSTEM 18
TABLE 7-3 BYPASSES REPORTED IN THE CONISTON WASTEWATER SYSTEM BETWEEN 2004 AND 2012 20
TABLE 8-1 COPPER CLIFF LIFT STATION FORCEMAIN SIZES 21
TABLE 9-1 DOWLING LIFT STATION FORCEMAIN SIZES 23
TABLE 9-2 DOWLING WWTP EFFLUENT OBJECTIVES AND COMPLIANCE CRITERIA 24
TABLE 11-1 GARSON LIFT STATION FORCEMAIN SIZES 27
TABLE 12-1 LEVACK LIFT STATION FORCEMAIN SIZES 29
TABLE 12-2 LEVACK WWTP UNIT PROCESS DESIGN DATA 30
TABLE 12-3 LEVACK WWTP EFFLUENT OBJECTIVES AND COMPLIANCE CRITERIA 31
TABLE 13-1 LIVELY / WALDEN LIFT STATION FORCEMAIN SIZES 32
TABLE 13-2 REPORTED SPILLS IN THE LIVELY/WALDEN WASTEWATER SYSTEM 33
TABLE 13-3 LIVELY WWTP UNIT PROCESS DESIGN DATA 35
TABLE 13-4 LIVELY WWTP EFFLUENT OBJECTIVES AND COMPLIANCE CRITERIA 35
TABLE 13-5 REPORTED SPILLS IN THE LIVELY WASTEWATER SYSTEM 36
TABLE 13-6 WALDEN WWTP UNIT PROCESS DESIGN DATA 37
TABLE 13-7 WALDEN WWTP EFFLUENT OBJECTIVES AND COMPLIANCE CRITERIA 38
TABLE 13-8 REPORTED SPILLS IN THE WALDEN WASTEWATER SYSTEM 38

TABLE 14-1 SUDBURY LIFT STATION FORCEMAIN SIZES 41
TABLE 14-2 REPORTED SPILLS IN THE SUDBURY LIFT STATIONS 42
TABLE 14-3 SUDBURY WWTP UNIT PROCESS DESIGN DATA 45
TABLE 14-4 SUDBURY WWTP EFFLUENT OBJECTIVES AND COMPLIANCE CRITERIA FOR PHASE 1 EXPANSION 47
TABLE 14-5 SUDBURY WWTP EFFLUENT OBJECTIVES AND COMPLIANCE CRITERIA FOR PHASE 2 EXPANSION 47
TABLE 14-6 REPORTED SPILLS IN THE SUDBURY WASTEWATER PLANT 47
TABLE 15-1 VALLEY EAST LIFT STATION FORCEMAIN SIZES....................50
TABLE 15-2 VALLEY EAST WWTP UNIT PROCESS DESIGN DATA 52
TABLE 15-3 VALLEY EAST WWTP EFFLUENT OBJECTIVES AND COMPLIANCE CRITERIA 53
TABLE 16-1 WAHNAPITAE LIFT STATION FORCEMAIN SIZES 54

FIGURES

FIGURE 4-1 AZILDA WASTEWATER SYSTEM FLOW DIAGRAM 6
FIGURE 4-2 AZILDA WWTP PROCESS 8
FIGURE 5-1 CAPREOL WASTEWATER SYSTEM FLOW DIAGRAM 10
FIGURE 5-2 CAPREOL LAGOON SYSTEM....................11
FIGURE 6-1 CHELMSFORD WASTEWATER SYSTEM FLOW DIAGRAM 13
FIGURE 6-2 CHELMSFORD WWTP PROCESS 15
FIGURE 7-1 CONISTON WASTEWATER SYSTEM FLOW DIAGRAM 18
FIGURE 7-2 CONISTON WWTP PROCESS....................19
FIGURE 8-1 COPPER CLIFF WASTEWATER SYSTEM FLOW DIAGRAM 21
FIGURE 9-1 DOWLING WASTEWATER SYSTEM FLOW DIAGRAM 23
FIGURE 9-2 DOWLING WWTP PROCESS 24
FIGURE 10-1 FALCONBRIDGE WWTP PROCESS....................25
FIGURE 11-1 GARSON WASTEWATER SYSTEM FLOW DIAGRAM 27
FIGURE 12-1 LEVACK WASTEWATER SYSTEM FLOW DIAGRAM 29

FIGURE 12-2 LEVACK WWTP PROCESS 30
FIGURE 13-1 LIVELY / WALDEN WASTEWATER SYSTEM FLOW DIAGRAM 32
FIGURE 13-2 LIVELY WWTP PROCESS 34
FIGURE 13-3 WALDEN WWTP PROCESS 37
FIGURE 14-1 SUDBURY WASTEWATER SYSTEM FLOW DIAGRAM 40
FIGURE 14-2 SUDBURY WWTP PROCESS 45
FIGURE 15-1 VALLEY EAST WASTEWATER SYSTEM FLOW DIAGRAM 50
FIGURE 15-2 VALLEY EAST WWTP PROCESS 51
FIGURE 16-1 WAHNAPITAE WASTEWATER SYSTEM FLOW DIAGRAM 54
FIGURE 16-2 WAHNAPITAE LAGOON SYSTEM 55

1 INTRODUCTION

The City of Greater Sudbury (CGS) retained WSP (previously GENIVAR) to undertake a Water and Wastewater Master Plan. The purpose of the Master Plan project is to establish servicing strategies for water and wastewater infrastructure for the core urban areas and surrounding communities in the City for the next 20 years, per the City's Official Plan.

The Study is being conducted in accordance with the requirements set out in the Municipal Class Environmental Assessment (Class EA) document (June 2000 as amended in 2007 and in 2011).

A key component of the Master Plan is to incorporate the City's Official Plan, as well as the City's Water and Wastewater mission statement into long-term infrastructure planning. The mission statement is:

> *The City of Greater Sudbury Water/Wastewater Services Division is committed to providing its customers with safe, reliable, and environmentally responsible municipal water and wastewater services with a sustainable, cost effective approach.*

This Baseline Review Report compiles and documents available information on the City's existing wastewater infrastructure and establishes the starting point in the assessment of the wastewater systems to service the existing and projected development. The report also includes an overview of the regulatory requirements relevant to the planning and design of wastewater systems in Ontario and a description of the various wastewater conveyance systems and treatment facilities in the City.

A separate baseline review report has been completed for the water systems.

2 REGULATORY REQUIREMENTS

2.1 THE PLANNING ACT, 1990

The Planning Act establishes the mechanisms and rules for land use planning in Ontario, outlining how land uses may be controlled, and who may control them. The Act sets the basis for the preparation of official plans and planning policies for future development, and it provides municipalities with local autonomy to make decisions and streamline the planning process. The Act empowers local citizens to provide their input to their municipal council and, where permitted, to appeal decisions to the Ontario Municipal Board.

Through the Act, the Province issues Provincial Policy Statements and plans (e.g. Greenbelt Plan and Growth Plan for the Greater Golden Horseshoe, 2006).

2.1.1 PROVINCIAL POLICY STATEMENT, 2014

The Provincial Policy Statement (PPS) is a key component of Ontario's planning system as it sets policy direction on matters of provincial interest related to land use planning, growth management, environmental protection, and public health and safety. It aims to provide a stronger policy framework that guides communities in Ontario toward a higher quality of life and a better long-term future.

The PPS establishes the various municipalities' roles in planning for growth, intensification and redevelopment. New settlement area policies will only permit expansions where it is demonstrated that opportunities for growth are not available through intensification, redevelopment or in designated areas. The PPS also requires municipalities to co–ordinate and provide direction on policies with cross municipal boundaries, such as natural heritage systems and resource management.

The PPS states that infrastructure planning must be coordinated and integrated with land use planning so that they are:

1 Financially viable over the lifecycle, which may be demonstrated through asset management planning
2 Available to meet current and projected needs

The PPS promotes optimizing existing infrastructure and public service facilities as well as using opportunities for adaptive re-use, where feasible.

In addition to the above, requirements for planning water and wastewater infrastructure specified in the PPS are listed below:

1 Direct and accommodate expected growth or development in a manner that promotes the efficient use and optimization of existing:
— Municipal sewage services and municipal water services
— Private communal sewage services and private communal water services, where municipal sewage services and municipal water services are not available
2 Ensure that these systems are provided in a manner that:
— Can be sustained by the water resources upon which such services rely
— Is feasible, financially viable and complies with all regulatory requirements and
— Protects human health and the natural environment
3 Promote water conservation and water use efficiency
4 Integrate servicing and land use considerations at all stages of the planning process
5 Be in accordance with the servicing hierarchy outlined in the PPS, which briefly identifies the following in order of descending preference:
— Municipal servicing

- Private communal servicing
- Individual on-site servicing
- Partial servicing

2.2 CLEAN WATER ACT, 2006

The Province of Ontario developed the Clean Water Act to protect drinking water through a “source to tap” policy. This policy is intended to provide necessary protection of drinking water resources through a multi barrier approach which includes protection of the source water, such as surface or groundwater, prior to intake into the drinking water system. A key requirement of the Act is development of a Source Protection Plan specific to a respective watershed.

The three main phases of developing a Source Protection Plan include: Assessment, Planning, and Management. Assessment involves taking an inventory of current conditions of and potential threats to drinking water sources. Planning ensures appropriate land use designations to prevent threats of existing and future land use activities to drinking water sources. Finally, Management aims to monitor to prevent threats to drinking water sources.

A Source Protection Plan has been prepared for the Sudbury area and can be reviewed online at www.sourcewatersudbury.ca.

2.3 WASTEWATER SYSTEM EFFLUENT REGULATIONS, 2012

On June 29 2012, amendments to the Fisheries Act received Royal Assent. The changes focus on protecting the productivity of recreational, commercial and Aboriginal fisheries. Of particular importance to this Master Plan is the Wastewater System Effluent Regulations, 2012, which is one of the regulations created under the Fisheries Act.

The Wastewater System Effluent Regulations are applicable to wastewater systems that collect, or are designed to collect, an average volume of 100 m^3/d or more of influent. The Regulations require wastewater treatment plant effluents to meet average concentration limits of 25 mg/L for $CBOD_5$ and TSS and 0.02 mg/L for total residual chlorine (TRC), and a maximum concentration limit of 1.25 mg/L for un-ionized ammonia (expressed as nitrogen) at 15°C +/- 1°C. The effluent must also not be acutely lethal (based on the rainbow trout acute lethality test). The Regulations also specify effluent sampling frequencies, recordkeeping and reporting requirements.

The requirements set in the Regulations are to be enforced in a phased fashion. The Regulations require the measurement of wastewater volume treated and the monitoring of deleterious substances in the effluent ($CBOD_5$, TSS, TRC, and un-ionized ammonia) starting January 2013. Acute lethality monitoring began in January 1, 2015 for systems treating over 2,500 m^3/d. An Annual Monitoring Report has to be submitted annually or quarterly depending on the size of treatment facility. Quarterly reporting is required starting May 15, 2013 for continuous plants with capacity greater than or equal to 2,500 m^3/d and then within 45 days of the end of each quarter. As of February 14, 2014, annual reporting has been required 45 days after the end of each calendar year for intermittent systems and for continuous systems with capacities less than 2,500 m^3/d. A Combined Sewer Overflow Report has to be submitted for systems with at least one CSO point by February 15 of every year. This requirement came into effect February 15, 2014.

Transitional authorization may be obtained if a facility does not meet the effluent limits established by the Regulation. Particularly, a transitional authorization to discharge un-ionized ammonia may be obtained if un-ionized ammonia 100 m from discharge point is less than or equal to 0.016 mg/L N and it is found that acute toxicity is caused by ammonia (i.e. the effluent fails the acute toxicity test and the effluent un-ionized ammonia concentration is over 1.25 mg/L N). The initial application for transitional authorization is required within 30 days of the acute toxicity result.

2.4 MOE GUIDELINE F-5

The Ontario Ministry of the Environment and Climate Change (MOECC) requires that municipal and private sewage treatment works, outfall structures and emergency overflow facilities be located designed, constructed and operated so as to minimize pollution of receiving waters and interference with water uses.

The primary purpose of Guideline F-5 is to describe the levels of treatment required for municipal and private sewage treatment works discharging to surface waters. This Guideline is supported by Guideline B-1, which is described in Section 2.5, as well as:

— Procedure F-5-1: Determination of Treatment Requirements for Municipal and Private Sewage Treatment Works Discharging to Surface Waters
— Procedure F-5-2: Relaxation of Normal Level of Treatment for Municipal and Private Sewage Treatment Works Discharging to Surface Waters
— Procedure F-5-3: Derivation of Sewage Treatment Works Effluent Requirements for the Incorporation of Effluent Requirements into Certificates of Approval for New or Expanded Sewage Treatment Works
— Procedure F-5-4: Effluent Disinfection Requirements for Sewage Works Discharging to Surface Waters
— Procedure F-5-5: Determination of Treatment Requirements for Municipal and Private Combined and Partially Separated Sewer Systems

Guideline F-5 states that the level of treatment for new or expanded sewage treatment works must be in accordance with Procedures F-5-1 and F-5-2. Effluent requirements, including both waste loadings and concentrations, must be derived in accordance with Procedure F-5-3 or those established in the Wastewater System Effluent Regulations (See Section 2.3), whichever are stricter.

Requirements for the mitigation of Combined Sewer Overflows (CSOs) are dictated by Procedure F-5-5. Pollution Prevention and Control Plans (PPCPs) are required to address CSO issues. The PPCPs will ultimately provide the City, Ministry of the Environment and Climate Change, and the community with a long term plan for managing combined sewer overflows and bypasses in the City of Greater Sudbury.

2.5 MOE GUIDELINES B-1 AND B-2

Under Guideline B-1, the MOECC establishes specific receiving water quality objectives (that is, Provincial Water Quality Objectives, or PWQO) for many pollutants, and the requirements intended to ensure that the objectives are maintained or achieved. These objectives are used as the basis for establishing specific effluent requirements (design objectives and non-compliance criteria) for sewage works proposed for approval under Section 53 of the Ontario Water Resources Act (OWRA). Guideline B1 also identifies Surface Water Quality Management "Policy 2", which is a policy stating that no further water quality degradation shall be allowed in areas with water quality not meeting the PWQOs.

Guideline B-2 elaborates on the Ministry's practices concerning deviations from Policy 2. Deviation from "Policy 2" refers to instances where in areas with water quality not meeting PWQOs, it is not possible to prevent further degradation of existing water quality. The Guideline identifies the situations in which a request for a deviation may be considered and the procedures to be followed in order to obtain a deviation.

Several of the treatment plants in CGS discharge to water bodies that are Policy 2 with respect to phosphorus, including Chelmsford and Azilda. In general, this means that increases in phosphorus loadings to these streams (either due to the construction of a new plant or a capacity expansion at an existing plant) are not permitted.

3 WASTEWATER SYSTEMS OVERVIEW

There are 13 independent wastewater systems throughout the City of Greater Sudbury (CGS), namely:

1. Azilda Wastewater System
2. Capreol Wastewater System
3. Chelmsford Wastewater System
4. Coniston Wastewater System
5. Copper Cliff Wastewater System
6. Dowling Wastewater System
7. Falconbridge Wastewater System
8. Garson Wastewater System
9. Levack Wastewater System
10. Lively/Walden Wastewater System
11. Sudbury Wastewater System
12. Valley East Wastewater System
13. Wahnapitae Wastewater System

Each system includes a wastewater treatment plant or lagoon and, except for Falconbridge, at least one lift station.

3.1 LIFT STATIONS

The City of Greater Sudbury has 68 wastewater lift stations in its jurisdiction. This is due to the challenging topographical and geotechnical conditions. The City has varied topography, with many high and low points and shallow bedrock. As a result, the lift stations were constructed to overcome these challenges and avoid deep sewers built in rock. Of the 68 lift stations, Bell Park LS and Moonlight Beach LS are special cases as they are only used seasonally.

3.2 WASTEWATER TREATMENT PLANTS

The City's Sewage Treatment Facilities including ten wastewater treatment plants (WWTP) and four lagoons are document here within. A documentation of each plant's capacity and effluent quality parameters for the wastewater treatment plants in the CGS was included. The analysis of wastewater treatment gaps based on future projected wastewater flows will be undertaken as part of the gap analysis, which will be documented in each system's respective Gap Report.

4 AZILDA WASTEWATER SYSTEM

The Azilda Wastewater system provides wastewater servicing to the community of Azilda and the surrounding area. The system includes the Azilda WWTP, five wastewater lift stations and a sewer network.

A schematic flow diagram is shown below.

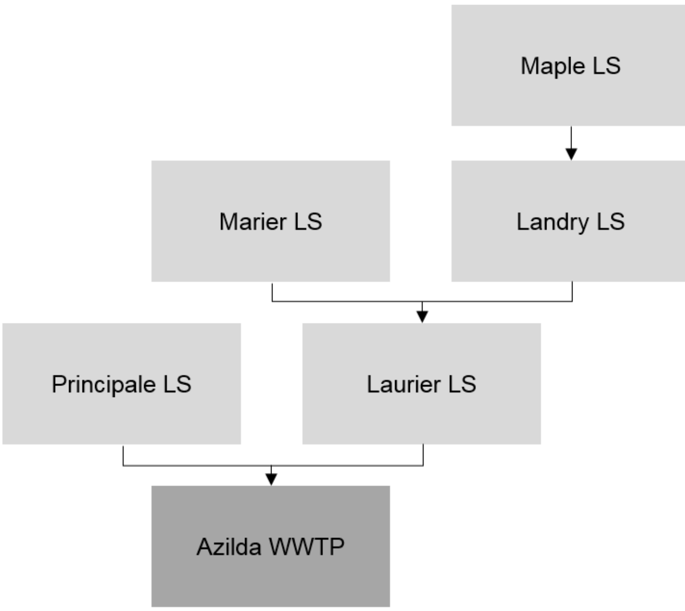


Figure 4-1 Azilda Wastewater System Flow Diagram

4.1 LIFT STATIONS

The Azilda Wastewater System has five lift stations within its catchment area, as illustrated in the flow diagram above. Forcemain sizes and other details for each lift station are summarized in the table below, as reported in the City's Wastewater Lift Stations Operating Manual (2013 Edition).

Table 4-1 Azilda Lift Station Forcemain Sizes

LIFT STATION	LIFT STATION CAPACITY (L/S)	FORCEMAIN SIZE	OVERFLOW	FLOOD HOMES?	EMERGENCY POWER
Landry	41.30	300 mm	No	Yes	62.5 kVA diesel generator
Laurier	90.1	450 mm	No	Yes	156 kVA diesel generator
Maple	17.8	100 mm	Yes, in MH #12-10, in front of 2449 Birch St.	Yes	Portable generator receptacle
Marier	10.8	200 mm	No	Yes	37.5 kVA diesel generator

Principale	32.9	250 mm	No	Yes	60.5 kVA diesel generator

4.1.1 BYPASSES AND SPILLS

There were no reported bypasses or spills at the lift stations in recent history.

4.1.2 RECENT AND PROPOSED NEAR TERM UPGRADES

There are no recent or near term proposed upgrades for the lift stations in Azilda.

4.2 WASTEWATER TREATMENT PLANT

The Azilda WWTP is located at 564 St. Agnes Street in the City of Greater Sudbury. The treatment plant is operated under amended Environmental Compliance Approval (ECA) number 3498-8XGJVK.

The raw wastewater entering the Azilda WWTP is primarily of domestic origin.

The Azilda WWTP is a circular extended aeration plant. The plant has a rated capacity of 3,300 m^3/d and a peak capacity of 6,680 m^3/d.

4.2.1 UNIT PROCESS DESCRIPTION

Sewage enters the Azilda WWTP via a 450 mm diameter forcemain from the Laurier Lift Station (LS) and a 250 mm diameter forcemain from the Principale Street LS. Preliminary treatment consists of an inlet channel, three horizontal flow constant velocity influent grit channels, a grit tank, a coarse bar screen and a comminutor.

Secondary treatment consists of an annular aeration tank equipped with coarse bubble diffusers. Air is supplied by two centrifugal blowers. Secondary clarification of the mixed liquor occurs in a circular clarifier at the centre of the tank. Return activated sludge (RAS) is pumped to the front of the aeration tank and mixed with raw wastewater. Waste activated sludge (WAS) is stored in an aerated sludge holding tank. The sludge is hauled to the biosolids management facility located at the Sudbury WWTP for final treatment.

Prior to entering the secondary clarifier, ferric sulphate is added to the mixed liquor. Secondary effluent is disinfected year-round using chlorine gas. The treated effluent from the facility is discharged to Pilon Drain (also known as the Azilda Creek), which then flows into the Whitson River.

The plant is equipped with an emergency bypass channel, controlled by an overflow weir. Flows in excess of 6,680 m^3/d can bypass secondary treatment, but are chlorinated before discharge, as per the Azilda WWTP ECA.

A process flow schematic of the liquid treatment train is presented in Figure 4-2.

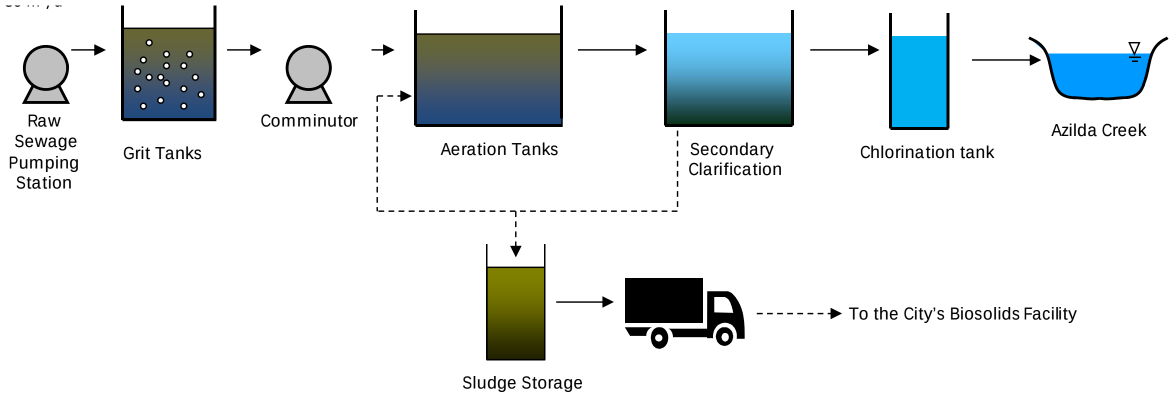


Figure 4-2 Azilda WWTP Process

A description of the unit processes is provided in the table below.

Table 4-2 Azilda WWTP Unit Process Design Data

UNIT PROCESS	DESCRIPTION
Inlet Works	One 450 mm diameter forcemain from the Laurier PS One 250 mm diameter forcemain from the Principale Street PS One inlet chamber (1.4 m wide, 2.2 m long and 1.0 m deep) Three horizontal flow, constant velocity grit channels (each 0.60 m wide,10 m long and 0.90 m deep) One grit tank (2.1 m wide, 2.2 m long and 1.0 m deep) One coarse bar screen (0.8 m wide and 1.0 m long) One comminutor having a rated capacity of 1260 m^3/hr and 1750 RPM
Secondary Treatment Facilities	One circular combined treatment unit consisting of: Aeration tank approximately 2,520 m^3 volume (7 m wide, 75 m long and 4.8 m deep) with coarse bubble “Snap-Cap” diffusers Central circular clarifier 17.4 m in diameter, 3.0 m deep side water depth, equipped with a clarifier gear reducer Two 75 hp and one 100 hp centrifugal blowers one airlift pump to pump the return activated sludge from the clarifier to the aeration tank
Phosphorus Removal	One 0.25 hp chemical feed pump adding ferric sulphate at a rate of approximately 45 mg/L
Disinfection	One concrete chlorine contact chamber (1.0 m wide and 4.0 m long inlet chamber with six - 1.8 m wide and 4 m long sections separated by a concrete baffle wall) One gas chlorinator
Outlet Works	600 mm diameter effluent sewer from the chlorine contact chamber to the outlet headwall discharging to the Pilon Drain The Pilon Drain (known as Azilda Creek) runs for approximately 4.4 km and discharges into the Whitson River; One V-notch weir for effluent flow measurement

4.2.2 EFFLUENT CRITERIA

The plant is required to meet average monthly concentration and annual average loading limits for $cBOD_5$, total suspended solids, total phosphorus, and total ammonia. The effluent objectives and limits are summarized in Table 4-3, per *MOECC Amended Environmental Compliance Approval (ECA) No. 3498-8XGJVK,* dated October 29, 2012.

Table 4-3 Azilda WWTP Effluent Objectives and Compliance Criteria

PARAMETER	EFFLUENT OBJECTIVES	NON-COMPLIANCE LIMIT CONCENTRATION	NON-COMPLIANCE LIMIT TOTAL LOADING
CBOD5	7 mg/L	10 mg/L	33 kg/d
TSS	7 mg/L	10 mg/L	33 kg/d
Total P	0.28 mg/L	0.6 mg/L	2.0 kg/d
Total Ammonia Nitrogen	2.0 mg/L	5.0 mg/L	16.5 kg/d
E. coli	150 organisms per 100 mL	200 organisms per 100 mL	N/A
pH	6.5-8.5	6.0-9.5	N/A

4.2.3 BYPASSES AND SPILLS

On April 26-27, 2011, the maximum daily flow at the plant was 11,446 m^3/d due to snow melt and a spring storm with 20 mm of rain on April 26 and 26 mm of rain on April 27. The flow exceeded the rated average day flow and resulted in an 8,000 m^3 primary plant bypass over 24 hours primary plant bypass into the Whitson River.

Prior to this event, in April 2006 and April 2009, the Azilda WWTP had similar issues of exceeding the rated capacity and discharging to the Whitson River.

As a result of these historical events, the Ministry of the Environment issued a Provincial Officer's Order for the City of Greater Sudbury. The Order requires the City to submit an action plan to assess the performance of the Plant when treating flows exceeding the design flow capacity.

4.2.4 RECENT AND PROPOSED NEAR TERM UPGRADES

In response to the Provincial Officer's Order, the City completed a Schedule B Class Environmental Assessment (EA) Study in 2010 for the purposes of planning a preferred solution for managing the immediate demands on the Azilda WWTP.

The Schedule B Class EA's recommended solution was to re-rate the Azilda WWTP and continue to discharge into the Whitson River. However, the re-rating of the Azilda WWTP is a short-term solution and will only allow for limited additional development in the catchment area.

Significant equipment rehabilitation is also required at the plant as a majority of the equipment has exceeded its expected service life. A Schedule C Class Environmental Assessment and Inflow and Infiltration Study was initiated in late 2012 to determine the preferred solution for managing immediate and future needs in the Azilda catchment area. The recommendation from this study will be included into the final Master Plan report.

5 CAPREOL WASTEWATER SYSTEM

The Capreol Wastewater System includes the Capreol Lagoon, two wastewater lift stations (Lloyd St LS and Vermilion LS) and a network of sewers.

An overview of the wastewater system is shown in Figure 5-1.

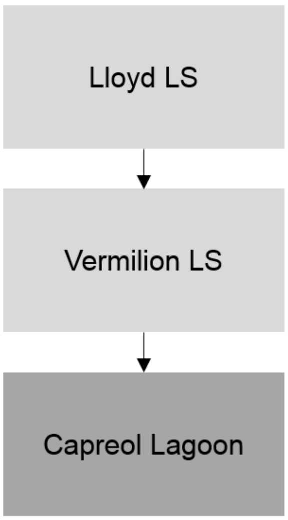


Figure 5-1 Capreol Wastewater System Flow Diagram

5.1 LIFT STATIONS

The Capreol Wastewater System has two lift stations within its catchment area, as illustrated in the flow diagram in Figure 5-1. Forcemain sizes and other details for each lift station are summarized in the table below, as reported in the City's Wastewater Lift Stations Operating Manual (2013 Edition).

Table 5-1 Capreol Lift Station Forcemain Sizes

LIFT STATION	LIFT STATION CAPACITY (L/S)	FORCEMAIN SIZE	OVERFLOW	FLOOD HOMES?	DIESEL GENERATOR
Lloyd	11.42	150 mm	Yes, remove cover and chlorinate at MH #9-6	No	Portable generator receptacle
Vermilion	100	250 mm	Yes, 450 mm from MH #1-87 to river and 600 mm to river	No	Portable generator receptacle

5.1.1 BYPASSES AND SPILLS

There were no reported bypasses or spills at the Capreol lift stations in recent history.

5.1.2 RECENT AND PROPOSED NEAR TERM UPGRADES

There are no recent or near term proposed upgrades.

5.2 LAGOON

The City currently monitors and reports groundwater levels and quality at several locations surrounding the lagoon, as detailed in the Certificate of Approval and reported in the annual wastewater reports.

5.2.1 UNIT PROCESS DESCRIPTION

The Capreol Lagoon is a two cell waste stabilization lagoon, operated as a Continuous Discharge Exfiltration System, with a rated capacity of 5,000 m^3/day. Treated wastewater is discharged to the Vermilion River.

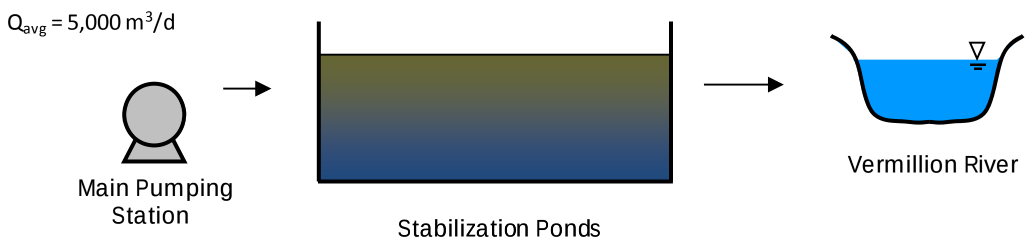


Figure 5-2 Capreol Lagoon System

5.2.2 EFFLUENT CRITERIA

The plant is required to meet annual average loading limits for $cBOD_5$ and total suspended solids. The effluent objectives and limits are summarized in Table 5-2, as per the Certificate of Approval requirements.

Table 5-2 Capreol Lagoon Effluent Objectives and Compliance Criteria

PARAMETER	EFFLUENT OBJECTIVES	NON-COMPLIANCE LIMIT CONCENTRATION
CBOD5	25.00	30.00
TSS	30.00	40.00
Total P	N/A	N/A
Total Ammonia Nitrogen	N/A	N/A
E. coli	N/A	N/A

5.2.3 BYPASSES AND SPILLS

There were no reported bypasses or spills at the wastewater treatment plant in recent history.

5.2.4 RECENT AND PROPOSED NEAR TERM UPGRADES

According to the 2011 Annual WW Report, there were plans to incorporate chemical phosphorous removal at the inlet of the north cell in 2012.

6 CHELMSFORD WASTEWATER SYSTEM

The Chelmsford wastewater system provides wastewater servicing to the community of Chelmsford and includes eight lift stations, the Chelmsford WWTP, the Chelmsford Lagoons, and a network of sewers.

Originally, wastewater generated by a portion of the community of Chelmsford was treated in the Chelmsford Lagoons, located at Montpellier Road, Concession IV, Lot 2, Town of Rayside-Balfour, and discharged to Mackenzie Creek. However, in the 1990s wastewater from the lagoons was diverted to the Chelmsford WWTP. Currently, the Chelmsford Lagoons are used for wet weather flow storage. Wastewater stored in the lagoons is treated at the Chelmsford WWTP during low flow periods.

A Schematic flow diagram of the Chelmsford wastewater system is shown below.

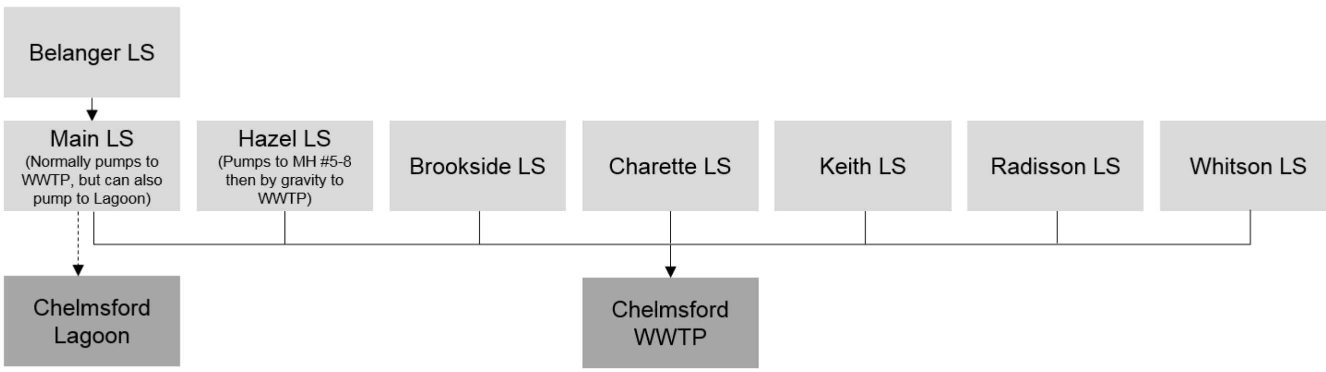


Figure 6-1 Chelmsford Wastewater System Flow Diagram

6.1 LIFT STATIONS

The Chelmsford Wastewater System has eight lift stations within its catchment area, as illustrated in the flow diagram above. All of the lift stations, except Belanger LS, pump directly to the Chelmsford WWTP. Belanger LS pumps to Main LS, and Main LS then pumps to Chelmsford WWTP. Main LS can also pump to the Chelmsford Lagoons in case of emergency.

The forcemain sizes for each Lift Station are summarized in the table below, and obtained from the 2013 Edition of the Wastewater Lift Stations manual.

Table 6-1 Chelmsford Lift Station Forcemain Sizes

LIFT STATION	LIFT STATION CAPACITY (L/S)	FORCEMAIN SIZE	OVERFLOW	FLOOD HOMES?	EMERGENCY POWER
Belanger	6.25	150 mm	Yes, at MH #8-67 to Whitson River; has flapper	No	Fed from Main LS generator
Brookside	13.5	450 mm	Yes, 150 mm with flapper	Yes	Portable generator receptacle
Charette	14	250 mm	No	Yes	50 kW diesel generator

Hazel	51.7	250 mm	Yes, but flapper valve is broken and plug installed on overflow pipe in MH #5-17	Yes	Portable generator receptacle
Keith	45.2	200 mm	Yes, to storm sewer (has check valve)	Yes	50 kW diesel generator
Main	40.1	North to lagoon: 250 mm for 221 m then increasing to 300 mm for 46 m, then reducing to 200 mm for 1452 m South to Omer: 250 mm for 1512 m then increasing to 300 mm	Yes, west of wet well, from MH #8-306	No	375 kVA diesel generator
Radisson	6.5	100 mm	No	No	Portable generator receptacle
Whitson	22.5	100 mm	Yes, 300 mm with valve, southwest of station at river	No	Portable generator receptacle

6.1.1 BYPASSES AND SPILLS

The Chelmsford wastewater system has three reported spills in recent years, all occurring in 2010, as listed in Table 6-2. Two of the spills occurred at Main Lift Station. Details are not known about the April 2010 spill, but the event in September was caused by a sewer overflow.

A third event occurred at the Belanger Lift Station in August 2010. This was due to a forcemain break.

Table 6-2 Reported Spills in the Chelmsford Wastewater System

LOCATION	DATE	DURATION	REASON	DISCHARGE LOCATION
Main LS	Apr-10	1 hr	Other	Whitson River
Belanger LS	Aug-10	0.5 hr	Forcemain break	Whitson River
Main LS	Sep-10	2.5 hr	Overflow	Whitson River

Based on the duration of the breaks and reason, bypasses and spills are not severe in the Chelmsford system.

6.1.2 RECENT AND PROPOSED NEAR TERM UPGRADES

No near term upgrades have been proposed for the lift stations in Chelmsford.

6.2 WASTEWATER TREATMENT PLANT

The Chelmsford WWTP provides wastewater servicing to the community of Chelmsford and the surrounding area. It is located at 300 Laurette St Lot 3, Concession 2, Greater Sudbury, and operates under Amended Certificate of Approval number 4370-7QPMG2.

6.2.1 UNIT PROCESS DESCRIPTION

The Chelmsford WWTP is comprised of three individual extended aeration plants, two of which are circular "packaged" plants and a third rectangular plant. The plants have common preliminary treatment works and disinfection. The Chelmsford WWTP has a rated capacity of 7,100 m^3/d, and a peak daily flow of 18,200 m^3/d. A process flow schematic of the liquid treatment train at the Chelmsford WWTP is presented in Figure 6-2.

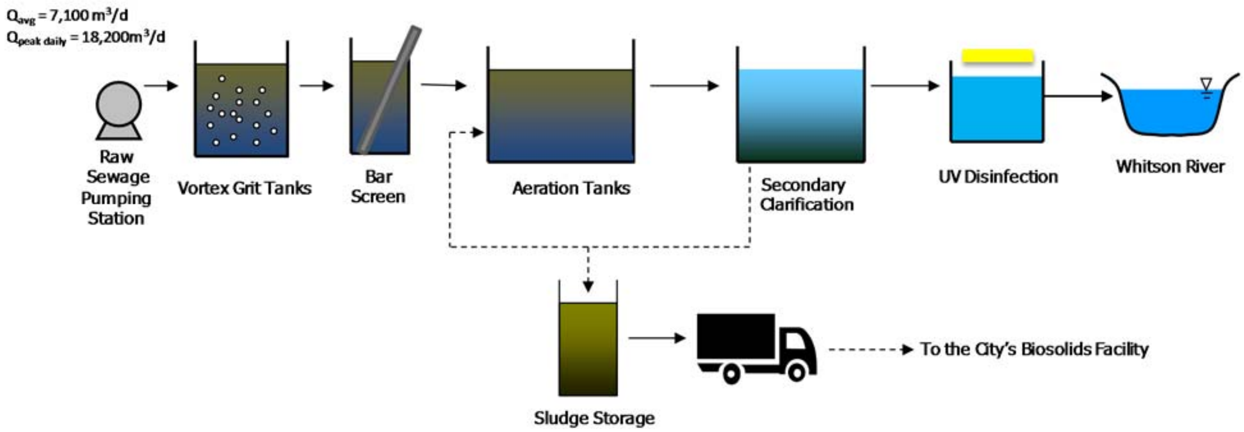


Figure 6-2 Chelmsford WWTP Process

Sewage enters the Chelmsford WWTP via a raw sewage lift station consisting of an elliptical dry well and two circular wet wells, providing a firm pumping capacity of 21,600 m^3/d. Preliminary treatment consists of an elevated vortex grit tank followed by a mechanically cleaned bar screen. After screening, the flow is split to each of the three extended aeration treatment plants.

Secondary treatment consists of three individual treatment plants:

Plants A and B: Annular aeration tank equipped with coarse bubble diffusers Air is supplied by two centrifugal blowers. Return activated sludge (RAS) is pumped to the front of the aeration tank and mixed with raw wastewater. Secondary clarification of the mixed liquor occurs in a circular clarifier at the centre of the tank. The waste activated sludge (WAS) is directed to an aerated sludge holding tank for storage.

Plant C: Rectangular aeration tank equipped with fine bubble diffusers Air is supplied by three positive displacement air blowers. There are two RAS pumps and two rectangular final clarifiers.

The plant is equipped with an ultraviolet (UV) disinfection facility, consisting of two banks in series, with an automatic level controller and dedicated programmable logic controller (PLC).

For phosphorus removal, a coagulant delivery system is routed to various points of application including: lift station inlet, flow splitter chamber inlet, Plants A, B and C. Secondary effluent is disinfected during the period from May 1 to October 31 using the UV disinfection system. The treated effluent from the facility is discharged to Whitson River. Table 6-3 presents key process parameters.

Table 6-3 Chelmsford WWTP Unit Process Design Data

UNIT PROCESS	DESIGN PARAMETERS
Raw Sewage Lift Station	Firm pumping capacity of 21,600 m^3/d consisting of: Two (2) constant speed vertical centrifugal pumps, each rated at 7,800 m^3/d at 16.2 m total dynamic head (TDH) Two (2) variable speed, variable frequency submersible pumps rated at: Pump #1: 2,000 to 6,000 m^3/d at 13.4 TDH Pump #2: 3,000 to 13,000 m^3/d at 13.4 TDH One 300 mm diameter standby forcemain from the PS to the grit tank A pipe flushing loop with motorized valves; interlocked with the pump PLC connected to the 400 mm forcemain to each wet well
Inlet Works	One elevated vortex grit tank with design capacity of 24,000 m^3/d One mechanically cleaned bar screen with design capacity of 24,000 m^3/d
Influent Flow Splitter Chamber	One flow splitter box to divide the influent between Plant A, B and C at: Plant A, average flow up to 2,370 m^3/d, and peak day flow up to 4,000 m^3/d Plant B, average flow up to 2,370 m^3/d, and peak day flow up to 4,000 m^3/d Plant C, average flow up to 3,500 m^3/d, and peak day flow up to 10,200 m^3/d
Secondary Treatment Facilities	Three secondary treatment plants including: Plant A: circular extended aeration treatment process Plant B: circular extended aeration treatment process Plant C: conventional activated sludge process consisting of: Aeration tank approximately 1,400 m^3 volume (10.8 m wide, 30.8 m long and 5.0 m deep), consisting of two chambers, each chamber divided into four compartment with fine bubble aeration system Two rectangular final clarifier each having two passes (3.7 m wide, 31 m long and 3.7 m side water depth Four positive displacement air blowers, each with an average air flow of 883 m^3/h including VFD Two return activated sludge pumps each having capacities varying from 867 m^3/d at 2 m TDH to 1,776 m^3/d at 6 m TDH and to 2,250 m^3/d at 9 m TDH, complete with a VFD One unwatering/recycling pump having capacities varying from 2,250 m^3/d at 6 m TDH to 4,500 m^3/d at 9 m TDH and to 6,750 m^3/d at 13 m TDH, complete with a VFD
Phosphorus Removal	Chemical delivery system routed to various points of application: Lift Station inlet, flow splitter chamber inlet, plants A, B and C
Disinfection	One disinfection building approximately 5.5 m wide 14 m long and 6.1 m high consisting of: One UV disinfection system consisting of two banks in one channel with automatic control and complete PLC
Outlet Works	One Cipoletti Weir and associated level monitoring device for effluent flow measurement

6.2.2 EFFLUENT CRITERIA

The Chelmsford WWTP is required to meet seasonal average concentration and average loading limits for $cBOD_5$, total suspended solids, and total ammonia nitrogen and monthly average concentration and monthly loading for total phosphorus. The loading limits for all parameters are based on the non-compliance concentration limits and a rated capacity of 7,100 m^3/d. The effluent compliance limit for E. coli between May 1 and October 31 is a monthly average of 200 organisms per 100 mL based on a monthly geometric mean density. The effluent objectives and limits are summarized in Table 6-4, as per the C of A.

Table 6-4 Chelmsford WWTP Effluent Objectives and Compliance Criteria

PARAMETER	EFFLUENT OBJECTIVES	NON-COMPLIANCE LIMIT CONCENTRATION	NON-COMPLIANCE LIMIT TOTAL LOADING
Summer: from May 1 to October 31			
cBOD5	5 mg/L	7 mg/L	49.7 kg/d
TSS	5 mg/L	7 mg/L	49.7 kg/d
Total Ammonia-N	1.0 mg/L	2.0 mg/L	14.2 kg/d
Total Phosphorus	N/A	0.3 mg/L	2.13 kg/d
Winter: from November 1 to April 30			
cBOD5	10 mg/L	15 mg/L	106.5 kg/d
TSS	10 mg/L	15 mg/L	106.5 kg/d
Total Ammonia-N	2.0 mg/L	4.0 mg/L	28.4 kg/d
Total Phosphorus	N/A	0.5 mg/L	3.55 kg/d
E. coli	N/A	200 cfu/100mL	

6.2.3 BYPASSES AND SPILLS

There were no reported bypasses or spills at the WWTP in recent history.

6.2.4 RECENT AND PROPOSED NEAR TERM UPGRADES

The City has invested a significant effort to reduce and ensure treatment of peak flows in the Chelmsford WWTP catchment area. Repairs and retrofits to the collection system have been undertaken in an attempt to reduce the overall inflow and infiltration into the collection system.

The Certificate of Approval for the plant was updated in December of 2009 to allow additional capacity for Plant C. The average capacity of Plant C was increased to 3,500 m^3/d (formerly 2,370 m^3/d), based on findings reported in the Chelmsford WWTP Peak Capacity Re-Rating Assessment Final Report. However, the overall average daily flow at the plant remained unchanged at 7,100 m^3/d. In the near future, the City may wish to increase the rated average capacity of the WWTP to 8,240 m^3/d to reflect the increase in capacity for Plant C.

The City is currently investigating solutions to a bottleneck problem in the Charette LS sewershed. It is understood that, currently, during heavy precipitation or snow melt, pump trucks are brought in to bypass the bottle neck.

7 CONISTON WASTEWATER SYSTEM

The Coniston wastewater system includes the Coniston WWTP, two wastewater lift stations (Edward LS and Government LS) a network of sewers.

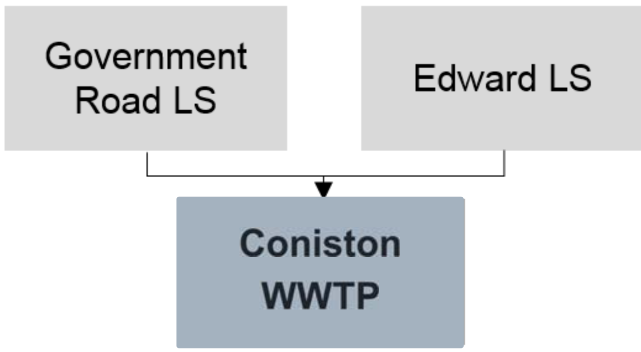


Figure 7-1 Coniston Wastewater System Flow Diagram

7.1 LIFT STATIONS

The Coniston Wastewater System has two lift stations within its catchment area, as illustrated in the flow diagram above. Each Lift Station pumps to the Coniston WWTP. Forcemain sizes and other details for each lift station are summarized in the table below, as reported in the City's Wastewater Lift Stations Operating Manual (2013 Edition).

Table 7-1 Coniston Lift Station Forcemain Sizes

LIFT STATION	LIFT STATION CAPACITY (L/S)	FORCEMAIN SIZE	OVERFLOW	FLOOD HOMES?	EMERGENCY POWER
Edward	89.4	250 mm	Yes, 350 mm from MH #7-47 at 329 Edward Ave. North	Yes	95 kVA diesel generator
Government Road	18.1	200 mm	Yes, 450 mm	No	Fed from generator at Coniston WWTP

7.1.1 BYPASSES AND SPILLS

Three bypasses were reported at the Coniston Lift Stations between 2004 and 2012. Two of these were as a result of heavy precipitation and snow melts, at the Government Road LS, as summarized in the table below.

Table 7-2 Reported Spills in the Coniston Wastewater System

LOCATION	DATE	DURATION	REASON	DISCHARGE LOCATION
Government Road	Apr-2009	15.2 hr	Heavy precipitation	Coniston Creek
Government Road	Apr-2011	4.5 hr	Overflow	Coniston Creek
Edward	Sep-2010	4 hr	Forcemain break	Coniston Creek

7.1.2 RECENT AND PROPOSED NEAR TERM UPGRADES

No near term upgrades have been proposed for the lift stations in Coniston. The plant is operated under C of A number 3-0215-86-007.

7.2 WASTEWATER TREATMENT PLANT

The Coniston WWTP provides wastewater servicing to the community of Coniston and is located at 121 Government Road in Coniston.

7.2.1 UNIT PROCESS DESCRIPTION

The Coniston WWTP is an oxidation ditch system with rated capacity of 3,000 m^3/d. Major system upgrades were completed in the late 1980s. Based on the annual operation reports, the system is well maintained and operating satisfactorily. The treatment process is illustrated schematically in Figure 7-2 below. The effluent is disinfected only during the period of May 1 to October 31.

The treatment process is illustrated schematically in Figure 7-2 below

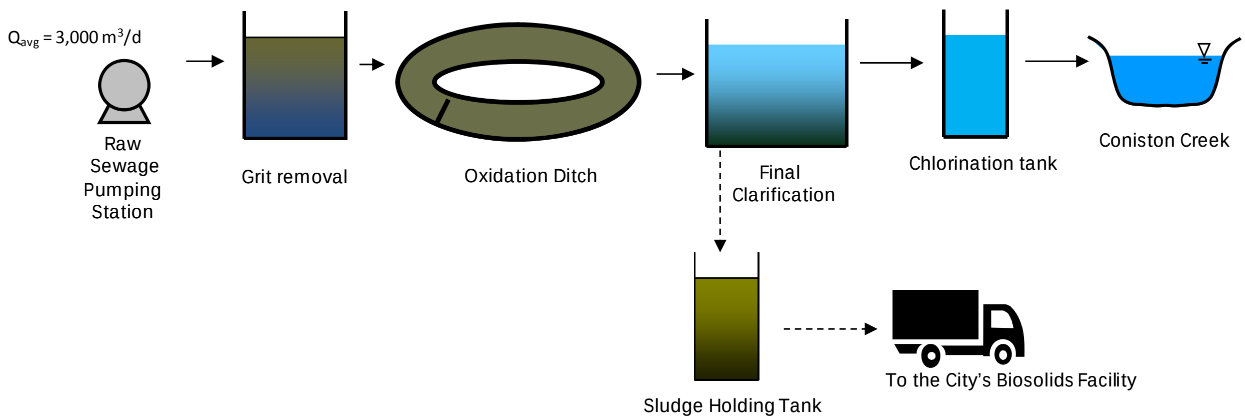


Figure 7-2 Coniston WWTP Process

7.2.2 EFFLUENT CRITERIA

The Certificate of Approval for the Coniston WWTP stipulates that the effluent concentrations of $cBOD_5$ and Suspended Solids not exceed 20 mg/L each.

7.2.3 BYPASSES AND SPILLS

Numerous bypasses were reported at the Coniston WWTP between 2004 and 2012. Most of these occurred at the Coniston WWTP as a result of heavy precipitation and snow melts, contributors to inflow and infiltration concerns.

Table 7-3 Bypasses Reported in the Coniston Wastewater System between 2004 and 2012

LOCATION	DATE	DURATION	REASON	DISCHARGE LOCATION
Coniston WWTP	May-2004	5.5 hr, primary bypass	Heavy precipitation	Coniston Creek
Coniston WWTP	May-2004	16.5 hr, primary bypass	Heavy precipitation	Coniston Creek
Coniston WWTP	Nov-2004	8.5 hr, primary bypass	Heavy precipitation	Coniston Creek
Coniston WWTP	Nov-2005	11 hr, primary bypass	Heavy precipitation	Coniston Creek
Coniston WWTP	Jan-2008	12 hr, secondary bypass	Heavy precipitation	Coniston Creek
Coniston WWTP	Jan-2008	3 hr, secondary bypass	Heavy precipitation and snow melt	Coniston Creek
Coniston WWTP	Apr-2008	12 hr, secondary bypass	Heavy precipitation and snow melt	Coniston Creek
Coniston WWTP	Dec-2008	7 hr, secondary bypass	Heavy precipitation and snow melt	Coniston Creek
Coniston WWTP	Dec-2008	20 hr, secondary bypass	Heavy precipitation and snow melt	Coniston Creek
Coniston WWTP	Mar-2009	5 hr, primary bypass	Snow melt	Coniston Creek
Coniston WWTP	Mar-2009	19 hr, primary bypass	Snow melt	Coniston Creek
Coniston WWTP	Apr-2009	38 hr, primary bypass	Heavy precipitation	Coniston Creek
Coniston WWTP	Apr-2009	73 hr, primary bypass	Heavy precipitation	Coniston Creek
Coniston WWTP	Sep-2010	19 hr, primary bypass	Unknown	Coniston Creek
Coniston WWTP	Apr-2011	16.75 hr, primary bypass	Unknown	Coniston Creek

7.2.4 RECENT AND PROPOSED NEAR TERM UPGRADES

Based on a review of the current plant capacity and effluent quality, no major upgrades were reported.

8 COPPER CLIFF WASTEWATER SYSTEM

The Copper Cliff Wastewater System is owned and operated by a third party (Vale) and by the City of Greater Sudbury. The City owns and operates the collection system including sewers and two lift stations (Orford and Nickel), while Vale owns and operates the Copper Cliff Wastewater Treatment Plant.

The collection system consists mainly of legacy infrastructure that has been grandfathered into the municipal system. Moreover, City Operations' Staff have reported that the Copper Cliff system has high levels of inflow and infiltration.

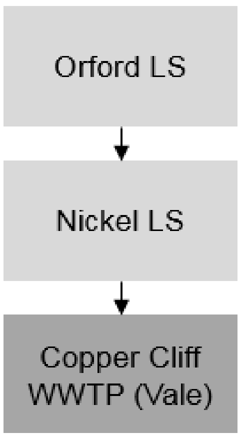


Figure 8-1 Copper Cliff Wastewater System Flow Diagram

8.1 LIFT STATIONS

Copper Cliff is serviced by two lift stations: Orford LS and Nickel LS. As illustrated in the flow diagram in Figure 8-1. Forcemain sizes and other details for each lift station are summarized in the table below, as reported in the City's Wastewater Lift Stations Operating Manual (2013 Edition).

Table 8-1 Copper Cliff Lift Station Forcemain Sizes

LIFT STATION	LIFT STATION CAPACITY (L/S)	FORCEMAIN SIZE	OVERFLOW	FLOOD HOMES?	EMERGENCY POWER
Nickel	181	400 mm	No	Yes	125 kW diesel generator
Orford	18.9	150 mm	No	Yes	25 kW diesel generator

8.1.1 BYPASSES AND SPILLS

There were no reported bypasses or spills at the lift stations in recent history.

8.1.2 RECENT AND PROPOSED NEAR TERM UPGRADES

There is currently an EA underway to redirect the flows from the Nickel Lift Station to the Sudbury WWTP.

8.2 WASTEWATER TREATMENT PLANT

Because the WWTP is not owned by the City, details regarding the Wastewater Treatment plant were not included in this report.

9 DOWLING WASTEWATER SYSTEM

The Dowling Wastewater System contains the Dowling WWTP, two wastewater lift stations (Dowling WWTP LS, and Lionel LS) and numerous gravity sewers and forcemains.

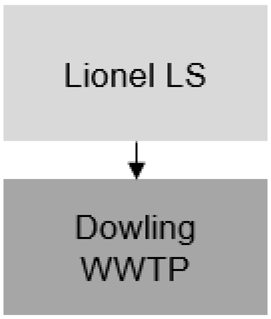


Figure 9-1 Dowling Wastewater System Flow Diagram

9.1 LIFT STATIONS

Dowling has one independent lift station, the Lionel LS within its catchment area, as illustrated in Figure 9-1. There is a second lift station at the Dowling WWTP. Forcemain size and other details for Lionel LS are summarized in the table below, as reported in the City's Wastewater Lift Stations Operating Manual (2013 Edition).

Table 9-1 Dowling Lift Station Forcemain Sizes

LIFT STATION	LIFT STATION CAPACITY (L/S)	FORCEMAIN SIZE	OVERFLOW	FLOOD HOMES?	EMERGENCY POWER
Lionel	18.61	150 mm	Yes, 300 mm north of station at river via MH	No	Standby generator power from #2 well

9.1.1 BYPASSES AND SPILLS

There were no reported bypasses or spills at the lift stations in recent history.

9.1.2 RECENT AND PROPOSED NEAR TERM UPGRADES

No near term upgrades have been proposed for the lift stations in Dowling.

9.2 WASTEWATER TREATMENT PLANT

The Dowling WWTP provides wastewater servicing to the community of Dowling and town of Onaping Falls, it is located approximately 240 m north of the intersection of Riverside Dr. and Houle St. The plant is operated under C of A number 3-0897-98-006.

9.2.1 UNIT PROCESS DESCRIPTION

The Dowling WWTP consists of an extended aeration type treatment system. The Dowling WWTP has recently been re-rated to a hydraulic capacity of 3,200 m^3/d. The City has also implemented a program to reduce extraneous flows (inflow and infiltration), further increasing the available hydraulic capacity. The treatment plant process schematic is illustrated in Figure 9-2 below.

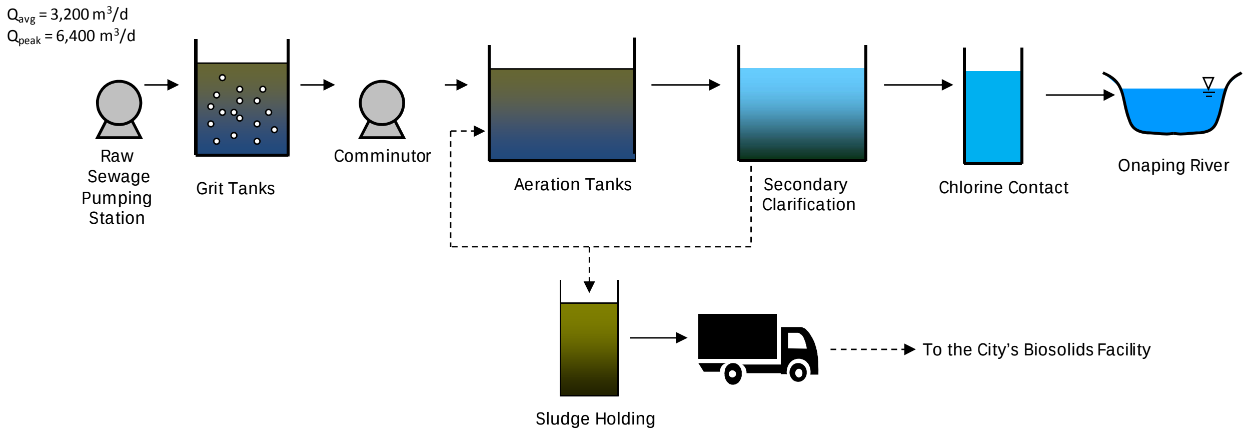


Figure 9-2 Dowling WWTP Process

9.2.2 EFFLUENT CRITERIA

The plant is required to meet annual average loading limits for $cBOD_5$, total suspended solids, and total phosphorus. The effluent objectives and limits are summarized in Table 4-3, as per the Certificate of Approval requirements.

Table 9-2 Dowling WWTP Effluent Objectives and Compliance Criteria

PARAMETER	EFFLUENT OBJECTIVES	NON-COMPLIANCE LIMIT CONCENTRATION	NON-COMPLIANCE LIMIT TOTAL LOADING
CBOD5	15	25	80 kg/day
TSS	15	25	80 kg/day
Total P	0.5	1	3.2 kg/day

9.2.3 BYPASSES AND SPILLS

One spill was reported in Dowling since 2004. This was a sludge spill occurring in December 2011.

9.2.4 RECENT AND PROPOSED NEAR TERM UPGRADES

Based on a review of the plant's current capacity and effluent quality, no major upgrades are required for the Dowling WWTP

10 FALCONBRIDGE WASTEWATER SYSTEM

The Falconbridge Wastewater System conveys sewage to the Falconbridge WWTP solely by gravity and does not have any lift stations. The system provides wastewater servicing to the community of Falconbridge and is located in the Town of Falconbridge on Lot 12, Concession 3.

10.1 WASTEWATER TREATMENT PLANT

The Falconbridge WWTP was constructed in 1978 and originally owned by Falconbridge Nickel Mines Limited. Ownership was transferred to the former Regional Municipality of Sudbury in the 1980s.

A 1979 letter from the MOE to the Regional Municipality of Sudbury identified that the Falconbridge WWTP has an average daily flow capacity of 909 m^3/d, provided that sufficient stream flow is maintained through the effluent receiving area of the existing outfall to provide a 20:1 dilution under average conditions and a 10:1 dilution under the worst conditions.

10.1.1 UNIT PROCESS DESCRIPTION

Based on the Official Plan Review, Infrastructure Background Study in 2005, the WWTP is a trickling filter system but no detailed facility information is available. The system has been operating well at approximately one third of its rated capacity. The treatment plant process schematic is illustrated in Figure 10-1.

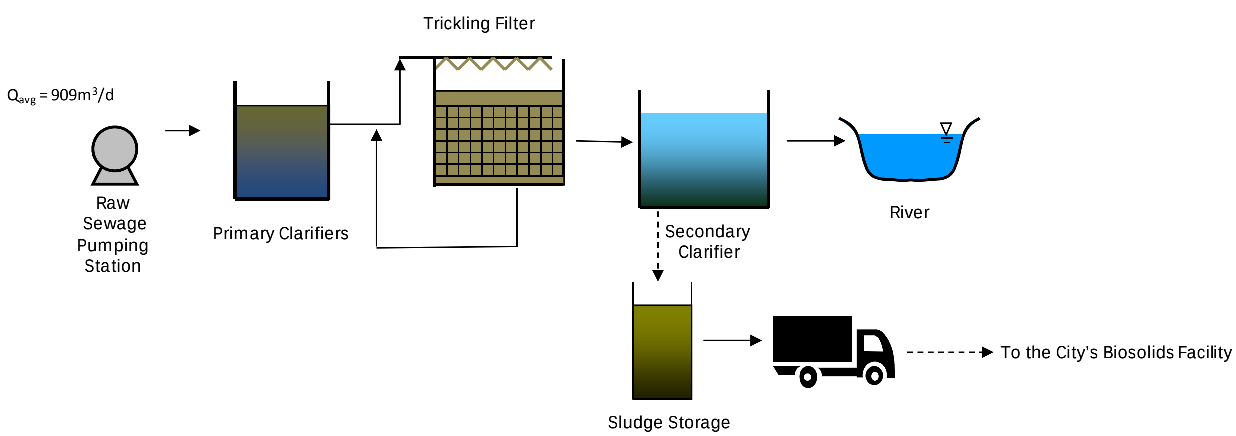


Figure 10-1 Falconbridge WWTP Process

10.1.2 EFFLUENT CRITERIA

The Certificate of Approval for the Falconbridge WWTP stipulates that the effluent concentrations of BOD_5 and Suspended Solids not exceed 25 mg/L each.

10.1.3 BYPASSES AND SPILLS

There were no reported bypasses and spills at the WWTP in recent history.

10.1.4 RECENT AND PROPOSED NEAR TERM UPGRADES

No upgrades have been proposed recently or for the near term.

11 GARSON WASTEWATER SYSTEM

The Garson Wastewater System includes the Garson Sewage Lagoon, three wastewater lift stations and a network of gravity sewers and forcemains. A schematic flow diagram is shown in the figure below. The Garson Wastewater System typically discharges to the Sudbury WWTP, with discharge to the Garson Lagoon only in emergencies.

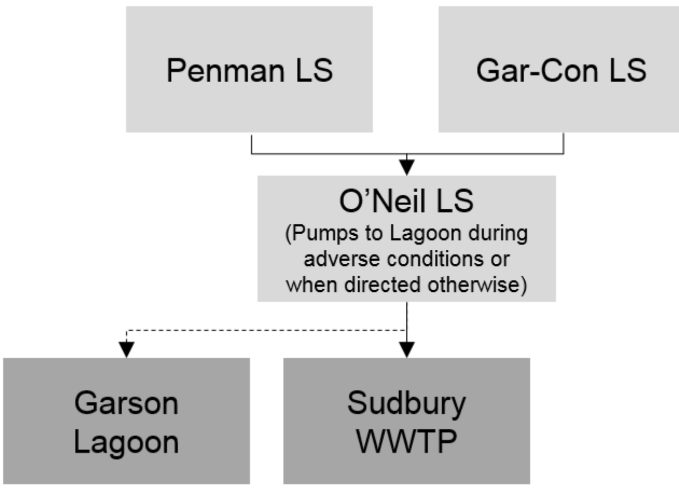


Figure 11-1 Garson Wastewater System Flow Diagram

11.1 LIFT STATIONS

Community of Garson has three wastewater lift stations: Penman LS, Gar-Con LS and O'Neil LS. Forcemain sizes and other details for each lift station are summarized in the table below, as reported in the City's Wastewater Lift Stations Operating Manual (2013 Edition).

Table 11-1 Garson Lift Station Forcemain Sizes

LIFT STATION	LIFT STATION CAPACITY (L/S)	FORCEMAIN SIZE	OVERFLOW	FLOOD HOMES?	EMERGENCY POWER
Gar-Con	24.3	150 mm	Yes, check valve at culvert from MH #11-69	Yes	100 kVA diesel generator
O'Neil[1]	98.6	250 mm	Yes, valved east of station, always closed	No	None
Penman	8.3	150 mm	No	Yes, 180 Penman	Portable generator receptacle

[1] *O'Neil LS is not operated all year, but seasonally.*

11.1.1 BYPASSES AND SPILLS

There were no reported bypasses or spills at the lift stations in recent history.

11.1.2 RECENT AND PROPOSED NEAR TERM UPGRADES

No near term upgrades have been proposed for the lift stations in Community of Garson.

11.2 WASTEWATER TREATMENT PLANT

Historically, the Garson Sewage Lagoon provided wastewater servicing to the community of Garson. It is located at Lot 7 Concession 2 within the City of Greater Sudbury. The original lagoons have been in operation since the 1960s. However, no effluent has been discharged from the lagoons since the fall of 2007 due to operational inability of the lagoons to meet acceptable phosphorus and suspended solids levels and odour concerns at the lagoons. Since 2007 all sewage generated in the catchment area has been diverted to the Sudbury Wastewater Treatment Plant, with the option to send flow to the Garson Lagoons in case of emergency.

11.2.1 BYPASSES AND SPILLS

There were no reported bypasses or spills at the lagoon in recent history.

11.2.2 RECENT AND PROPOSED NEAR TERM UPGRADES

In June 2009, the City completed a Long Term Needs Study for the Garson Lagoons and the O'Neil Lift Station. The study examined the following alternatives:

1. Continue to use the lagoons for treatment of wastewater generated in Garson and discharge to Junction Creek.
2. Abandon the lagoons and convey all wastewater generated in Garson to the Sudbury Wastewater Treatment Plant.
3. Utilize the existing lagoons for peak wet weather flow management.

The Report concluded that retaining the lagoons for peak wet weather flow management was the most advantageous option for the City. In June 2011, the City discontinued use of the lagoons for wastewater treatment, and commenced using them to manage peak wet weather flows, as indicated above.

Additional studies are recommended to determine how to maximize the life cycle value of the Garson Lagoons and to identify an optimal method of draining the stored flows back to the Sudbury WWTP.

12 LEVACK WASTEWATER SYSTEM

The Levack Wastewater System includes the Levack WWTP, the Fraser Lift Station and numerous gravity sewers. The system provides wastewater services to the Towns of Onaping Falls and Levack.

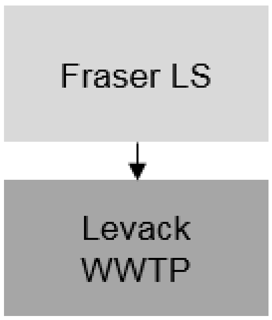


Figure 12-1 Levack Wastewater System Flow Diagram

12.1 LIFT STATIONS

The Levack Wastewater System includes one lift station: Fraser Lift Station. Forcemain sizes and other details this lift station are summarized in the table below, as reported in the City's Wastewater Lift Stations Operating Manual (2013 Edition).

Table 12-1 Levack Lift Station Forcemain Sizes

LIFT STATION	LIFT STATION CAPACITY (L/S)	FORCEMAIN SIZE	OVERFLOW	FLOOD HOMES?	EMERGENCY POWER
Fraser	27	200 mm	No	No	60 kW diesel generator

12.1.1 BYPASSES AND SPILLS

There were no reported bypasses or spills at the lift stations in recent history.

12.1.2 RECENT AND PROPOSED NEAR TERM UPGRADES

No near term upgrades have been proposed for the lift station in Levack.

12.2 WASTEWATER TREATMENT PLANT

The Levack WWTP is located at 45 High Street within the City of Greater Sudbury and operates under amended C of A number 6279-5KKLQA. The raw wastewater entering the Levack WWTP is primarily of domestic origin

12.2.1 UNIT PROCESS DESCRIPTION

The Levack WWTP is a twin-celled extended aeration plant. The plant has a rated capacity of 2,270 m^3/d, and a peak capacity of 5,675 m^3/d. A process flow schematic of the liquid treatment train at the Levack WWTP is presented in Figure 12-2.

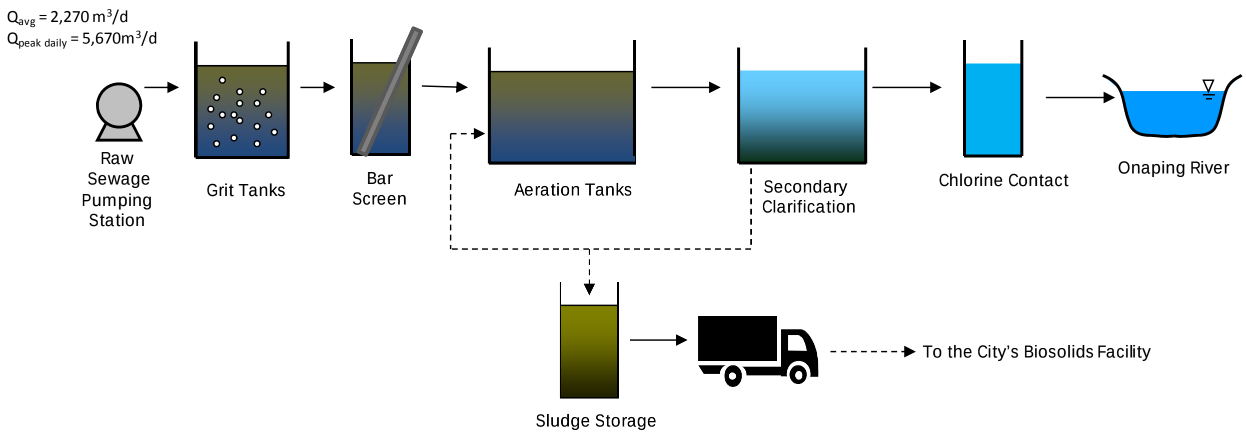


Figure 12-2 Levack WWTP Process

Sewage enters the Levack WWTP via a 200 mm diameter forcemain from the Fraser Avenue Lift Station. Preliminary treatment consists of a coarse bar screen, a vortex-type grit chamber with airlift pump and grit classifier, and a comminutor.

Secondary treatment consists of two twin-celled aeration tanks equipped with a fine bubble aeration system including air pipe headers, grids and membrane diffusers. Air is supplied by three blowers. Returned activated sludge (RAS) is pumped to the front of the aeration tank and mixed with raw wastewater. Secondary clarification of the mixed liquor occurs in a circular clarifier equipped with a surface skimmer and scum removal system. The waste activated sludge (WAS) is directed to a sludge thickening tank for storage. A submersible pump is used to pump supernatant from the sludge thickening tank.

Prior to entering the secondary clarifier, ferric chloride or alum is added to the mixed liquor for precipitation of phosphorus. Secondary effluent is disinfected year-round using chlorine gas. The treated effluent from the facility is discharged to the Onaping River.

Table 12-2 Levack WWTP Unit Process Design Data

UNIT PROCESS	DESIGN PARAMETERS
Inlet Works	One 200 mm diameter forcemain from the Fraser Avenue PS One coarse bar screen for influent channel One 66 L/s capacity cortex-type grit chamber with airlift pump and grit classifier One comminutor with by-pass fine bar screen 14 m x 11 m brick covered structure enclosing the influent works
Secondary Treatment Facilities	Two twin-cell aeration tank system consisting of: Aeration tank approximately 1,135 m^3 volume for each twin-cell unit with fine bubble aeration system including air pipe headers, grids and membrane dome diffusers One circular clarifier with surface area of 190 m2, equipped with surface skimmer, one submersible pump rated at 6.0 L/s at a TDH of 4.0 m from scum removal Three blowers with control system Two airlift pumps to pump return activated sludge from the clarifier to the aeration tank

Phosphorus Removal	One 18,900 L chemical storage tank for ferric chloride or alum Two positive displacement diaphragm metering pumps each of 6.0 L/h capacity
Disinfection	One 50 kg/d capacity gas chlorinator One 2-cylinder digital scale, chlorine diffuser One twin compartment contact tank
Sludge Thickening and Transfer	One gravity thickening tank One sludge loading pump rated at 25.0 L/s at a TDH of 11.0 m One submersible pump rated at 6.0 L/s at a TDH of 5.0 m to pump supernatant

12.2.2 EFFLUENT CRITERIA

The plant is required to meet average monthly concentration for total phosphorus and annual average concentration for $cBOD_5$, total suspended solids, and annual average loading limits for $cBOD_5$, total suspended solids, and total phosphorus. The effluent compliance limit for E. coli is 200 organisms per 100 mL based on a monthly geometric mean density. The effluent requirements are summarized in Table 12-3.

Table 12-3 Levack WWTP Effluent Objectives and Compliance Criteria

PARAMETER	EFFLUENT OBJECTIVES	NON-COMPLIANCE LIMIT CONCENTRATION	NON-COMPLIANCE LIMIT TOTAL LOADING
cBOD5	15 mg/L	25 mg/L	56.75 kg/d
TSS	15 mg/L	25 mg/L	56.75 kg/d
Total P	0.5 mg/L	1 mg/L	2.27 kg/d
E. coli	N/A	200 cfu/100 mL	N/A
pH	N/A	6.0 to 9.5	N/A

12.2.3 BYPASSES AND SPILLS

No spills were reported in the Levack Wastewater System in recent years (2004 to 2012).

12.2.4 RECENT AND PROPOSED NEAR TERM UPGRADES

Based on a review of the current plant capacity and effluent quality, no major upgrades are required for the Levack WWTP.

13 LIVELY/WALDEN WASTEWATER SYSTEM

The Lively/Walden Wastewater System includes two wastewater treatment plants, seven wastewater lift stations and a network of sewers. The two wastewater treatment plants, Lively WWTP and Walden WWTP, service the Lively and Naughton communities, the Mikkola and Oja subdivisions, and the surrounding developed areas. A schematic flow diagram is shown in Figure 13-1.

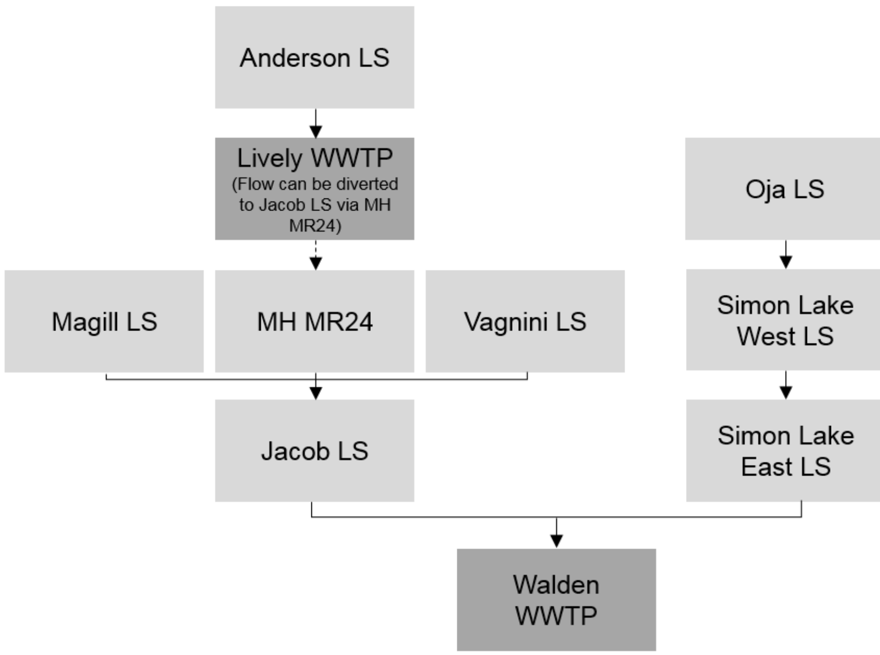


Figure 13-1 Lively / Walden Wastewater System Flow Diagram

13.1 LIFT STATIONS

The Lively/Walden wastewater system has seven lift stations, with one in Lively and six in Walden, as shown in Figure 13-1. Flow from the Lively WWTP can be diverted to the Jacob LS in the Walden WWTP catchment via manhole MR24.

Forcemain sizes and other details for each lift station are summarized in the table below, as reported in the City's Wastewater Lift Stations Operating Manual (2013 Edition).

Table 13-1 Lively / Walden Lift Station Forcemain Sizes

LIFT STATION	LIFT STATION CAPACITY (L/S)	FORCEMAIN SIZE	OVERFLOW	FLOOD HOMES?	EMERGENCY POWER
Anderson	97.8	300 mm for 7.5 m then increasing to 350 mm	Yes, 250 mm valve inside station	No	62.5 kVA diesel generator

Jacob	138.9	400 mm	Yes	Yes	60.2 kVA diesel generator
Magill	20.1	150 mm for 256 m then increasing to 250 mm	Yes, at MH #3-20	No	Portable generator receptacle
Oja	15.39	150 mm	Yes, 375 mm flapper in MH	No	Portable generator receptacle
Simon Lake East	39.4	250 mm	Yes, valved, flapper south of station	No	Portable generator receptacle
Simon Lake West	37.85	200 mm	Yes, valved flapper in MH south of station	No	Portable generator receptacle
Vagnini	32.50	150 mm for 936 m then increasing to 250 mm	150 mm to ditch	No	Portable generator receptacle

13.1.1 BYPASSES AND SPILLS

The following table lists the reported spills that occurred at Lively / Walden lift stations.

Table 13-2 Reported Spills in the Lively/Walden Wastewater System

LOCATION	DATE	DURATION	REASON	DISCHARGE LOCATION
Vagnini	Dec-2007	0.1 hr	Forcemain break	Junction Creek
Vagnini	Jul-2007	0.75 hr	Forcemain break	Junction Creek
Anderson	Apr-2009	10 hr	Heavy precipitation	Meatbird Creek
Anderson	Oct-2009	6 hr	Heavy precipitation	Meatbird Creek
Jacob	Sep-2010	1.7 hr, primary bypass	Unknown	Mud Lake

The Vagnini LS had two forcemain breaks in 2007. Because this did not occur again, it is assumed that the problem has been repaired. However, it is recommended that this forcemain be inspected to determine its existing condition.

There were two reported bypasses at Anderson LS in 2009 due to heavy precipitation. However, no further bypasses occurred at this station and the City intends to decommission Anderson LS in the near future.

13.1.2 RECENT AND PROPOSED NEAR TERM UPGRADES

The Lively/Walden Environmental Summary Report (ESR), completed in 2013, concluded that the upgrades to the Lively WWTP were so extensive that it would be more cost effective to decommission the plant (including the Anderson LS) and pump all wastewater from Lively to the Walden WWTP. This work is expected to take place circa 2019.

13.2 LIVELY WASTEWATER TREATMENT PLANT

The Lively WWTP provides wastewater servicing to the community of Lively and the surrounding area. It is located at Lot 7, Concession V within the City of Greater Sudbury and operated under Certificate of Approval number 6339-7W6JAJ. The plant was originally commissioned in 1950 by Vale Limited. The ownership of the plant was transferred to what is now the City of Greater Sudbury in 1973.

13.2.1 UNIT PROCESS DESCRIPTION

The Lively WWTP uses a conventional wastewater treatment process. A process flow schematic of the liquid treatment train at the Lively WWTP is presented in Figure 13-2.

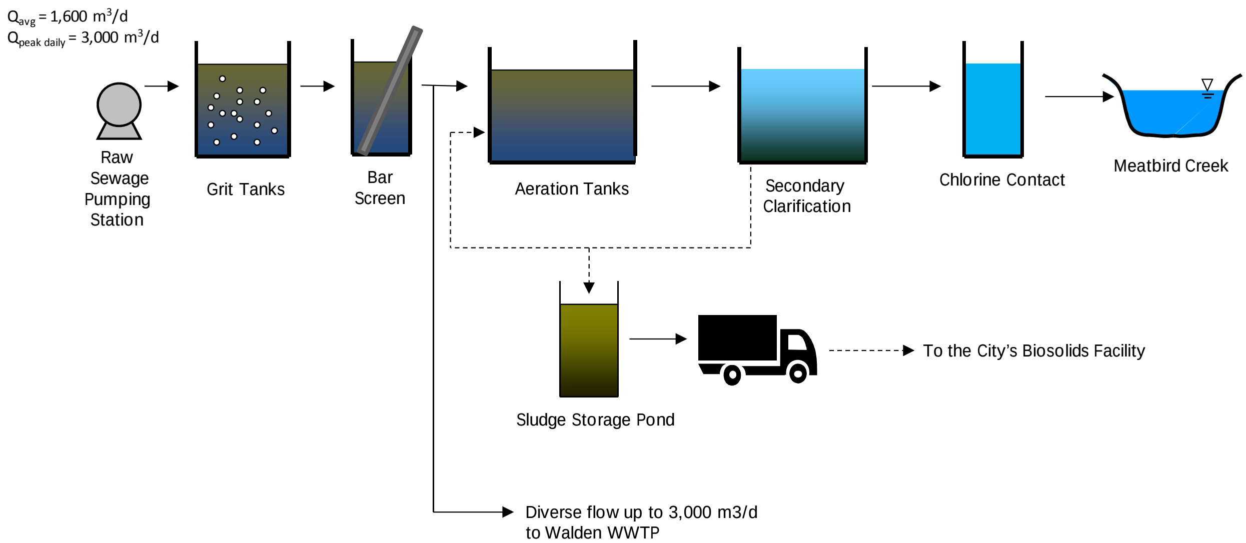


Figure 13-2 Lively WWTP Process

Sewage enters the Lively WWTP via a gravity sewer origination in the east end of Lively or the Anderson Lift Station. A diversion chamber is located upstream of the Lively WWTP which can divert up to 3,000 m^3/d of sewage to the Jacob Lift Station. The Jacob Lift Station pumps the sewage to the Walden WWTP.

Flow entering the plant is first passed through a comminutor. Secondary treatment consists of an annular aeration tank equipped with coarse bubble diffusers. Air is supplied by two centrifugal blowers. Returned activated sludge is pumped to the front of the aeration tank and mixed with raw wastewater.

Secondary clarification is divided into a sludge settling zone and a final clarification zone. The WAS is directed to a sludge holding tank for storage. In the aeration zone, ferric sulphate is added to the mixed liquor for precipitation of phosphorus. Secondary effluent is disinfected from May 15 to October 15 using chlorine gas. The treated effluent from the facility is discharged to Meatbird Creek a tributary of Junction Creek.

There is a bypass in the Lively / Walden system at Diversion Chamber 2. A sluice gate can be opened in Diversion Chamber 2 which allows flows to be disinfected and discharged directly to Meatbird Creek. Table 13-3 presents key process design parameters.

Table 13-3 Lively WWTP Unit Process Design Data

UNIT PROCESS	DESIGN PARAMETERS
Inlet Works	Two comminutors (one duty and one standby) Each comminutor is equipped with a vertical axis rotation cutting head with a ¾ hp motor
Secondary Treatment Facilities	One circular combined treatment unit consisting of: Aeration tank approximately 2,025 m^3 volume with coarse bubble diffusers Central circular clarifier 13 m in diameter, 4.6 m deep side water depth, equipped with a clarifier gear reducer Two 40 hp centrifugal blowers Twelve airlift sludge return guns and four airlift sludge wasting guns
Phosphorus Removal	Two chemical feed pump adding ferric sulphate
Disinfection	One six-pass concrete chlorine contact chamber (61.7 m^3) One gas chlorinator
Outlet Works	One V-notch weir with bubbler tube system (pressure sensor) Discharges to Meatbird Creek

13.2.2 EFFLUENT CRITERIA

The plant is required to meet average monthly concentration for total phosphorus and annual average concentration for $cBOD_5$ and total suspended solids. The plant is also required to meet an annual average loading limits for $cBOD_5$, total suspended solids, and total phosphorus. The effluent compliance limit for E. coli is 200 organisms per 100 mL based on a monthly geometric mean density. The effluent requirements are summarized in Table 13-4. The Lively WWTP is operated in accordance with *MOE Certificate of Approval (C of A) No. 6339-7W6JAJ dated December 1, 2009*.

Table 13-4 Lively WWTP Effluent Objectives and Compliance Criteria

PARAMETER	EFFLUENT OBJECTIVES	NON-COMPLIANCE LIMIT CONCENTRATION	NON-COMPLIANCE LIMIT TOTAL LOADING
cBOD5	25 mg/L	25 mg/L	40 kg/d
TSS	25 mg/L	25 mg/L	40 kg/d
Total P June 1 to August 31 September 1 to May 31	 0.5 mg/L <1.0 mg/L	1 mg/L	1.6 kg/d
E. coli	N/A	200 cfu / 100 ml	N/A
pH	6.0-9.5	N/A	N/A

13.2.3 BYPASSES AND SPILLS

There have been numerous bypasses and spills in the Lively/Walden system since 2004, many of which occurred at the Lively WWTP. Discharges at the Lively WWTP were mainly primary bypasses due to heavy precipitation and/or snow melt, indicating inflow and infiltration problems.

Table 13-5 Reported Spills in the Lively Wastewater System

LOCATION	DATE	DURATION	REASON	DISCHARGE LOCATION
Lively WWTP	Mar-2004	17 hr, primary bypass	Heavy precipitation	Meatbird Creek
Lively WWTP	May-2004	6 hr, primary bypass	Heavy precipitation	Meatbird Creek
Lively WWTP	May-2004	1.5 hr, primary bypass	Heavy precipitation	Meatbird Creek
Lively WWTP	Mar-2006	20 hr, primary bypass	Snow melt	Meatbird Creek
Lively WWTP	Mar-2006	42.5 hr, primary bypass	Heavy precipitation	Meatbird Creek
Lively WWTP	Apr-2006	12 hr, primary bypass	Heavy precipitation and snow melt	Meatbird Creek
Lively WWTP	Apr-2006	22 hr, primary bypass	Heavy precipitation	Meatbird Creek
Lively WWTP	May-2006	15 hr, primary bypass	Heavy precipitation	Meatbird Creek
Lively WWTP	Apr-2007	5.5 hr, primary bypass	Heavy precipitation	Meatbird Creek
Lively WWTP	Apr-2008	8.25 hr, secondary bypass	Heavy precipitation and snow melt	Meatbird Creek
Lively WWTP	Apr-2008	3.5 hr, secondary bypass	Heavy precipitation and snow melt	Meatbird Creek
Lively WWTP	Dec-2008	9.75 hr, secondary bypass	Heavy precipitation and snow melt	Meatbird Creek
Lively WWTP	Dec-2008	38.75 hr, secondary bypass	Heavy precipitation and snow melt	Meatbird Creek
Lively WWTP	Mar-2009	12 hr, primary bypass	Snow melt	Meatbird Creek
Lively WWTP	Apr-2009	6 hr, primary bypass	Heavy precipitation	Meatbird Creek
Lively WWTP	Apr-2009	19 hr, primary bypass	Heavy precipitation	Meatbird Creek
Lively WWTP	Apr-2011	7.75 hr, primary bypass	Not provided	Meatbird Creek

13.2.4 RECENT AND PROPOSED NEAR TERM UPGRADES

The Lively/Walden Environmental Summary Report (ESR), completed in 2013, concluded that the upgrades to the former Lively WWTP were so extensive that it would be more cost effective to decommission the plant (including the Anderson LS) and pump all wastewater from Lively to the Walden WWTP.

Based on the findings of the aforementioned report, the following linear infrastructure upgrades are required to divert sewage from the Lively WWTP to Walden WWTP:

— Trunk sewer between the Lively WWTP and the Jacob Lift Station
— Sewer along an easement on the northwest boundary of Lively
— Trunk sewer on an easement between Herman Mayer Drive and Jacob Street

To implement the preferred solution, upgrades are also required to the Jacob Lift Station and the Walden WWTP.

13.3 WALDEN WASTEWATER TREATMENT PLANT

The Walden WWTP provides wastewater servicing to the community of Walden and the surrounding area. It is located at Lot 10, Concession III within the City of Greater Sudbury. The plant was originally commissioned in 1982 and has gradually expanded to accommodate growth of the area.

13.3.1 UNIT PROCESS DESCRIPTION

The Walden WWTP is an extended aeration plant. The plant has a rated capacity of 4,500 m^3/d, and a peak capacity of 8,000 m^3/d. A process flow schematic of the liquid treatment train at the Walden WWTP is presented in Figure 13-3.

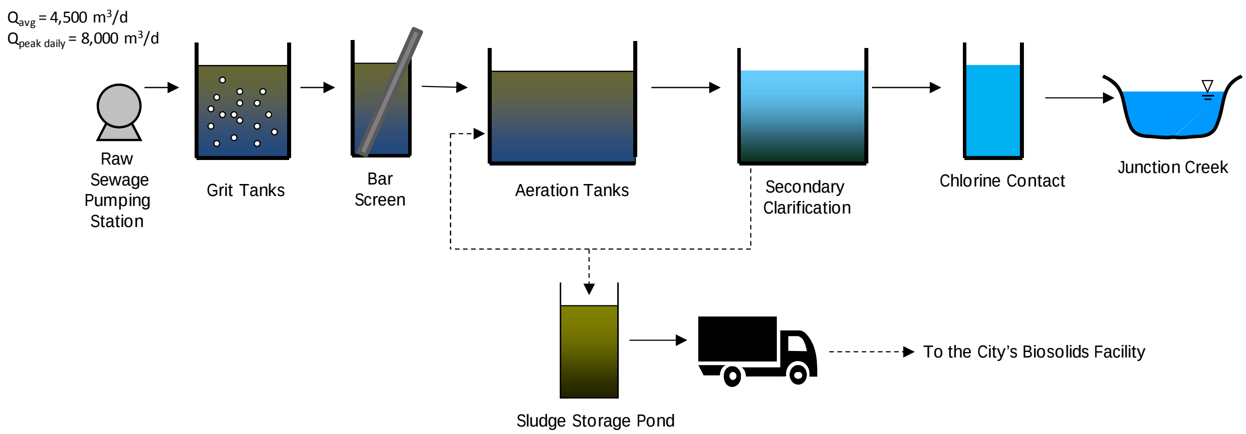


Figure 13-3 Walden WWTP Process

Primary treatment at the Walden WWTP consists of a mechanical screen and two aerated grit tanks combined with a grit classifier.

Secondary treatment consists of two aeration tanks equipped with fine bubble diffusers. Air is supplied by one VFD driven positive displacement blower and two centrifugal blowers. RAS is pumped to the front of the aeration tank and mixed with raw wastewater. Secondary clarification of the mixed liquor occurs in one of three circular centre-feed clarifiers. WAS is directed to a sludge holding tank for storage.

Prior to entering the secondary clarifier, ferric sulphate is added to the mixed liquor for precipitation of phosphorus. Secondary effluent is disinfected year-round using chlorine gas. The treated effluent from the facility is discharged to Junction Creek.

The plant is equipped with an emergency bypass channel. Flows in excess of 6,680 m^3/d can bypass secondary treatment however are required to be screened and chlorinated before being discharged. Table 13-6 presents key process design parameters.

Table 13-6 Walden WWTP Unit Process Design Data

UNIT PROCESS	DESIGN PARAMETERS
Inlet Works	One 12 mm mechanical screen with screening compactor Two grit tank (each tank with a volume of 18 m^3)

Secondary Treatment Facilities	Two aeration tank approximately 2,603 m^3 volume with fine bubble diffusers One VFD positive displacement blower and two centrifugal blowers Three circular centre-feed clarifiers 10.8 m in diameter, 3.0 m deep side water depth Two progressive cavity variable speed drive waste sludge pumps (each with a capacity of 3.8 L/s) Three variable speed drive centrifugal pumps with 10 hp motors (each with a capacity of 38 L/s)
Phosphorus Removal	Two chemical feed pump adding ferric sulphate at a rate of approximately 1,300 mL/min
Disinfection	One concrete chlorine contact chamber (with a volume of 140 m^3) Two gas chlorinators
Outlet Works	Treated effluent is discharged to Junction Creek

13.3.2 EFFLUENT CRITERIA

The treatment plant is operated under Certificate of Approval number 5318-7W6J9Y, dated December 1, 2009. The plant is required to meet average monthly concentration for total phosphorus and annual average concentration for $cBOD_5$ and total suspended solids. The plant also has annual average loading limits for $cBOD_5$, total suspended solids, and total phosphorus. The effluent compliance limit for E. coli is 200 counts/100 mL based on a monthly geometric mean density. The effluent requirements are summarized in the table, below.

Table 13-7 Walden WWTP Effluent Objectives and Compliance Criteria

PARAMETER	EFFLUENT OBJECTIVES	NON-COMPLIANCE LIMIT CONCENTRATION	NON-COMPLIANCE LIMIT TOTAL LOADING
cBOD5	15 mg/L	25 mg/L	112.5 kg/d
TSS	15 mg/L	25 mg/L	112.5 kg/d
Total P June 1 to August 31 September 1 to May 31	 0.5 mg/L <1.0 mg/L	1 mg/L	4.5 kg/d
E. coli	N/A	200 cfu / 100 ml	N/A
pH	6.0-9.5	N/A	N/A

13.3.3 BYPASSES AND SPILLS

There have been four bypasses at the Walden WWTP since 2004, as listed in the table, below. All bypasses were primary bypasses, and three were due to heavy precipitation. There have not been any bypasses at the plant since 2009.

Table 13-8 Reported Spills in the Walden Wastewater System

LOCATION	DATE	DURATION	REASON	DISCHARGE LOCATION
Walden WWTP	May-2004	3.5 hr, primary bypass	Heavy precipitation	Unknown

Walden WWTP	Jan-2005	2 hr, primary bypass	Broken water line feeding chlorine contact chamber	Unknown
Walden WWTP	Apr-2009	16.5 hr, primary bypass	Heavy precipitation	Unknown
Walden WWTP	Nov-2009	1 hr, primary bypass	Heavy precipitation	Unknown

13.3.4 RECENT AND PROPOSED NEAR TERM UPGRADES

The Lively/Walden ESR, also discussed in Section 13.2.4, proposed the following upgrades to the Walden WWTP:

— A new headworks facility
— Three new aeration tanks and three new secondary clarifiers (to meet future flow projections to 2032).
— New tertiary treatment process when average day flows to the WWTP exceed 6,000 m^3/day. This is currently projected to occur in 2021.
— Expansion of the existing gravity thickening system
— Replacement of the existing chlorine gas system with UV Disinfection
— Upgrades to the plant's current SCADA system

Significant equipment rehabilitation is also required at the Walden WWTP as the majority of the equipment at the plant has exceeded its expected service life. The ESR also recommended an expansion of the sludge thickening system.

14 SUDBURY WASTEWATER SYSTEM

The Sudbury wastewater system services the City of Sudbury and Garson community. The system contains the Sudbury WWTP, the Rock Tunnel trunk sewer, 27 wastewater lift stations and a network of gravity sewers and forcemains.

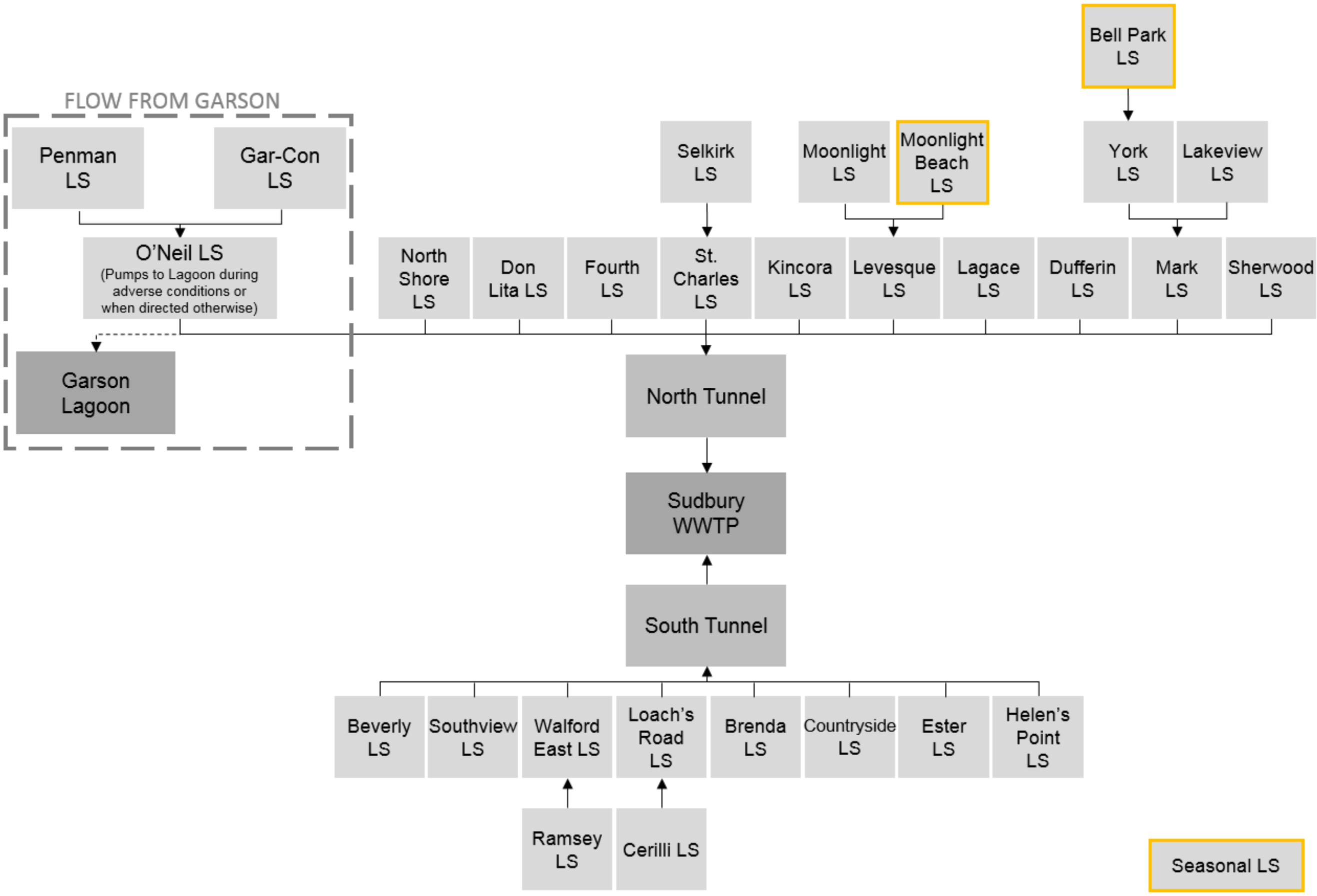


Figure 14-1 Sudbury Wastewater System Flow Diagram

14.1 LIFT STATIONS

There are 27 wastewater lift stations in Sudbury wastewater system, including Marcel Bouchard LS which still remains in the system but is not operational. All the operational lift stations are presented in Figure 14-1 above. Please note, Bell Park LS operates seasonally and services only Bell Park. As such, the capacity was not assessed below. However, it is understood that the Bell Park LS has insufficient capacity in the summer and the forcemain freezes in the winter. Moonlight Beach LS is also only used seasonally.

The remaining lift stations pump to the north or south tunnel either directly or indirectly by pumping first to another lift station, as pictured in the above schematic.

Forcemain sizes and other details for each lift station are summarized in the table below, as reported in the City's Wastewater Lift Stations Operating Manual (2013 Edition).

Table 14-1 Sudbury Lift Station Forcemain Sizes

LIFT STATION	LIFT STATION CAPACITY (L/S)	FORCEMAIN SIZE	OVERFLOW	FLOOD HOMES?	EMERGENCY POWER
Bell Park*		100 mm	Yes	No	No
Beverly	28.8	200 mm	No	Yes	Portable generator receptacle
Brenda	13.3	150 mm	No	Yes	38 kW diesel generator
Cerilli	14	100 mm	Yes, 23 m from nearest panel corner	No	Fed from Loach’s Road LS
Countryside	7.6	Two forcemains: 75 mm and 200 mm	No	Yes	60 kW diesel generator
Don Lita	30.3	200 mm	No	Yes	80 kW diesel generator
Dufferin	6.4	100 mm	Yes, 100 mm to creek	Yes	Portable generator receptacle
Ester	28.4	150 mm	No	Yes	Portable generator receptacle
Fourth	15.2	150 mm	Yes, 150 mm from MH #5-342	No	25 kW diesel generator
Helen's Point	7.6	100 mm	Yes, 150 mm	No	Portable generator receptacle
Kincora	8.7	100 mm	Yes, 150 mm in wet well, to catch basin in front of house #48	Yes	Fed from Mark LS
Lagace	14	100 mm	Yes, valved 150 mm to MH outside station	No	Portable generator receptacle
Lakeview	20.9	150 mm	Yes, 200 mm in wet well, to ditch	No	Fed from York LS
Levesque	167.6	400 mm	Yes, gate in MH #12-88 and flapper west of station	No	250 kVA diesel generator
Loach's Road	12.1	100 mm	150 mm to ditch	Yes	Portable generator receptacle

Marcel Bouchard**	303.3	750 mm	Yes	Yes	106 kVA diesel generator
Mark	41.7	150 mm	Yes, in 200 mm wet well to MHCB #15-47	May flood house across from station	185 kW diesel generator
Moonlight	16.3	150 mm	150 mm, east of station	No	25 kVA diesel generator
Moonlight Beach*	N/A	150 mm	Yes, out of cover	Yes	None
Northshore	11.4	150 mm	Overflows out of the top of MH #10-216 and into Ramsey Lake	No	Portable generator receptacle
Ramsey	32.2	200 mm for 2.4 m then increasing to 250 mm	No	No	194 kVA diesel generator
St. Charles	383	400 mm	No	Yes, all low homes in area	187.5 kVA diesel generator
Selkirk	38.7	150 mm	Yes, 150 mm from wet well to catch basin	No	Portable generator receptacle
Sherwood	30	150 mm	No	Yes	100 kW diesel generator
Southview	58.8	300 mm	No	Yes	135 kW diesel generator
Walford East	127	300 mm	No	Yes	Stationary diesel generator on site at back lot for house #279
York	13.2	100 mm	Yes, 200 mm in wet well to MHCB #15-57	No	50 kW diesel generator

[1] *Seasonal operation only.*

[2] *Decommissioned.*

14.1.1 BYPASSES AND SPILLS

The following table shows the spills that occurred at various lift stations and at manholes throughout the Sudbury Wastewater System.

Table 14-2 Reported Spills in the Sudbury Lift Stations

LOCATION	DATE	DURATION	REASON	DISCHARGE LOCATION
Stewart LS (decommissioned)	May-09	2 hr, primary bypass	Equipment failure	Unknown

Stewart LS (decommissioned)	May-09	0.3 hr, sewer overflow	Power failure	Unknown
St. Charles LS	Mar-09	2.5 hr, primary bypass	Equipment failure	Unknown
St. Charles	Mar-09	2.5 hr	Equipment failure	Junction Creek
Selkirk, north of Burton	Feb-09	1.3 hr, sewer overflow	Sewer problems	Unknown
Notre Dame at Kathleen	Mar-09	4 hr, primary bypass	Equipment failure	Unknown
Moonlight LS	Apr-09	16 hr, sewer overflow	Heavy precipitation and snow melt	Unknown
Moonlight LS	Mar-09	16 hr	Heavy precipitation and snow melt	Field ditch
Moonlight LS	Apr-2011	3 hr	Overflow	Rumford Creek
Moonlight LS	Apr-2011	0.25 hr	Overflow	Rumford Creek
MH 15-79	Feb-11		Sewer overflow	Ditch
Loach's Rd at Oriole	Jan-09	2 hr, primary bypass	Equipment failure	Unknown
Leslie St. and Louis St.	Dec-09	Unknown	Equipment failure	Unknown
Kelly Lake Road	Jul-11	1 hr	Sewer overflow	Junction Creek
Horobin St. Bypass	Sep-06	23.5 hr, primary bypass	Equipment failure and equipment maintenance	Unknown
Horobin Bypass	Apr-09	18.3 hr, sewer overflow	Heavy precipitation and snow melt	Unknown
Horobin Bypass	Apr-11	12 hr, primary bypass	Unknown	Junction Creek
Green LS	Apr-09	19 hr, primary bypass	Heavy precipitation and snow melt	Unknown
Fielding Road at MH 5-70	Dec-11	2 hr, sewer overflow	Unknown	Junction Creek
Corner of Matthew	Sep-11	2.5 hr, sewer overflow	Unknown	Junction Creek
Bell Park	Sep-10	2.5 hr, sewer overflow	Unknown	Ramsey Lake
482 Loach's Road	Feb-09	3.5 hr, primary bypass	Equipment failure	Unknown

481 Loach's Road	Mar-09	2 hr, primary bypass	Equipment failure	Unknown
460 Isabel St	Apr-11	1.5 hr, sewer overflow	Unknown	Junction Creek
39 Orell, Garson	Apr-11	0.1 hr, sewer overflow	Unknown	Unknown
21 William, Garson	Apr-11	2.5 hr, sewer overflow	Unknown	Unknown
1865 Paris Street	Mar-09	5 hr, primary bypass	Equipment failure	Unknown
1562 Stillbrook	Jun-09	8 hr, primary bypass	Equipment failure	Unknown

The frequency of bypasses throughout the system further indicates that I & I may be a problem in the system. Moreover, there were numerous bypasses due to equipment failure in 2009. It is also understood that many of the lift stations are aging.

14.1.2 RECENT AND PROPOSED NEAR TERM UPGRADES

No near term upgrades have been proposed for the lift stations in Sudbury.

14.2 WASTEWATER TREATMENT PLANT

The Sudbury WWTP provides wastewater servicing to the City of Sudbury and community of Garson. It is located at 1271 Kelly Lake Road within the City of Greater Sudbury, and the current property has very little available space for future expansion, if required (to be discussed further as part of the Gap Analysis). The treatment plant is operated under Certificate of Approval number 8970-8J3R79.

14.2.1 UNIT PROCESS DESCRIPTION

The Sudbury WWTP is a conventional activated sludge plant. Currently, the plant has completed the Phase 1 upgrades with a rated capacity of 79,625 m^3/d and peak flow rate of 159,250 m^3/d. When the Phase 2 expansion is complete, the plant rated capacity will increase to 102,375 m^3/d and peak flow rate of 204,750 m^3/d. A process flow schematic of the liquid treatment train after Phase 2 expansion at the Sudbury WWTP is presented in Figure 14-2.

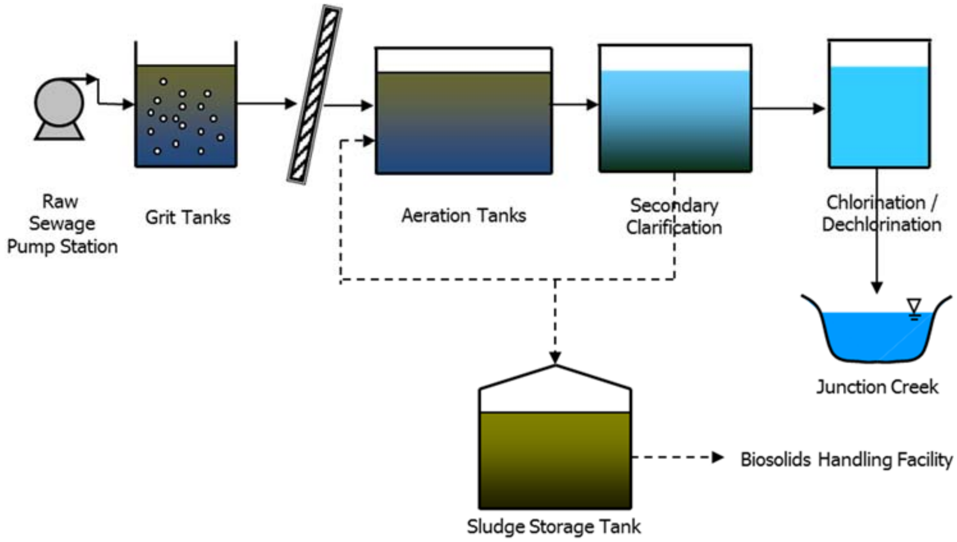


Figure 14-2 Sudbury WWTP Process

Sewage enters the Sudbury WWTP from its raw sewage Lift Station equipped with six raw sewage pumps. One sewage by-pass conduit was designed to handle a peak flow up to 409,500 m^3/d. Provided in Table 14-3 below are the key wastewater treatment plant process design parameters.

Table 14-3 Sudbury WWTP Unit Process Design Data

UNIT PROCESS	DESIGN PARAMETERS
Sludge and Septage Receiving Station	One septage receiving station equipped with a sump and two 20.0 L/s capacity pumps, a grinder/screen, a flow meter and a sampler Two 80 m^3 capacity septage storage tanks equipped with two 10.0 L/s capacity pumps One 340 m^3 capacity sludge receiving tank equipped with two 10.0 L/s capacity pumps
Headworks	Two mechanically raked bar screens controlled by VFD Two 5.0 m diameter grit vortex systems equipped with air lift pumps and grit classifier Two mechanically actuated fine screening system, each fitted with 6 mm openings complete with a washing, dewatering, and compacting system
Primary Treatment Facilities	Two 41.0 m x 41.0 m x 4 m SWD primary clarifier with a circular scraper, scum removing mechanism and sludge pumps

UNIT PROCESS	DESIGN PARAMETERS
Secondary Treatment Facilities	Current facilities (after Phase 1 expansion with the plant capacity of 79,625 m^3/d) Four aeration tanks with two passes each having an operating depth of 4.57 m, a pass width of 9.14 m and pass length of 41.2 m with fine bubble aeration system Four circular final clarifier each with a diameter of 33.5 m and SWD of 3.81 m, equipped with conventional scraper mechanism including: Two 264.9 L/s capacity constant speed pumps for return sludge One 264.9 L/s capacity variable speed pump for return sludge Two circular final clarifiers each of 33.5 m diameter and 4.2 SWD with conventional scraper and scum removing mechanisms including: Four return sludge pumps each rated at 150 L/s at 12.2 TDH Two waste sludge pumps each rated at 20 L/s at 13.1 m TDH Four scum pumps each rated at 20 L/s at 20.0 m TDH Two scum pumps each rated at 6.0 L/s at 9.0 TDH Two 250 HP and one 100 HP blowers One blower capable of supplying 4,700 L/s to the aeration tanks
chlorination/dechlorination	One 4,300 m^3 concrete chlorine contact chamber for a peak flow of 409,500 m^3/d Three 990 kg/d chlorinators Three chlorine injectors Storage facility for fifteen cylinders Three treated effluent pumps, two rated at 30 L/s and one rated at 18 L/s against a head of 585 kpa Two scum pumps rated at 6 L/s at 6.0 m TDH One automatic chlorine gas effluent disinfection control system Three 7,782 L capacity sodium bisulphite storage tanks One 0.5 L/hr to 90 L/hr capacity dual pump chemical metering system
Sludge Handling Facility	Two 440 m^3 capacity gravity sludge thickening tanks One 1,425 m^3 capacity sludge holding tank with one submersible sludge transfer pump rated at 35 L/s at 13 m TDH Two sludge thickening tanks each having of 80 m^3 and sludge holding tank with a capacity of 340 m^3, complete with one centrifugal waste sludge transfer pump having a capacity of 11 L/s at 7 m TDH and a submersible sludge loading pump capable of pumping 75 L/s at 9.5 TDH
Phosphorus Removal Facility	Two 25,000 L ferrous/ferric chloride storage tanks Two metering pumps
Outfall facility	One 1200 mm diameter and one 1,800 mm diameter side discharge outfalls

14.2.2 EFFLUENT CRITERIA

The effluent criteria were set for Phase 1 and Phase 2 expansion separately. For Phase 1 expansion, the plant is required to meet annual average concentration for BOD5 and total suspended solids monthly average concentration for total phosphorus and total residual chlorine. Annual average loading limits for $cBOD_5$, total suspended solids, total phosphorus and total residual chlorine. The loading limits for all parameters are based on the non-compliance concentration limits and a rated capacity of 79,625 m^3/d. For Phase 2 expansion, the plant is required to meet monthly average concentration and annual average loading for BOD_5, total suspended solids, total phosphorus, and total residual chlorine. The loading limits for all parameters are based on the non-compliance concentration limits and a rated capacity of 102,375 m^3/d. The effluent compliance limit for E. coli is monthly average of 200 counts/100 mL based on a monthly geometric mean density. The effluent requirements are summarized in Table 14-4 and Table 14-5. The Sudbury WWTP is operated in accordance with *MOE Amended Environmental Compliance Approval (ECA) No. 1978-9CXQJL* dated May 27, 2014.

Table 14-4 Sudbury WWTP Effluent Objectives and Compliance Criteria for Phase 1 Expansion

PARAMETER	EFFLUENT OBJECTIVES	NON-COMPLIANCE LIMIT CONCENTRATION	NON-COMPLIANCE LIMIT TOTAL LOADING
cBOD5	15 mg/L	25 mg/L	1990.6 kg/d
TSS	15 mg/L	25 mg/L	1990.6 kg/d
Total P Oct-May	0.5 mg/L	1 mg/L	79.6 kg/d
Total P Jun-Dec		0.5 mg/L	39.8 kg/d
Total Ammonia Nitrogen	7.0 mg/L	N/A	N/A
Total Residual Chlorine	Non-detectable	0.02 mg/L	1.6 kg/d
E. coli	100 cfu/100 mL	200 cfu / 100 ml	N/A
pH	6.5-8.5	6.0-9.5	6.0-9.5

Table 14-5 Sudbury WWTP Effluent Objectives and Compliance Criteria for Phase 2 Expansion

PARAMETER	EFFLUENT OBJECTIVES	NON-COMPLIANCE LIMIT CONCENTRATION	NON-COMPLIANCE LIMIT TOTAL LOADING
cBOD5	4.0 mg/L	5.0 mg/L	511.8 kg/d
TSS	8.0 mg/L	10 mg/L	1023.8 kg/d
Total P	0.2 mg/L	0.25 mg/L	25.6 kg/d
Total Ammonia Nitrogen	7.0 mg/L	9.0 mg/L	921.4 kg/d
Total residual chlorine	Non-detectable	0.02 mg/L	2.0 kg/d
E. coli	100 cfu /100 mL	200 cfu / 100 ml	N/A
pH	6.5-8.5	6.0-9.5	6.0-9.5

14.2.3 BYPASSES AND SPILLS

Sudbury WWTP has had numerous reported spills in recent years. These are listed in Table 14-6, below. Most bypasses occurred as a result of heavy precipitation and/or snow melt events, emphasizing inflow and infiltration concerns in the system.

Table 14-6 Reported Spills in the Sudbury Wastewater Plant

LOCATION	DATE	DURATION	REASON	DISCHARGE LOCATION

Sudbury WWTP	Jan-04	3 hr, secondary bypass (white foam)	Freezing	Unknown
Sudbury WWTP	Feb-04	9 hr, primary bypass	Equipment failure	Unknown
Sudbury WWTP	Mar-04	170 hr, primary bypass	Heavy precipitation and snow melt	Unknown
Sudbury WWTP	Apr-04	10.5 hr, primary bypass	Snow melt	Unknown
Sudbury WWTP	Apr-04	24 hr, primary bypass	Heavy precipitation	Unknown
Sudbury WWTP	May-04	14 hr, primary bypass	Heavy precipitation	Unknown
Sudbury WWTP	May-04	26 hr, primary bypass	Heavy precipitation	Unknown
Sudbury WWTP	May-04	34 hr, primary bypass	Heavy precipitation	Unknown
Sudbury WWTP	May-04	10 hr, primary bypass	Heavy precipitation	Unknown
Sudbury WWTP	Jul-04	4 hr, primary bypass	Heavy precipitation	Unknown
Sudbury WWTP	Jan-05	8.5 hr, primary bypass	Heavy precipitation and snow melt	Unknown
Sudbury WWTP	Mar-05	23.5 hr, primary bypass	Snow melt	Unknown
Sudbury WWTP	Apr-05	38 hr, primary bypass	Snow melt	Unknown
Sudbury WWTP	Apr-05	42 hr, primary bypass	Heavy precipitation and snow melt	Unknown
Sudbury WWTP	Nov-05	25 hr, primary bypass	Heavy precipitation and snow melt	Unknown
Sudbury WWTP	Mar-06	124.5 hr, primary bypass	Heavy precipitation and snow melt	Unknown
Sudbury WWTP	Mar-06	552 hr, primary bypass	Snow melt	Unknown
Sudbury WWTP	May-06	17.5 hr, primary bypass	Heavy precipitation	Unknown
Sudbury WWTP	May-06	74 hr, primary bypass	Heavy precipitation	Unknown
Sudbury WWTP	Dec-06	80.5 hr, primary bypass	Heavy precipitation and snow melt	Unknown
Sudbury WWTP	Apr-07	23 hr, primary bypass	Heavy precipitation	Unknown
Sudbury WWTP	Jul-07	9 hr, primary bypass	Heavy precipitation	Unknown
Sudbury WWTP	Jul-07	19 hr, primary bypass	Heavy precipitation	Unknown
Sudbury WWTP	Aug-07	6.5 hr, primary bypass	Heavy precipitation	Unknown
Sudbury WWTP	Nov-07	8 hr, primary bypass	Heavy precipitation	Unknown
Sudbury WWTP	Jan-08	67.75 hr. secondary bypass	Heavy precipitation and snow melt	Unknown
Sudbury WWTP	Jan-08	5.25 hr, secondary bypass	Heavy precipitation and snow melt	Unknown
Sudbury WWTP	Apr-08	62.5 hr, secondary bypass	Heavy precipitation and snow melt	Unknown
Sudbury WWTP	Apr-08	155.6 hr, secondary bypass	Snow melt	Unknown
Sudbury WWTP	Dec-08	16 hr, secondary bypass	Heavy precipitation and snow melt	Unknown
Sudbury WWTP	Dec-08	59 hr, secondary bypass	Heavy precipitation and snow melt	Unknown
Sudbury WWTP	Mar-09	18.5 hr, primary bypass	Snow melt	Unknown
Sudbury WWTP	Mar-09	57 hr, secondary bypass	Heavy precipitation and snow melt	Unknown
Sudbury WWTP	Mar-09	260 hr, primary bypass	Snow melt	Unknown

Sudbury WWTP	Apr-09	16 hr, secondary bypass	Heavy precipitation	Unknown
Sudbury WWTP	Jul-09	22 hr, secondary bypass	Heavy precipitation	Unknown
Sudbury WWTP	Jul-09	17.5 hr, primary bypass	Heavy precipitation	Unknown
Sudbury WWTP	Oct-09	18.8 hr, secondary bypass	Heavy precipitation	Unknown
Sudbury WWTP	Sep-10	28.66 hr, primary bypass	Unknown	Coniston Creek
Sudbury WWTP	Apr-11	10 hr, primary bypass	Unknown	Junction Creek
Sudbury WWTP	Apr-11	69 hr, primary bypass	Unknown	Junction Creek

Most bypasses at the Sudbury WWTP occurred as a result of heavy precipitation or snow melt. It is recommended that the City consider studying I&I in the Sudbury wastewater system.

14.2.4 RECENT AND PROPOSED NEAR TERM UPGRADES

Amended Certificate of Approval Number 8970-8J3R79 for Sudbury WWTP was issued in September 2011 for phased expansion to a rated capacity of 102,375 m^3/d from its rated capacity of 68,250 m^3/d. Currently, the Phase I expansion to a rated capacity of 79,625 m^3/d has been completed. The Phase II expansion will be implemented in the near future.

15 VALLEY EAST WASTEWATER SYSTEM

The Valley East Wastewater system contains the Valley East WWTP, nine wastewater lift stations and a network of sewers. The general flow schematic is shown in the figure below.

The Valley East Wastewater System provides wastewater servicing to the community of Blezard Valley, Val Caron, McCrae Heights, Val Therese and Hanmer.

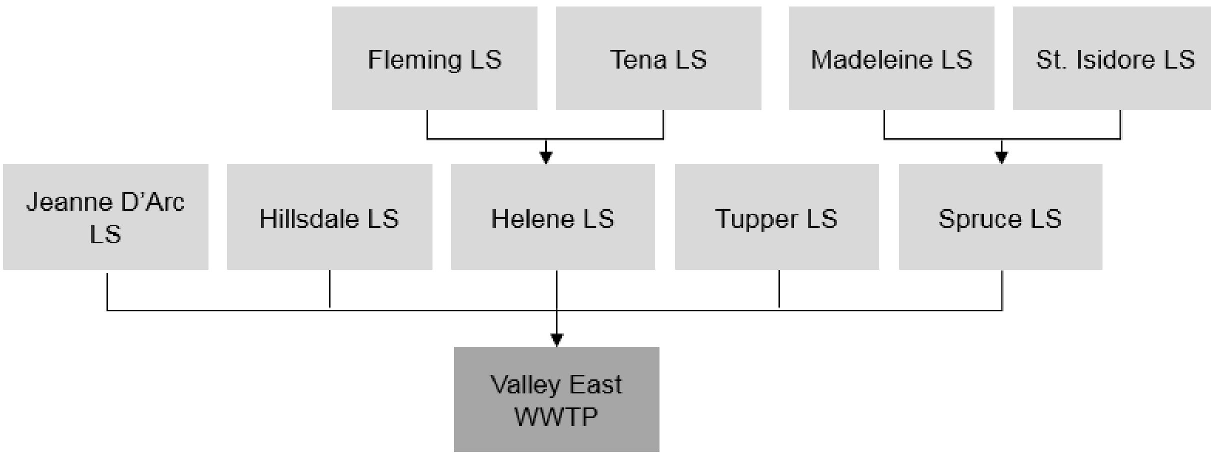


Figure 15-1 Valley East Wastewater System Flow Diagram

15.1 LIFT STATIONS

Valley East has nine wastewater lift stations within its capture area. Forcemain sizes and other details for each lift station are summarized in the table below, as reported in the City's Wastewater Lift Stations Operating Manual (2013 Edition).

Table 15-1 Valley East Lift Station Forcemain Sizes

LIFT STATION	LIFT STATION CAPACITY (L/S)	FORCEMAIN SIZE	OVERFLOW	FLOOD HOMES?	EMERGENCY POWER
Fleming	25.1	200 mm	Yes, valved, out of MH #6-1	Yes, one home	Portable generator receptacle
Helene	40.3	300 mm	Yes, 600 mm, valved, southwest of station	Yes	600 kVA diesel generator
Hillsdale	52.2	250 mm	Yes, 300 mm	Yes	37.5 kVA diesel generator
Jeanne D'Arc	110	400 mm	No	Yes	50 kVA diesel generator
Madeleine	15.2	150 mm	Yes, 150 mm into storm sewer MH #12-25 in front of 4477 Madeleine	Yes	Portable generator receptacle

St. Isidore	74	200 mm	No	Yes	31.75 kVA diesel generator
Spruce	27.9	350 mm	Yes, 600 mm, west of station	No	125 kVA diesel generator
Tena	22	150 mm	No	Yes	20 KVA diesel generator
Tupper	9.4	150 mm	No	Yes	50 kW diesel generator

15.1.1 BYPASSES AND SPILLS

There were no reported bypasses or spills at the lift stations in recent history.

15.1.2 RECENT AND PROPOSED NEAR TERM UPGRADES

No near term upgrades have been proposed for the lift stations in Valley East.

15.2 WASTEWATER TREATMENT PLANT

The Valley East WWTP is located at 1317 Yorkshire Drive, Val Caron in the City of Greater Sudbury. The treatment plant is operated under Certificate of Approval number 5864-7E5RLV.

The raw wastewater entering the Valley East WWTP is primarily of domestic origin.

15.2.1 UNIT PROCESS DESCRIPTION

The Valley East WWTP is conventional activated sludge treatment plant. The plant has a rated capacity of 11,365 m^3/d. A process flow schematic of the liquid treatment train at the Valley East WWTP is presented in Figure 15-2.

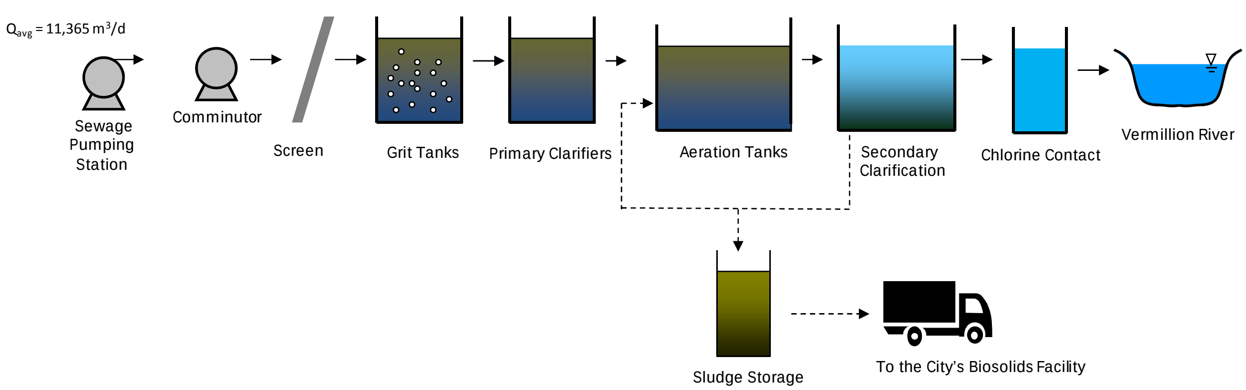


Figure 15-2 Valley East WWTP Process

Sewage enters the Valley East WWTP through the on-site influent sewage lift station. The treatment plant has two parallel trains comprising of inlet works with a comminutor, bypass channel, fine bar screens and an aerated grit tank. Primary treatment consists of two primary clarifiers for removing heavy particles.

Secondary treatment consists of two rectangular aeration tanks equipped with fine bubble diffusers. Air is supplied by one duty and two standby positive displacement blowers. RAS is pumped to the front of the aeration tank and mixed with raw wastewater. Secondary clarification of the mixed liquor occurs in two rectangular clarifiers. WAS is directed to two sludge holding tanks for storage. The sludge is hauled to a tailings area owned by Vale Limited for final disposal.

Prior to entering the secondary clarifier, ferric sulphate is added to the mixed liquor for precipitation of phosphorus. Secondary effluent is disinfected year-round using chlorine gas. The treated effluent from the facility is discharged to the Vermilion River via an effluent lift station. Table 15-2 presents key process design parameters.

Table 15-2 Valley East WWTP Unit Process Design Data

UNIT PROCESS	DESIGN PARAMETERS
Raw Sewage Lift Station	One 1.2 m diameter plant influent channel One coarse bar screen splitting into to raw sewage wet wells One dry well housing one 11.25 kw duty pump with a rated capacity of 75.7 L/s at 10.7 meter of TDH Three stand-by 30 kw pumps each with a rated capacity of 151.4 L/s at a TDH of 11.7 m One 250 mm diameter magnetic flow meter
Inlet Works	One 0.8 m and 1.2 m wall height channel equipped with one 2.25 kw comminutor One by-pass/overflow channel with an overflow weir One fine bar screen with 25 mm openings One continuous self-cleaning filter type bar screen with a screening compactor, screw type grit classifier Two air lift pumps each rated at 10 L/s at 1.5 m lift One aerated grit tank
Secondary Treatment Facilities	Two rectangular aeration tanks each 51.8 m long by 7.6 m wide by 4.3 m SWD and having combined volume of 3,380 m^3 equipped with fine bubble membrane diffusers One 93.75 kW positive displacement blower with a max rated capacity of 2,800 m^3/hr Two 56.25 kW standby centrifugal blowers Two two-pass secondary clarifiers, each pass 38.1 m long by 4.8 m wide by 2.9 m SWD Each tank has longitudinal sludge skimmers and collectors Two 56.25 kW RAS pumps each with a rated capacity of 50.5 L/s Two sludge splitter boxes
Phosphorus Removal	One 23.6 m^3 capacity ferric sulphate storage tank One chemical metering pump with max capacity of 78.9 L/hr
Disinfection	Two v-notch floor mounted gas chlorinators each unit capable of a set dosage concentration at a rate varying from 9.1 kg/d to 136 kg/d, two injectors, one two chlorine gas ton container
Treated effluent Lift Station	One 3.2 m by 2.1 m valve chamber One duty centrifugal effluent pump with a rated flow range of 7,500-10,000 m^3/d at a TDH of 12.0-13.5 m On dry-well housing two 100 kw pumps each rated at 328 L/s at a TDH of 26 m One 600 mm diameter forcemain to Vermilion River
Sludge Handling	One 7.67 m diameter by 7.27 m SWD sludge holding tank with a capacity of 320 m^3

15.2.2 EFFLUENT CRITERIA

The plant is required to meet average annual concentration and loading for $CBOD_5$ and total suspended solids as well as monthly average concentration and loading for total phosphorus. The loading limits for all parameters are based on the non-compliance concentration limits and a plant rated capacity of 11,365 m^3/d. The effluent compliance limit for E. coli is 200 organisms per 100 mL based on a monthly geometric mean density. The effluent requirements are summarized in Table 15-3. The Valley East WWTP is operated in accordance with *MOE Amended Certificate of Approval for Sewage No. 5864-7E5RLV* dated May 9, 2008.

Table 15-3 Valley East WWTP Effluent Objectives and Compliance Criteria

PARAMETER	EFFLUENT OBJECTIVES	NON-COMPLIANCE LIMIT CONCENTRATION	NON-COMPLIANCE LIMIT TOTAL LOADING
cBOD5	15 mg/L	25 mg/L	284 kg/d
TSS	15 mg/L	25 mg/L	284 kg/d
Total P	0.8 mg/L	1 mg/L	11.4 kg/d
E. coli	150 cfu/100 mL	200 cfu /100 mL	N/A
pH	6.5 to 9.5	6.0 to 9.5	N/A

15.2.3 BYPASSES AND SPILLS

The Valley East WWTP has one reported bypass (primary bypass) that occurred in April 2009 as a result of heavy precipitation. No other spills were reported.

15.2.4 RECENT AND PROPOSED NEAR TERM UPGRADES

The City of Greater Sudbury was required to prepare and implement a Pollution Prevention (P2) Plan as set out by a P2 Planning Notice published by Environment Canada (EC) in the *Canada Gazette*. The objective of this P2 Plan as it applied to the Valley East WWTP was to identify efficiencies to optimize the treatment process to reduce the quantity of inorganic chloramines and total residual chlorine (TRC) in the effluent discharged to surface water.

As per the requirements of the P2 Planning Notice, dechlorination will need to be implemented. In response, the City of Greater Sudbury has decided to reduce or eliminate the use of chlorine for disinfection at all of its WWTPs. The City is unable to meet the proposed deadline for implementing the preferred option under the P2 Planning Notice. As such, the City intends to submit a Request for Time Extension to Environment Canada.

16 WAHNAPITAE WASTEWATER SYSTEM

The Wahnapitae Wastewater System contains one wastewater lagoon, one wastewater lift station and a network of sewers.

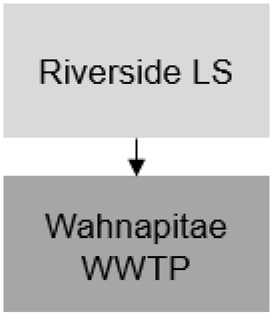


Figure 16-1 Wahnapitae Wastewater System Flow Diagram

16.1 LIFT STATIONS

The Wahnapitae Wastewater System includes a single lift station, the Riverside LS. Forcemain size and other details for this lift station are summarized in the table below, as reported in the City's Wastewater Lift Stations Operating Manual (2013 Edition).

Table 16-1 Wahnapitae Lift Station Forcemain Sizes

LIFT STATION	LIFT STATION CAPACITY (L/S)	FORCEMAIN SIZE	OVERFLOW	FLOOD HOMES?	EMERGENCY POWER
Riverside	52	300 mm	Yes, 375 mm, valved at river, from MH #5-42	Yes	62.5 kVA diesel generator

16.1.1 BYPASSES AND SPILLS

There were no reported bypasses or spills at the lift station in recent history.

16.1.2 RECENT AND PROPOSED NEAR TERM UPGRADES

No near term upgrades have been proposed for the lift station in Wahnapitae.

16.2 LAGOON

The Wahnapitae Lagoon provides wastewater servicing to the community of Wahnapitae and is located on Lot 10, Concession 2 in Dryden. The lagoon operates under C of A 7439-8BBJYJ.

16.2.1 UNIT PROCESS DESCRIPTION

Wahnapitae Lagoon is located in the Town of Nickel Centre for the treatment and disposal of sewage, having a rated capacity of 1,246 m^3/d. Treated wastewater is seasonally discharged to Wahnapitae River. The discharge periods are limited to between March 15 and April 30, and between November 1 and December 15.

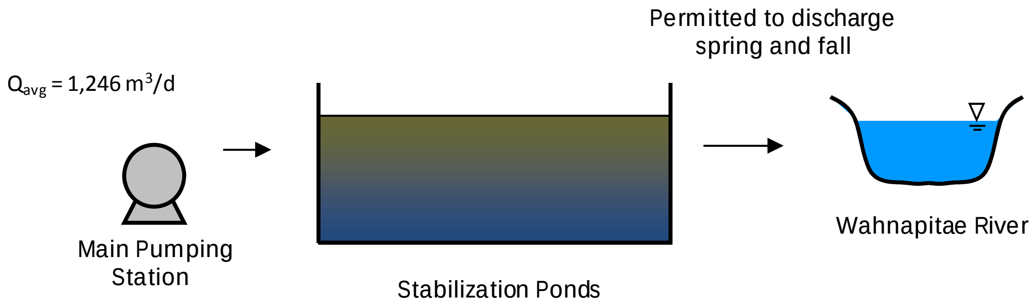


Figure 16-2 Wahnapitae Lagoon System

The average raw sewage flow to the plant in 2012 was 556 m^3/d, which is approximately 45% of the average day rated capacity of 1,246 m^3/d. Although maximum day flow to the lagoon is not recorded, the highest flow in 2012 was 972 m^3/d. This occurred in March 2012, with similar high levels occurring in March 2011 (760 m^3/d) and 2010 (1,234 m^3/d), the latter of which nearly matching the plant rated capacity. This may be attributed to the spring melt. Such high flows, however, are not typical and should not currently be used to evaluate the capacity of the plant.

Overall, the plant performs well, with effluent levels below the maximum permitted.

16.2.2 EFFLUENT CRITERIA

The Wahnapitae Lagoons are operated in accordance with MOE Certificate of Approval (C of A) No. 7439-8BBJYJ dated April 1, 2011.The C of A for the Wahnapitae Lagoons stipulates that the effluent concentrations of $CBOD_5$ and Suspended Solids not exceed 25 mg/L and 30 mg/L, respectively.

16.2.3 BYPASSES AND SPILLS

There were no reported bypasses or spills at the Wahnapitae lagoon in recent history.

16.2.4 RECENT AND PROPOSED NEAR TERM UPGRADES

Based on a review of the plant current capacity and effluent quality, no major upgrades are required for the Wahnapitae Lagoons. However, the City may wish to consider diverting spring melt water.