

**FUNCTIONAL SERVICING REPORT
74 EDWARDS DRIVE SUBDIVISION**

2025-01-30



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1 Background

Jewell Engineering Inc. (Jewell) was retained by Yvette Johnston to assist with the draft plan of subdivision application for the proposed residential development at 74 Edwards Drive in Keene, Ontario. The site fronts onto Edwards Drive and backs onto undeveloped land and the North Shore Public School, see Figure 1. This report is submitted to support the proposed development.

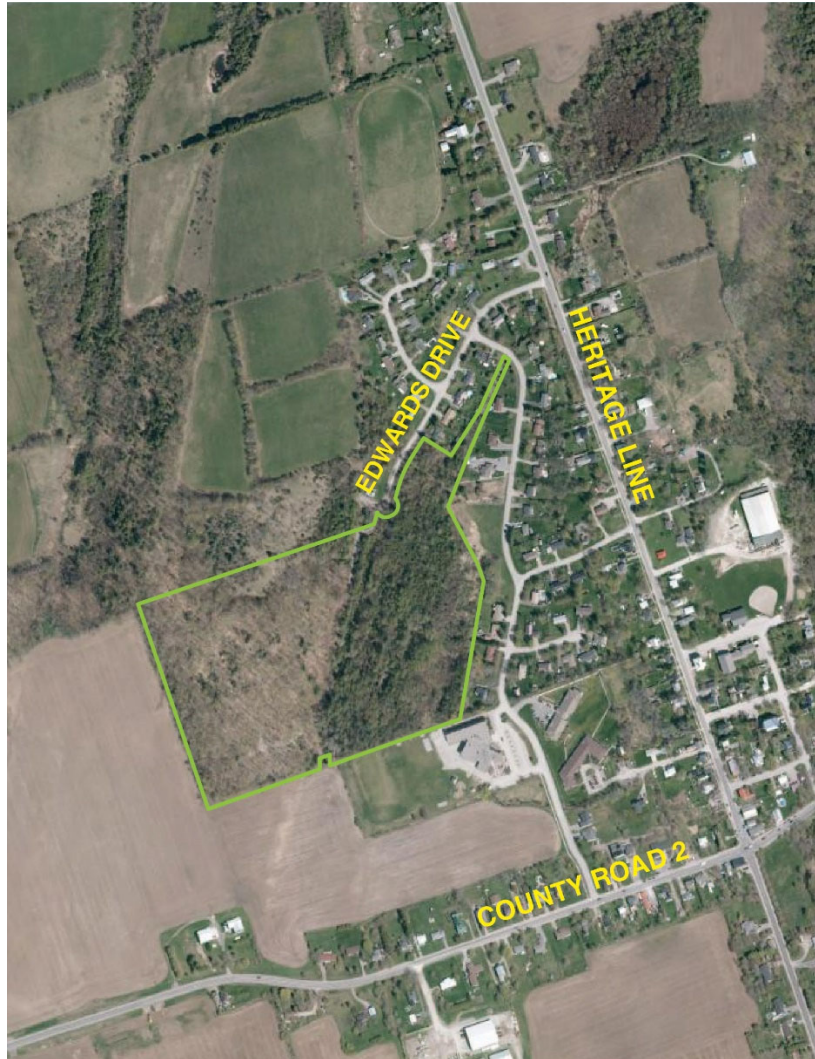


Figure 1: Property Location

The following services have been reviewed as part of the application:

- Water Distribution System
- Sanitary Treatment by Private Septic – Hydrogeological Assessment (separate cover)
- Stormwater Management (separate cover)

1.1 Site Description

The site is approximately 14 hectares (ha) in area and is located at the end of Edwards Drive in Keene, Ontario. The site is zoned future development with provisions as noted in zoning by-law.

The lot has access via Edwards Drive and abuts residential lands to the east and north, agricultural lands to the west, and North Shore Public School to the south.

The eastern portion of the property (6.2+0.2ha) is wetland and the north portion of the site (2.5ha) will remain undisturbed to provide a wildlife corridor, leaving approximately 5.0ha for the development of 16 lots on the drumlin located on the west side of the site.

Presently, the site is undeveloped. The developable portion of the landscape is dominated by a drumlin on the west side which drains to the east and west and also to a wetland on the east side of the site.

1.2 Proposed Site Development

The proposed development includes 16 rural residential lots. The development will include the construction of a new municipal road to extend Edwards Drive. A concept plan is shown in Appendix A.

Access

One new municipal road extension of Edwards Drive will provide access to the development.

Servicing

The site will be serviced with municipal water and private septic systems on each lot.

2 Water Distribution System

2.1 Existing Conditions

A municipal groundwater source services Keene. Two wells supply the system, one of which is located on the south side of the subject site. The water treatment plant is located on the adjacent property to the north. There is a small 150 mm diameter domestic water distribution system supplying the surrounding Keene Heights subdivision (37 residences). The system does not provide fire protection. A map of the network can be found in Appendix B.

It is understood that Engage Engineering is currently completing a review of the existing system and this review has not yet been made public or shared with Jewell Engineering. Based on a presentation made to Council by Engage Engineering, the capacity within the existing system is as follows:

Table 1: Keene Heights Water System Capacity

Feature	Rated Capacity	Capacity In Use	Capacity Remaining
Groundwater Wells - PTTW	164 m ³ /d	29%	116 m ³ /d
Treatment System	66 m ³ /d	72%	18.5 m ³ /d
Treated Water Storage	43.7 m ³	48%	22.7 m ³

The limiting component of the Keene Heights Water System is the treatment component that has a remaining capacity of 18.5m³/day for future growth.

2.2 Design Criteria

The municipal water infrastructure will be designed to the following specifications:

- Ministry of Environment, Conservation, and Parks (MECP)
 - Design Guidelines for Drinking-Water Systems, 2008

Water demand calculations were completed following the MECP guidelines and the pipe design was completed following the specific MECP drinking-water guidelines summarized below:

- Minimum watermain diameter size: 150 mm (200mm preferred)
- Average residential daily domestic demand: 350 L/d*cap
- Peak hour demand pressure minimum: 50 psi
- Peak hour demand pressure maximum: 80 psi
- System pressure maximum: 100 psi

The proposed system expansion must provide adequate pressure and flow to supply the residential development under Maximum Day and Peak Hour Demand.

2.3 Population Demand

The calculated water demand for the proposed development is provided in Table 2.

Table 2: Daily Average Water Demand

Type	Single Detached
# of Units	16
Population/Unit	2.5*
Total Population	40
Capita Usage	350 L/d*cap
Daily Average Demand	14,000 L/d
Daily Average Demand	14.0 m³/d

*Based on information published by Otonabee Region Conservation Authority (ORCA) which indicates the existing serviced population is approximately 75 people and the Council presentation by Engage which indicates 37 service connections, the population/unit of the existing system is determined to be approximately 2.0 ppl/unit. For the analysis of the proposed development, 2.5 ppl/unit was conservatively applied.

“In general, small systems have higher peaking factors for maximum day and peak hour demand than large systems. The minimum rate, maximum day and peak rate factors for the system should be based on existing flow data or data from a similar nearby system where available. Table 3.3 provides peaking factors for use with average day demand when actual data are not available.” MOE 2008 section 3.4.5.1.

The Council presentation by Engage notes an average day flow of 20.9m³/d and a maximum daily flow of 47.5 m³/d for the existing Keene Heights water system which indicates a maximum day peaking factor of 2.3. Information regarding the peak hour factor for the existing system was not available, therefore the peak hour factor was based on MOE standards Table 3.3 for a population served between 50 and 150 people.

Table 3: Peaking Factor

Peaking Factor	
Maximum Day	2.3
Peak Hour	7.4

Accordingly, the following total demands for the proposed development were determined and listed below:

- Average Day Demand: 9.72 L/min (14.0 m³/d)
- Maximum Day Demand: 22.4 L/min (32.2 m³/d)
- Peak Hour Demand: 71.9 L/min (4.3m³ for 1-hr period)

2.4 Water System Analysis

The existing 150mm watermain on Edwards Drive can be extended to service the proposed development.

“As a minimum, the water supply/treatment facility should be designed to meet the projected maximum daily flow requirement of the service area with peak hourly, outdoor use and fire demands met from storage. Where it is possible to develop the source of supply to meet more than the projected maximum daily flow, the storage volume can be reduced accordingly.” MOE 2008 section 3.4.5.1.

Based on the remaining system capacities noted in section 4.1, upgrades to the treatment system may be required to support the proposed development. The existing groundwater wells and treated water storage have sufficient capacity to support the proposed development.

Table 4: Keene Heights Water System Capacity

Feature	Capacity Remaining	Edward Drive Subdivision	Sufficient Capacity?
Groundwater Wells - PTTW	116 m ³ /d	32.2 m ³ /d	✓
Treatment System	18.5 m ³ /d	32.2 m ³ /d	✗
Treated Water Storage	22.7 m ³	13.7 m ³	✓

It is understood that Engage Engineering has been tasked with evaluating the existing system on behalf of the Municipality and are currently completing their evaluation. It is understood that Engage’s work includes consideration of the expansion of treatment plant capacity in order to service additional development lands but further details were unavailable until completion and publishing of the report. Once the report becomes available, the design values applied in this report (population factor, per capita usage, peaking factors) should be confirmed.

Due to the limited availability of information regarding the existing system, no further analysis could be completed. However, it appears that there is no elevated water storage as part of the Keene Heights water system, therefore it is expected that system pressure is being provided through pumps at the treatment plant. Due to the elevation of the proposed development site (~12m above the water treatment plant), it is expected that boosters will be required to ensure sufficient pressure within the proposed development. Accordingly, it is recommended that all homes be provided with 25mm water services and a Grundfos SCALA2 booster pump (or equivalent).

3 Conclusion

Jewell studied the existing site and reviewed the feasibility of servicing the proposed development.

Upgrades to the treatment system may be required in order to supply domestic water service to the proposed development. The existing groundwater wells and treated water storage have sufficient capacity to support the proposed development. 25mm water services and private boosters should be provided to all homes in the proposed development to ensure sufficient water pressure.

-Prepared by:

Julie Humphries

Julie Humphries, C.E.T.
Jewell Engineering Inc.

Approved by:



Amanda Redden, P.Eng.
Jewell Engineering Inc.

4 References

The information used to prepare this report is based on the following documents and information provided as noted below:

- Ontario Ministry of Environment
 - Design Guidelines for Drinking-Water Systems, 2008
- Engage Engineering
 - Keene Heights Water System Assessment, Figure 1
 - OSM Township Water System Assessment
- Otonabee Region Conservation Authority
 - Drinking Water Source Protection - Keene Heights Subdivision – Municipal Wellhead Protection Area

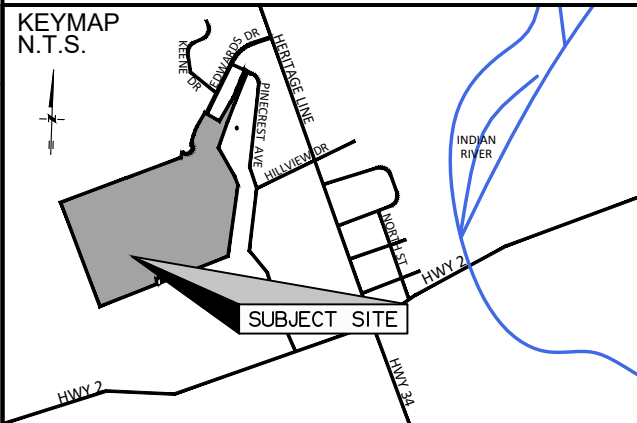
**APPENDIX A:
CONCEPT PLAN**

PLAN COPYRIGHT
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DEVELOPMENT SITE PLAN

PART OF LOT 13 & 14, CONCESSION 7
 (GEOGRAPHIC TOWNSHIP OF OTONABEE)
 PART 4, PLAN 45R-6864 & PARTS 1, 2, 3, 4 & 5 PLAN 45R-14319
 SAVE AND EXCEPT PART 2 45R-16688 & PART 1 PLAN 45R-16795
 SUBJECT TO AN EASEMENT AS IN LT21491, TOGETHER WITH AN EASEMENT OVER PARTS 1 & 2 PLAN 45R-6864
 TOWNSHIP OF OTONABEE-SOUTH MONAGHAN
 COUNTY OF PETERBOROUGH

SCALE = 1:2,000 METRIC
 0 40 80m



LEGEND

	MINERAL CULTURAL MEADOW (CUM1) VEGETATIVE COMMUNITY- TO BE VEGETATED - CAMBIUM, 2024		TIMMINS FLOODLINE - JEWELL, 2024
	TEMPORARY TREE REMOVAL AREA TO BE RE-VEGETATED - CAMBIUM, 2024		EXISTING NATURAL TRAIL
	SURVEYED EXISTING WETLAND - CAMBIUM, 2022		15m FLOODLINE SETBACK
	WETLAND REMOVAL AREA (580m ²)		30m WETLAND SETBACK
	3:1 WETLAND COMPENSATION AREA (1,742m ²)		WATERCOURSE
	POTENTIAL PRIMARY SEPTIC LOCATION - CAMBIUM, 2024		EXISTING EASEMENT LINES
	POTENTIAL SINGLE-DETACHED DWELLING		PROPOSED RETAINING WALL
	POTENTIAL DRIVEWAY LOCATION		TOP OF SLOPE - CAMBIUM, 2022
			BOTTOM OF SLOPE - CAMBIUM, 2022
			POTENTIAL SEPTIC RESERVE LOCATION - CAMBIUM, 2024

LAND USE SUMMARY

	AREA(ha.)	AREA%	UNITS
SINGLE-DETACHED RESIDENTIAL LOTS	3.78	26.9	16
MUNICIPAL ROAD ALLOWANCE	1.27	9.0	
PASSIVE PARKLAND WITHIN WETLAND	5.93	42.1	
PASSIVE PARKLAND OUTSIDE OF WETLAND	3.12	22.0	
TOTAL	14.10ha	100.0%	16

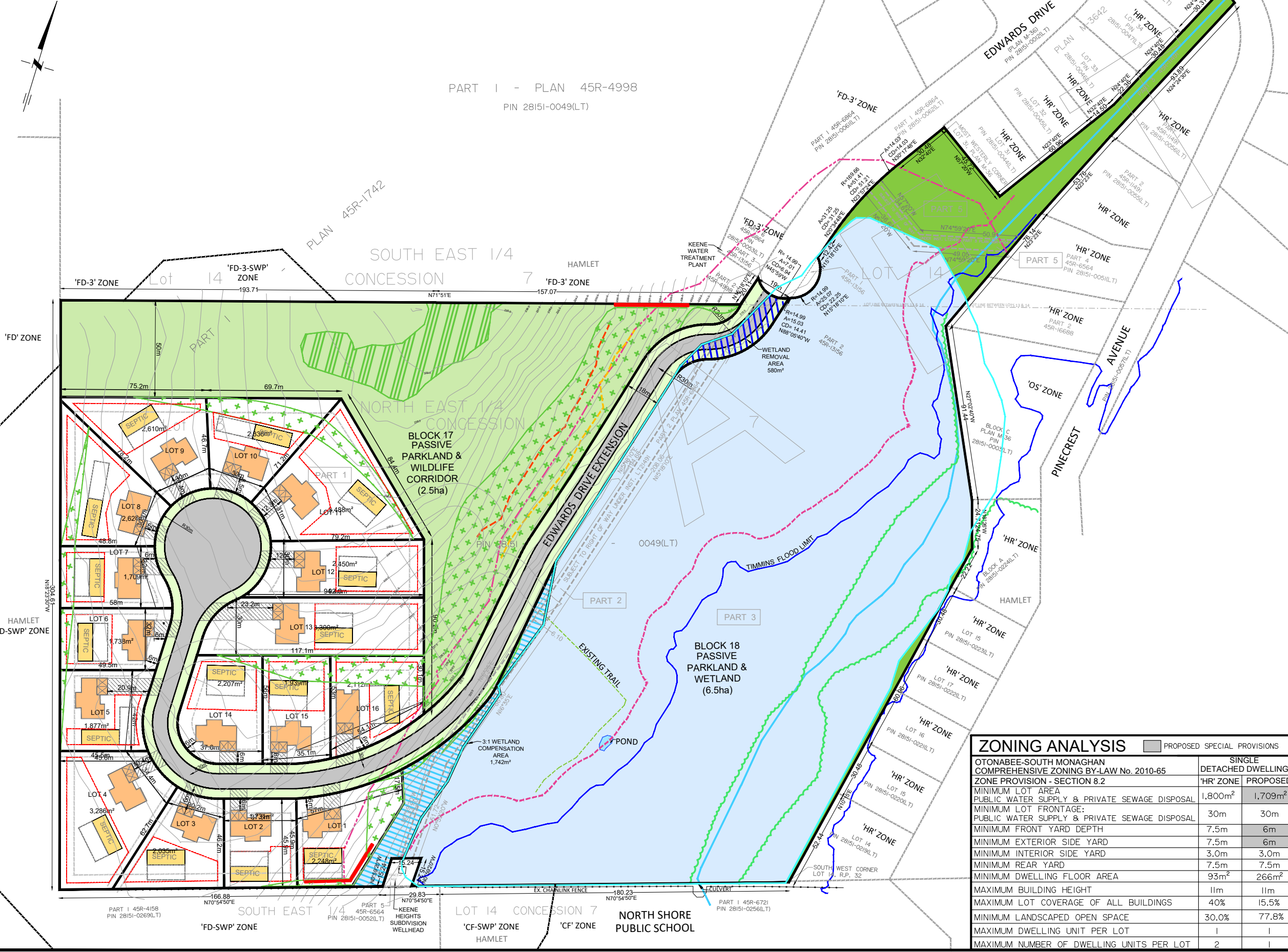
PARKLAND SUMMARY

PASSIVE PARKLAND WITHIN WETLAND	5.93
PASSIVE PARKLAND OUTSIDE OF WETLAND	0.62
WILDLIFE CORRIDOR - OUTSIDE WETLAND	2.5
PARKLAND TOTAL	9.05ha

NOTE:
 METRIC NOTE: DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.
 SURVEY NOTE: DRAWING CREATED USING DATA FROM PLAN 45R-14319 BY SENINGER SURVEYING LTD., DATED FEBRUARY 12, 2008. CONTOUR DATA PROVIDED BY JEWELL ENGINEERS.
 BUILDING NOTE: BUILDING FOOTPRINTS, LANDSCAPED OPEN SPACE AND DRIVEWAYS ARE CONCEPTUAL AND SUBJECT TO CHANGE.

ZONING ANALYSIS

OTONABEE-SOUTH MONAGHAN COMPREHENSIVE ZONING BY-LAW No. 2010-65 ZONE PROVISION - SECTION 8.2	SINGLE DETACHED DWELLING	
	'HR' ZONE	PROPOSED
MINIMUM LOT AREA	1,800m ²	1,709m ²
MINIMUM LOT FRONTAGE: PUBLIC WATER SUPPLY & PRIVATE SEWAGE DISPOSAL	30m	30m
MINIMUM FRONT YARD DEPTH	7.5m	6m
MINIMUM EXTERIOR SIDE YARD	7.5m	6m
MINIMUM INTERIOR SIDE YARD	3.0m	3.0m
MINIMUM REAR YARD	7.5m	7.5m
MINIMUM DWELLING FLOOR AREA	93m ²	266m ²
MAXIMUM BUILDING HEIGHT	11m	11m
MAXIMUM LOT COVERAGE OF ALL BUILDINGS	40%	15.5%
MINIMUM LANDSCAPED OPEN SPACE	30.0%	77.8%
MAXIMUM DWELLING UNIT PER LOT	1	1
MAXIMUM NUMBER OF DWELLING UNITS PER LOT	2	1

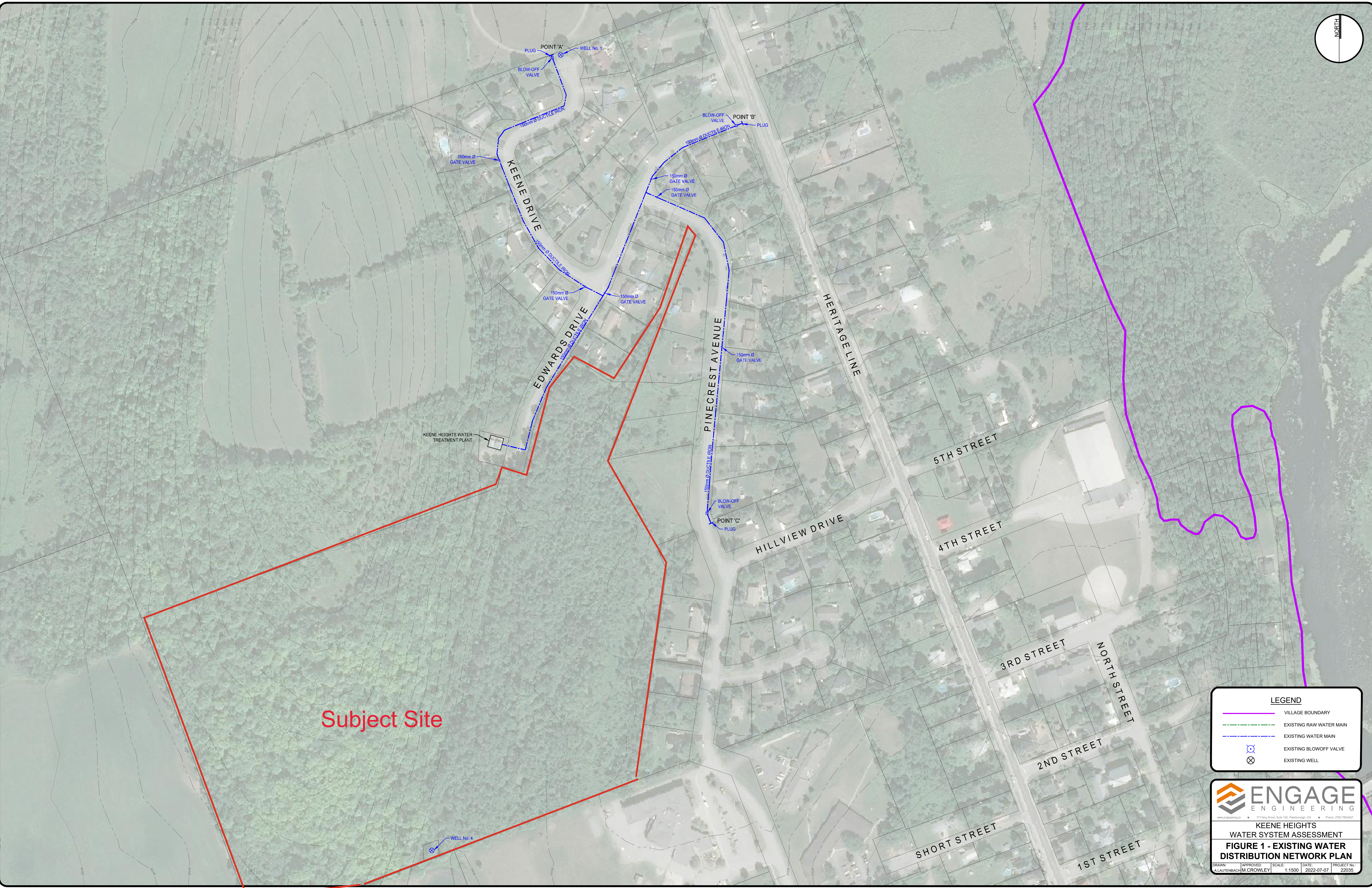
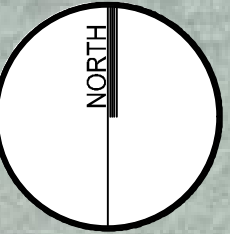


JAN 23, 2025




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 JOB No. 888

**APPENDIX B:
WATER DISTRIBUTION SYSTEM**



Subject Site

LEGEND	
	VILLAGE BOUNDARY
	EXISTING RAW WATER MAIN
	EXISTING WATER MAIN
	EXISTING BLOWOFF VALVE
	EXISTING WELL


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KEENE HEIGHTS
WATER SYSTEM ASSESSMENT
FIGURE 1 - EXISTING WATER DISTRIBUTION NETWORK PLAN

DRAWN: A. LAUTENBACH	APPROVED: M. CROWLEY	SCALE: 1:1500	DATE: 2022-07-07	PROJECT No.: 22035
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**APPENDIX C:
REFERENCE DOCUMENTS**



Engage Engineering

OSM Township Water
System Assessment





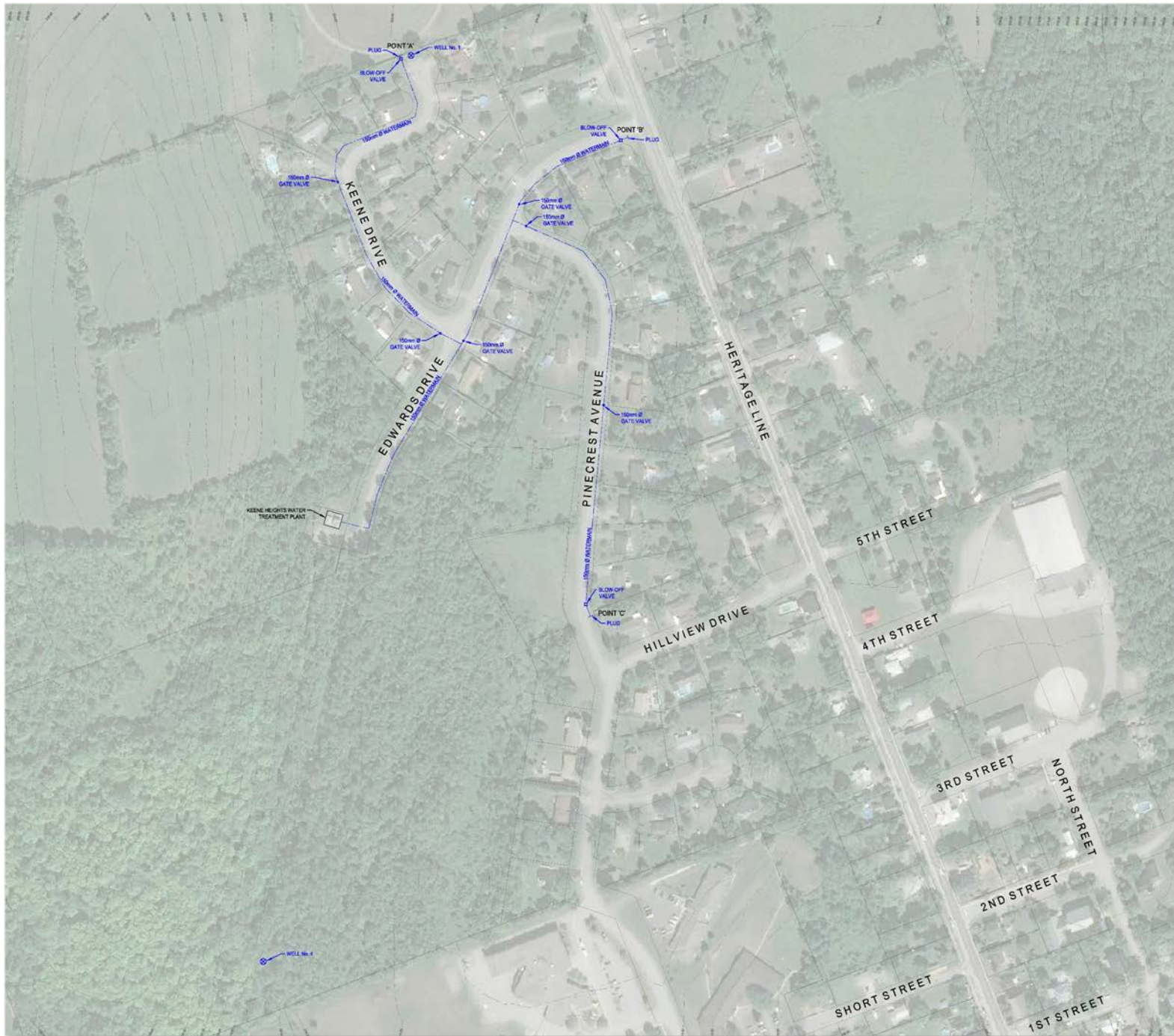
Introduction

Project
Overview

Keene Heights Water System

Overview

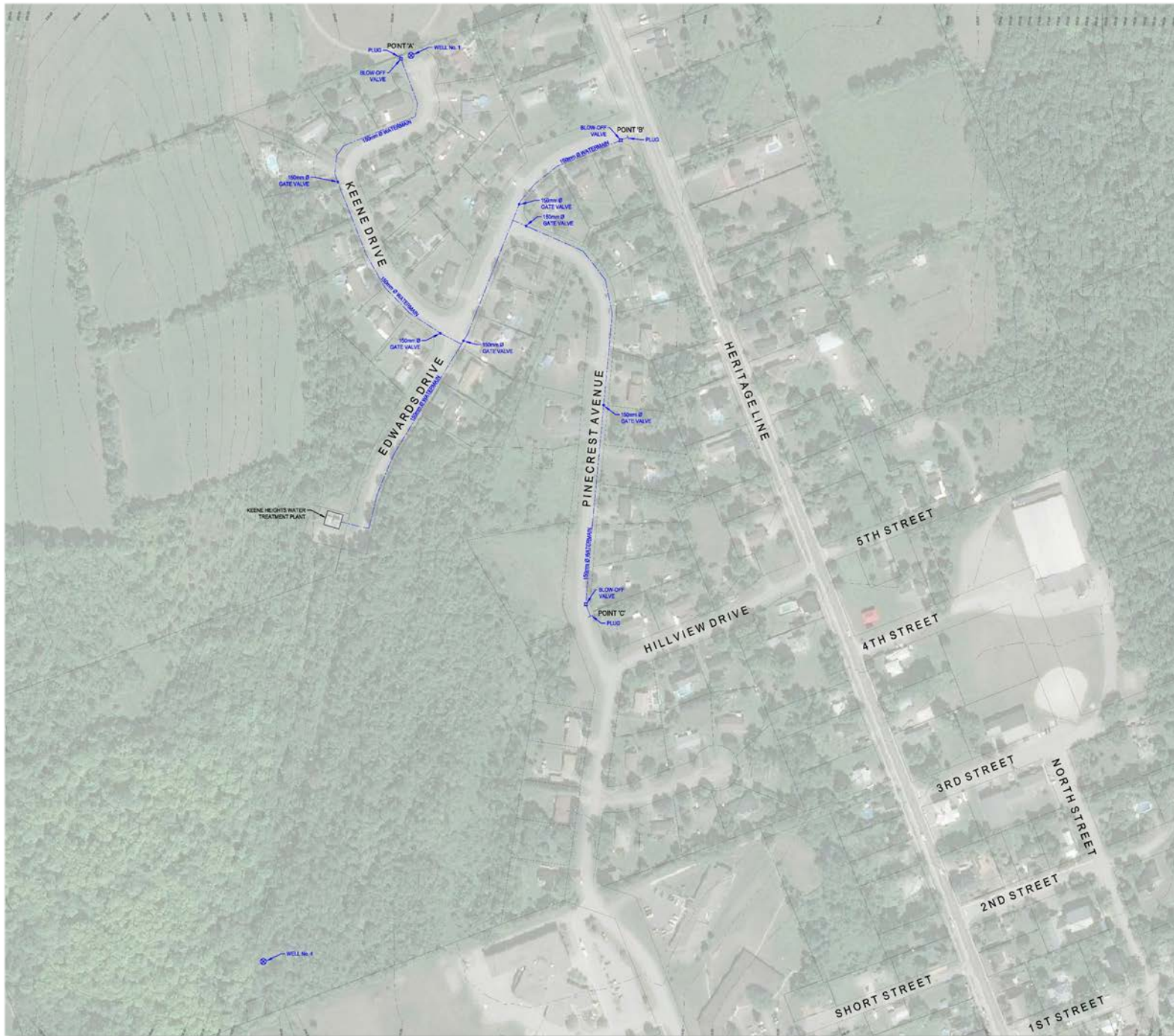
- Located in Keene
- The System is comprised of ...
 - Two groundwater wells
 - Keene Heights Treatment Plant
 - 1.05 km of treated watermain
 - 37 service connections
- Average daily flow of 20.9 m³/day
- Maximum daily flow of 47.5 m³/day



Keene Heights Water System

Capacity

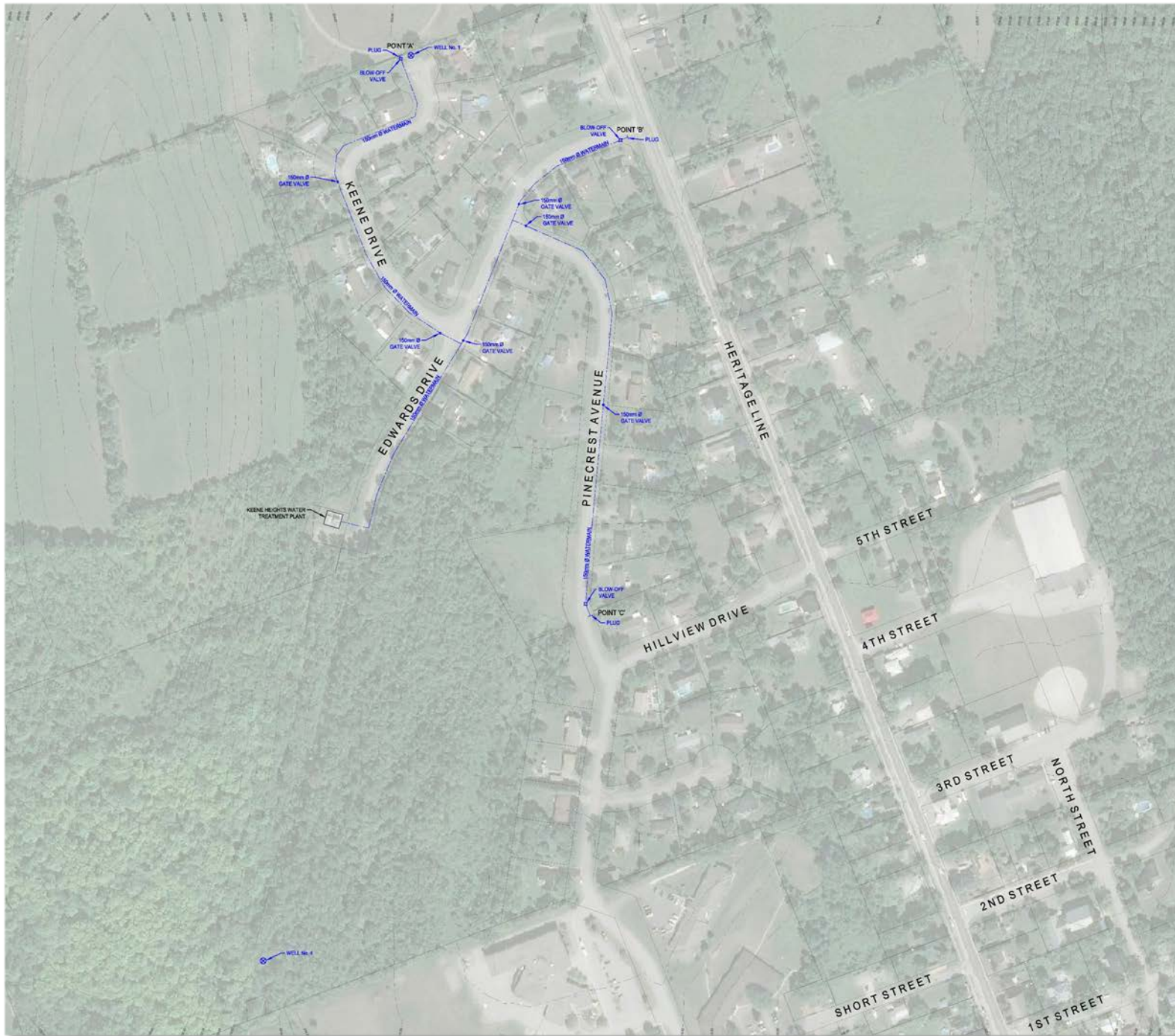
- Well Capacity
 - Current Permit to Take Water limits water uptake to 164 m³/day
 - 29% of capacity is in use
- Treatment System Capacity
 - Rated capacity of 66 m³/day
 - 72% of capacity is in use
 - 4 more residential units can be accommodated by the plant
- Treated Water Storage Requirements
 - 43.7 m³ of effective storage provided
 - 20.9 m³ of storage required
 - 48% of capacity is in use
- Water pressure is adequate throughout system



Keene Heights Water System

Conclusion

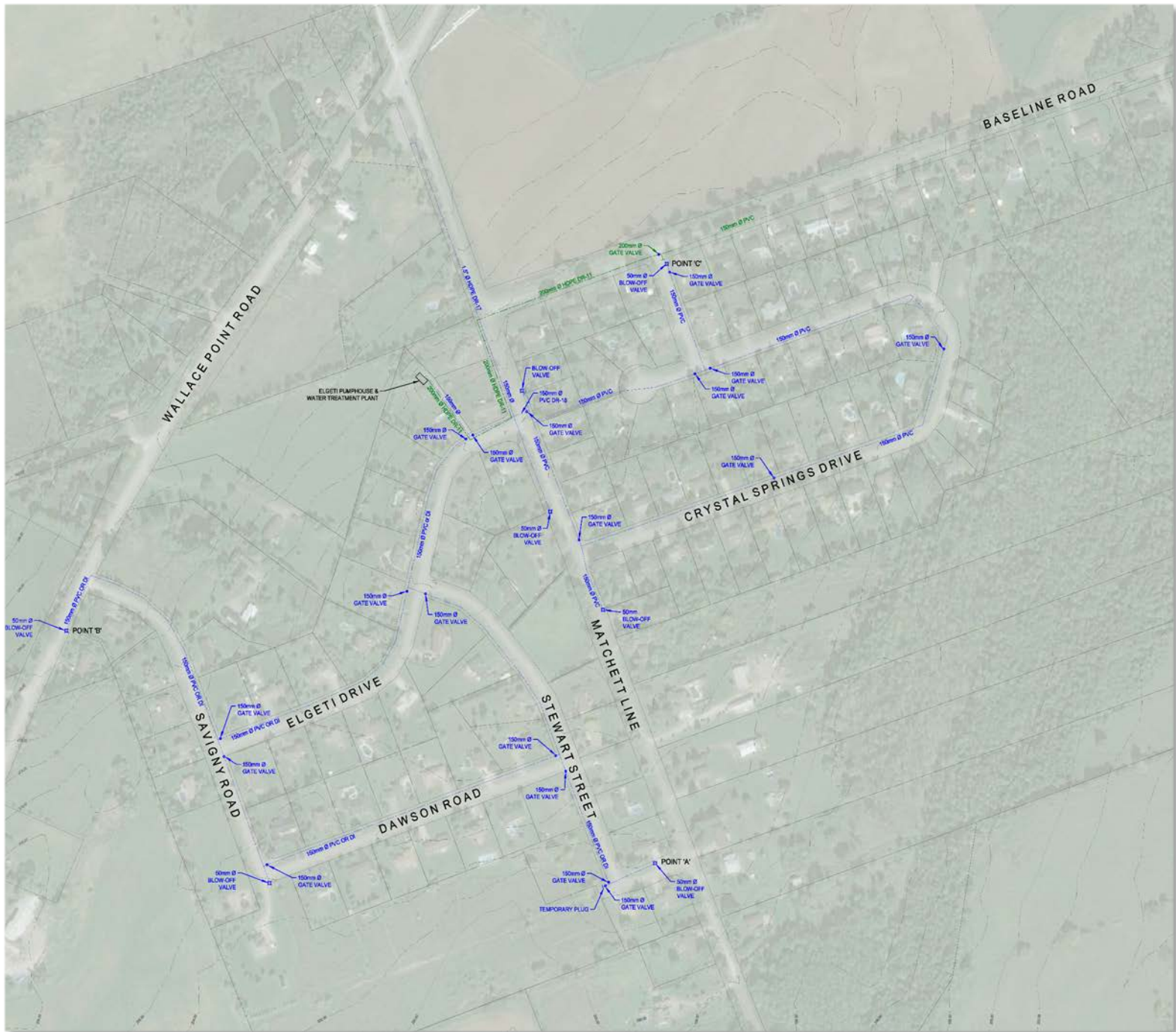
- Overall system capacity is limited by the water treatment plant
- 4 additional residential units can be accommodated prior to system upgrades
- Upgrades to the plant will be required to take advantage of the remaining storage and well capacity



Elgeti Crystal Springs Water System

Overview

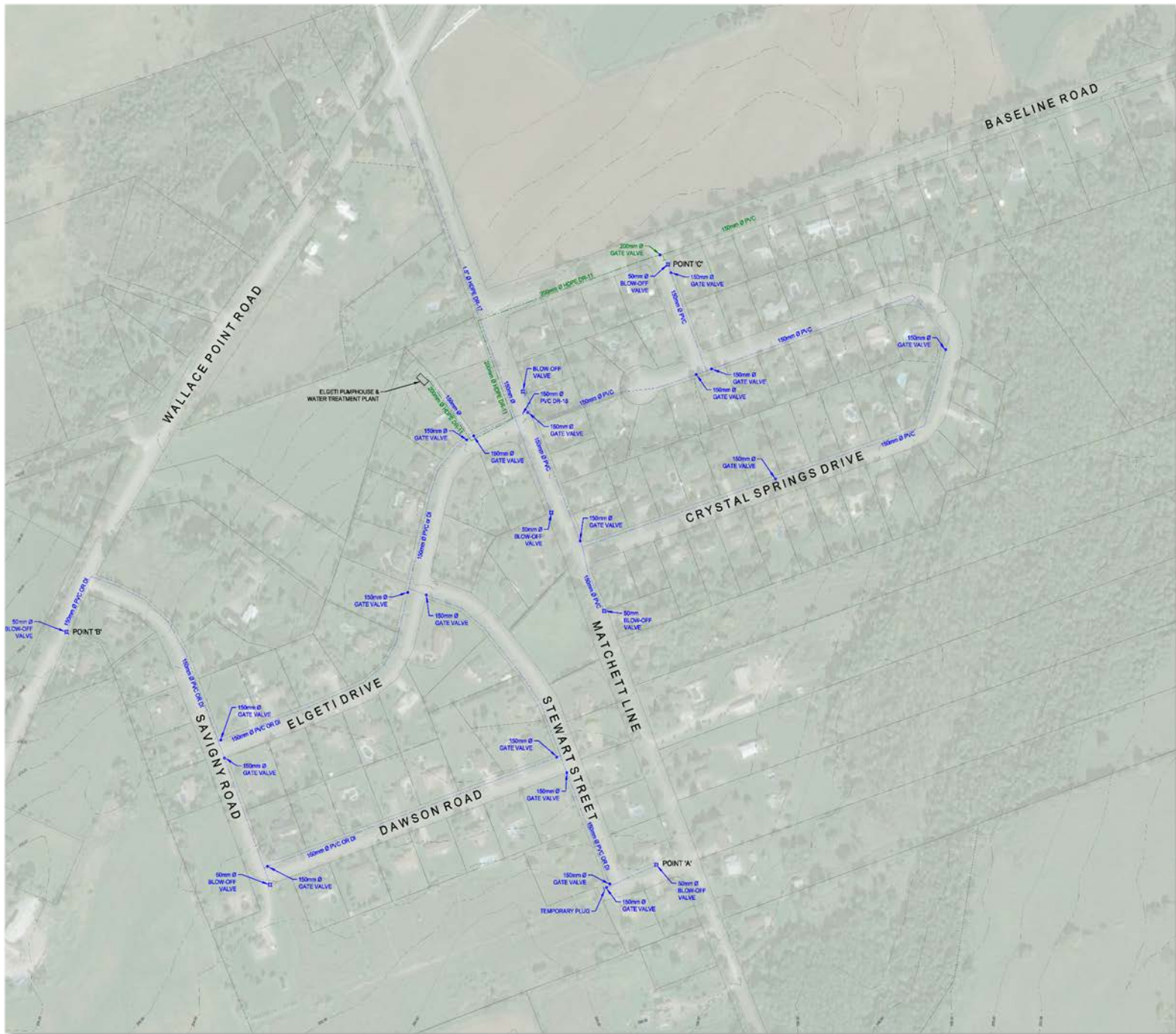
- Located in Stewart Hall
- The System is comprised of ...
 - Two groundwater wells
 - Crystal Springs Well Pumphouse
 - 1.5 km of raw watermain
 - Elgeti Pumphouse and Water Treatment Plant
 - 3.2 km of treated watermain
 - 107 service connections
- Average daily flow of 93 m³/day
- Maximum daily flow of 184 m³/day



Elgeti Crystal Springs Water System

Capacity

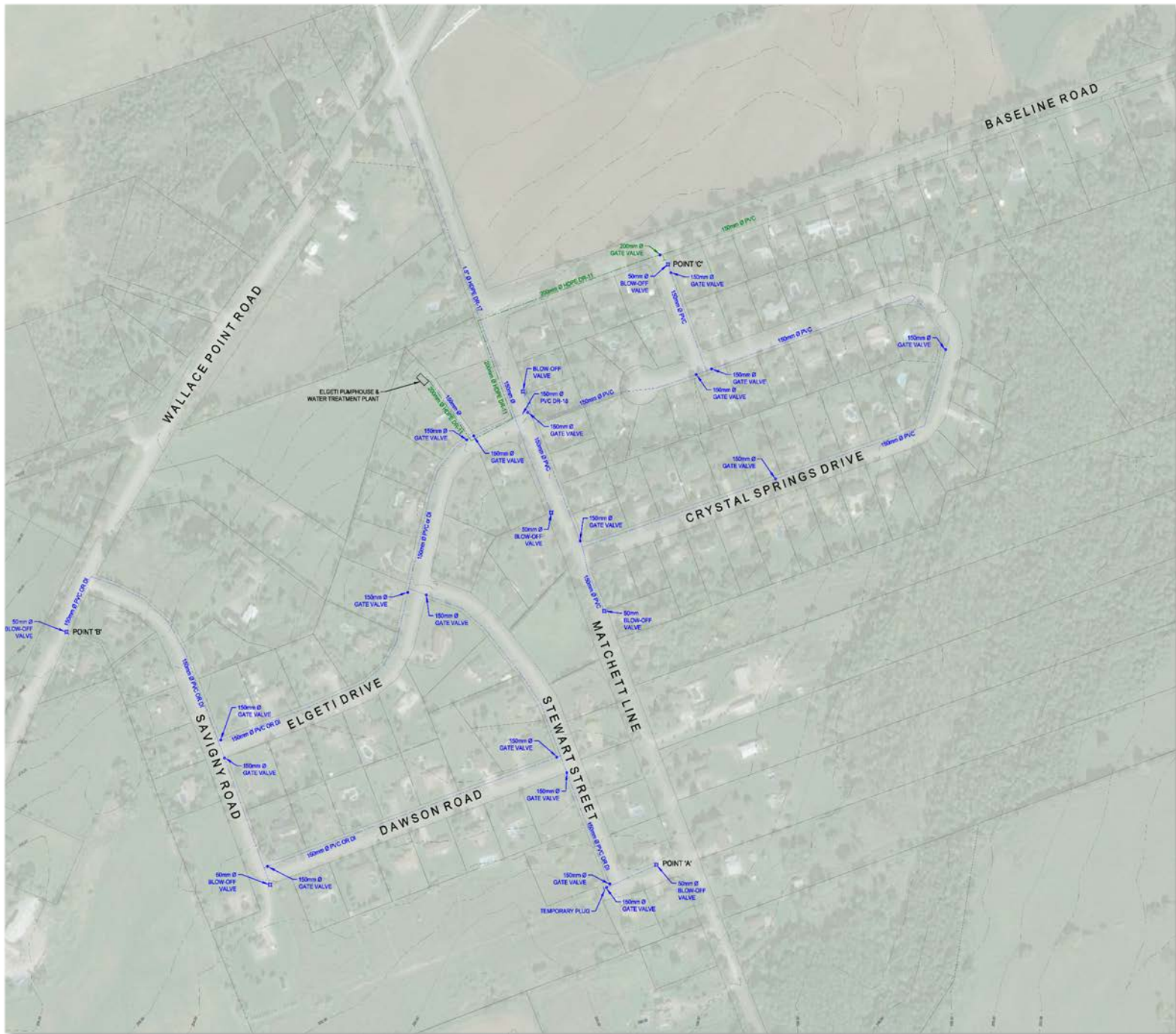
- Well Capacity
 - Current Permit to Take Water limits water uptake to 360 m³/day
 - 51% of capacity is in use
 - 47 more residential units can be accommodated by the wells
- Treatment System Capacity
 - Rated capacity of 540 m³/day
 - 34% of capacity is in use
- Treated Water Storage Requirements
 - 63.1 m³ of effective storage provided
 - 93.0 m³ of storage required
 - Upgrades recommended
- Water pressure is adequate throughout system



Elgeti Crystal Springs Water System

Conclusion

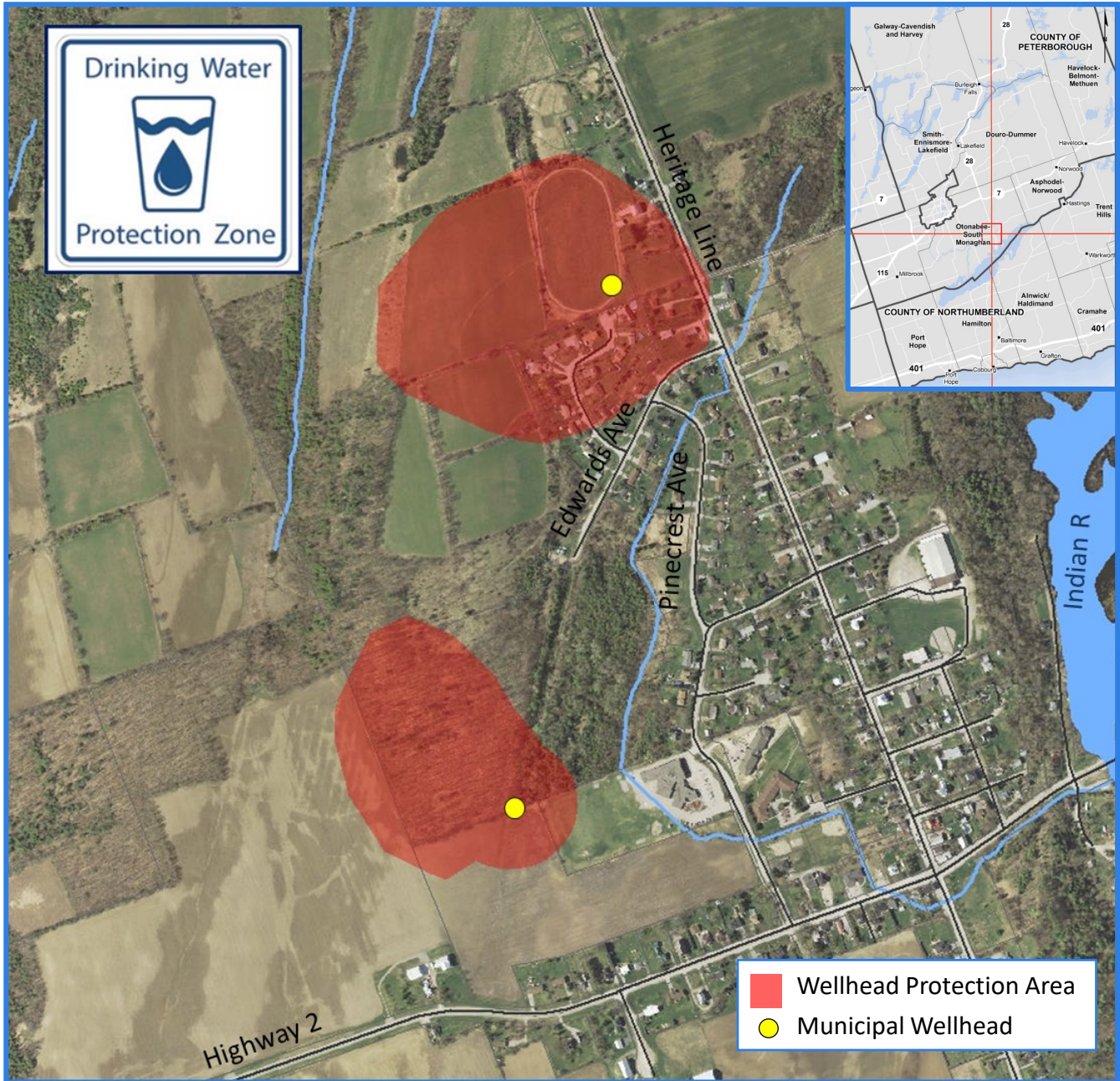
- Upgrades to the treated water storage are recommended to meet the MECP required volume
- A new Permit to Take Water will be required to take advantage of the remaining capacity within the treatment plant
- 47 additional residential units can be accommodated prior to updates to the Permit to Take Water





Questions?

The *Clean Water Act* was developed to protect municipal, residential drinking water sources across the province from contamination and/or overuse by ensuring policies are in place to manage activities that may pose a drinking water threat. **Locally, these policies are included in the Trent Source Protection Plan and they apply within the red shaded area shown below.**



The **Keene Heights Subdivision Municipal Well System** is one of 53 municipal, residential drinking water systems in the Trent Conservation Coalition Source Protection Region that is protected under the *Clean Water Act* and is 1 of 12 systems in the Otonabee-Peterborough Source Protection Area.

Water Source	Groundwater
Owner	Township of Otonabee-South Monaghan
Operated by	Ontario Clean Water Agency
Serviced Population	75 (approximately)
Annual Pump Rate	29 m ³ /day (average)
Well Depths	Well 1: 20.9m (main production well) Well 4: 26.5m (standby well)
Aquifer Type	Confined overburden
Treatment System	Disinfection with sodium hypochlorite; iron sequestration with sodium silicate

Data source: Trent Assessment Report

Activities that can pose a Threat to the municipal drinking water source



- ✓ Waste disposal and sewage systems
- ✓ Livestock grazing, pasturing, confinement
- ✓ Road salt use and snow storage
- ✓ Spreading or storing of agricultural materials (e.g. manure)
- ✓ Pesticide and fertilizer storage and use
- ✓ Liquid fuel storage (e.g. home heating oil)
- ✓ Chemical handling and storage

Contact us to find out how you can protect drinking water



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With support provided by **Ontario**

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