

MEMORANDUM



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To: Tyler Ferguson
Land Manager
1470424 Ontario Inc.

Date: January 28, 2022

JLR No.: 29540-000.1

CC: Matthew Marcuccio, P.Eng.

From: Ryan Ashford, P.Eng.

Re: **Creekside 2 Lands Communal Well Infrastructure
Conceptual Design**

The purpose of this Technical Memorandum is to provide a conceptual design for proposed communal well infrastructure to service the Creekside 2 development in the Village of Richmond.

Background

The Village of Richmond (the Village) is located in the southwestern end of rural Ottawa, south of Kanata in Rideau-Goulbourn Ward. Richmond is the second largest village in the City of Ottawa and has significant projected development growth in the future. The majority of the Village is currently serviced by privately owned groundwater wells. A small portion of the southwestern part of the Village is serviced by two (2) communal groundwater wells, Kings Park Well No. 1 and No. 2. Each well has its own submersible pumping and treatment system (sodium hypochlorite injection), each feeding the distribution system directly. The source water quality has historically been clear of bacteria and chemical contaminants but has high hardness and detectable naturally occurring iron and hydrogen sulphide.

1470424 Ontario Inc. (Cardel) is currently proceeding with a Draft Plan Application for a new subdivision referred to as Creekside 2 lands, located in the northeast quadrant of the Village. The subject lands are bounded by Eagleson Road to the east, Perth Street to the south and Shea Road to the west. The Creekside 2 lands are also bounded by the Flowing Creek Municipal Drain on its southwest property limit. In order to facilitate development within the Creekside 2 lands, a new potable water supply is required to accommodate projected water demands. The proposed Communal Well site is located on the southeastern limit of the Creekside 2 lands adjacent to Eagleson Road.

Cardel retained Robinson Consultants Inc. (RCI) to prepare a serviceability study, lot grading design / layout and utilities design for the Creekside 2 development. Cardel also retained GEMTEC to provide geotechnical and hydrogeological investigation services for the Creekside 2 lands, including the planned future well site. J.L. Richards & Associates Limited was retained by Cardel to provide design, tendering and contract administration services in support of the construction of communal well infrastructure to service the Creekside 2 development.

Cardel is conducting ongoing consultations with the City of Ottawa (the City) on communal well infrastructure requirements to service the Creekside 2 lands. Cardel subsequently requested JLR to develop a conceptual design of the proposed new communal well, which is to be submitted to the City for review and approval.

Guidelines, Studies and Reports

The conceptual design of communal well infrastructure has been prepared in accordance with the following documents:

- City of Ottawa Drinking Water Facility Design Guidelines, Fourth Edition, July 2018
- Preliminary Geotechnical Investigation, GEMTEC Consulting Engineers and Scientists, February 2021
- TW21-1C Water Supply Assessment, GEMTEC Consulting Engineers and Scientists Limited, December 14, 2021
- Creekside 2 Subdivision Richmond, ON Serviceability Report (Draft), Robinson Land Development, January 2022

Groundwater Supply and Treatment

The Creekside 2 lands is to be serviced by communal well infrastructure located in Block 302 of the Draft Plan of Subdivision (refer to Appendix A of the Creekside 2 Subdivision Richmond, ON Serviceability Report (Draft), Robinson Land Development, January 2022).

The Preliminary Geotechnical Investigation, GEMTEC Consulting Engineers and Scientists, February 2021 confirmed that the quantity of groundwater available from the proposed water supply aquifer will sustain repeated, long term pumping at the maximum day design flow rate noted herein. In addition, the Creekside 2 water supply meets the Ontario Drinking Water Quality Standards (ODWQS) maximum acceptable concentrations and treatability limits, with aesthetic objective and operational guideline exceedances for colour, TDS, hardness, and the sodium warning level.

Therefore, the anticipated scope of required treatment will be limited to sodium hypochlorite injection to provide a chlorine disinfectant residual within the Creekside 2 water distribution system. Water softening systems are recommended to be installed by homeowners to address potential elevated hardness and TDS in the treated groundwater. It is also recommended that homeowners and the Local Medical Officer of Health be informed that sodium concentrations exceed 20 mg/L and exceed the warning level for persons on sodium restricted diets.

Design Basis

Water Demands

The Creekside 2 Subdivision Richmond, ON Serviceability Report (Draft), Robinson Land Development, January 2022 established the following build-out water demands for the Creekside 2 development:

Table 1: Creekside 2 Development Design Flows

Average Day Demand	Maximum Day Demand	Peak Hour Demand	Fire Flow Demand
4.54 L/s	11.35 L/s	24.97 L/s	13,000 L/min (217 L/s)

Water Storage Requirements

Per Section 13.0 of the City of Ottawa Drinking Water Facility Design Guidelines, Fourth Edition, July 2018, all water storage facilities shall have sufficient capacity to accommodate fire protection, balancing and emergency flow demands. The required storage volume when the water supply has a capacity equal to the maximum day demand is based on the following equation:

$$\text{Total Treated Water Storage Required} = A + B + C$$

Where: A = Fire Storage (Fire flow demand for a 2 hour duration);
B = Equalization Storage (25% of maximum day demand); and
C = Emergency Storage (25% of A + B).

The following table summarizes the required water storage volumes corresponding to the above-noted design flows:

Table 2: Required Water Storage Volumes

Water Storage Component	Volume
Fire Storage (A)	1,560 m ³
Equalization Storage (B)	245 m ³
Emergency Storage (C)	450 m ³
Total Treated Water Storage Required	2,255 m³

Proposed Site Layout

The proposed Creekside 2 Communal Well Conceptual Site Plan is shown in Figure SK7. The proposed site location is in the southeast quadrant of the development, adjacent to Street 'D' of the internal road network, but with vehicular access to the site to be provided by Eagleson Road.

All site services and utilities (except Ottawa Hydro) including watermain, storm sewer, sanitary sewer and natural gas are to connect to services within the Street 'D' Right-of-Way (ROW). The Hydro Ottawa electrical service entrance is to connect to the existing circuit(s) on Eagleson Road. The proposed communal well block provides adequate space for two (2) reservoirs, a pumping station, two (2) groundwater wells, a Diesel Generator Sets Enclosure, an access road and three (3) parking stalls. The site would be fully enclosed with chain link fencing and a swing type vehicle access gate for security purposes.

The access road entrance from Eagleson Road may slope upwards, depending on the overall grading plan for the Creekside 2 development. Retaining wall(s) may be required adjacent to Eagleson road to maximize usage of available space within the communal well block.

Groundwater Wells and Well Pumps

Two (2) 250 mm diameter groundwater wells are to be constructed in accordance with the City of Ottawa Drinking Water Facility Design Guidelines and O. Reg. 903. Each well is to be equipped with well casings and grout sealing extending at least 57.3 m below existing grade, per the TW21-1C Water Supply Assessment.

Each well is to also be equipped with a submersible pump with a rated capacity of 11.35 L/s, to provide a redundant water supply for accommodating the maximum day demand, should one well be taken out of service. Submersible pump discharge piping from each well shall be configured to discharge to either of the two (2) water storage reservoirs.

Water Storage Reservoirs

Two (2) at-grade water storage reservoirs are proposed to provide sufficient storage capacity for balancing and emergency flow demands. The proposed reservoir construction consists of a domed, glass-fused-to-steel cylindrical structure over a cast-in-place concrete base. The proposed reservoir design parameters are as follows:

Table 3: Reservoir Design Parameters

Water Storage Reservoir	Design Parameters
Number of Reservoirs	2
Available Storage Per Reservoir	1,130 m ³
Reservoir Diameter	18.0 m
Tank Sidewall Height (Incl. 1.0 m Freeboard)	5.5 m

Communal Well Building

A building enclosure is proposed to house the high lift pumping and sodium hypochlorite feed systems. Separate rooms are to be provided for the Pump Room, Electrical Room, Sodium Hypochlorite Room and a washroom.

High Lift and Fire Flow Pumping Systems

Two (2) pumps equipped with variable frequency drives are proposed to accommodate average day to peak hour flow demands (4.54 L/s to 24.97 L/s) from the Creekside 2 development, operating in a duty/standby arrangement. Pump speed is to modulate in order maintain a consistent distribution system pressure over the aforementioned flow range.

The fire flow pumping system is to be designed as a separate system. Fire flow pump system design, controls and flow monitoring shall be in accordance with NFPA 20-10. Two (2) split-case type pumps equipped with constant speed drives are proposed to deliver the design fire flow of 217 L/s, operating in a duty/standby arrangement.

The suction piping configuration would allow for isolation of either reservoir, without impacting high lift pumping system operations. The high lift and fire flow pumps discharge piping are to connect to separate headers equipped with flow metering and pressure monitoring instrumentation. Both discharge headers would then converge and connect to the water distribution system via a discharge watermain.

Sodium Hypochlorite Feed System

A sodium hypochlorite feed system is proposed to for secondary disinfection purposes in the Creekside 2 water distribution system. The feed system capacity is to be based on the maintaining a minimum of 2.0 mg/L free chlorine residual following an effective contact time of 30 minutes, under maximum day flow and chlorine demand conditions.

The sodium hypochlorite feed system shall consist of two (2) positive displacement type feed pumps operating in a duty/standby arrangement, drawing from a single chemical storage day tank. Space is to be provided for long term storage of sodium hypochlorite shipping containers.

The primary dosing location would be into the well pump discharge header upstream of the water storage reservoirs. A secondary dosing location is to be provided on the high lift pumping system discharge header, to provide additional operational flexibility in maintaining consistent free chlorine residuals in the water distribution system.

Heating, Ventilation and Plumbing

Building heating systems for both the Communal Well Building and the Diesel Generator Sets Enclosure are to consist of gas-fired unit heaters supported by auxiliary electric heaters, in the event of interruption of the natural gas supply.

The Pump Room and Electrical Room is to be ventilated using an exhaust fan, with air being drawn into the space through a louvre and cold air trap. A dehumidifier is to be provided in the Pump Room to limit condensation on the pipes. The Sodium Hypochlorite Room is to be ventilated at all times to mitigate potential build-up of chlorine off-gassing. The

Electrical Room is to be provided with a dedicated AC unit in the space, which would turn on and off as required to offset the heat rejected by the electrical equipment.

The Communal Well Building plumbing system shall consist of a water heater and municipal hot and cold water piping to the washroom and the combination safety eyewash/shower in the Sodium Hypochlorite Room. Sanitary drainage piping is to be connected to the washroom fixtures and all floor drains, discharging to the sanitary sewer located in the Street 'D' ROW. No plumbing or sanitary drainage system is proposed for the Diesel Generator Sets Enclosure.

Electrical and Standby Power Systems

Service Distribution

Power distribution inside the Communal Well Building is to be provided via a new service entrance MCC (Motor Control Centre). The MCC is to house the service disconnect, the utility power meter, pump VFDs, and fire flow pump soft starters, two automatic transfer switches (ATSs), and a surge protective device. A 600V panelboard fed from the MCC is to distribute power to the other 600V loads and a 120V/ 208V transformer. 120V/ 208V power is to be distributed via a 120V/208V panelboard.

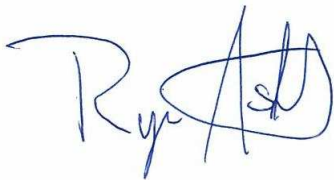
Standby Power

The proposed standby power system consists of two (2) diesel engine driven emergency generators connected to two (2) independent ATSs. Generator and ATS capacity are to be based on the combined loads of one (1) well pump, one (1) fire flow pump, one (1) chemical feed pump and all lighting, heating and ventilation equipment in operation.

Both Generator sets are to be located within a prefabricated sound attenuation enclosure located adjacent to the eastern elevation of the Communal Well Building. Generator Sets are to include integral double-wall containment diesel fuel storage tanks. The enclosure base is to be recessed to provide 150% fuel storage tank volume spill containment.

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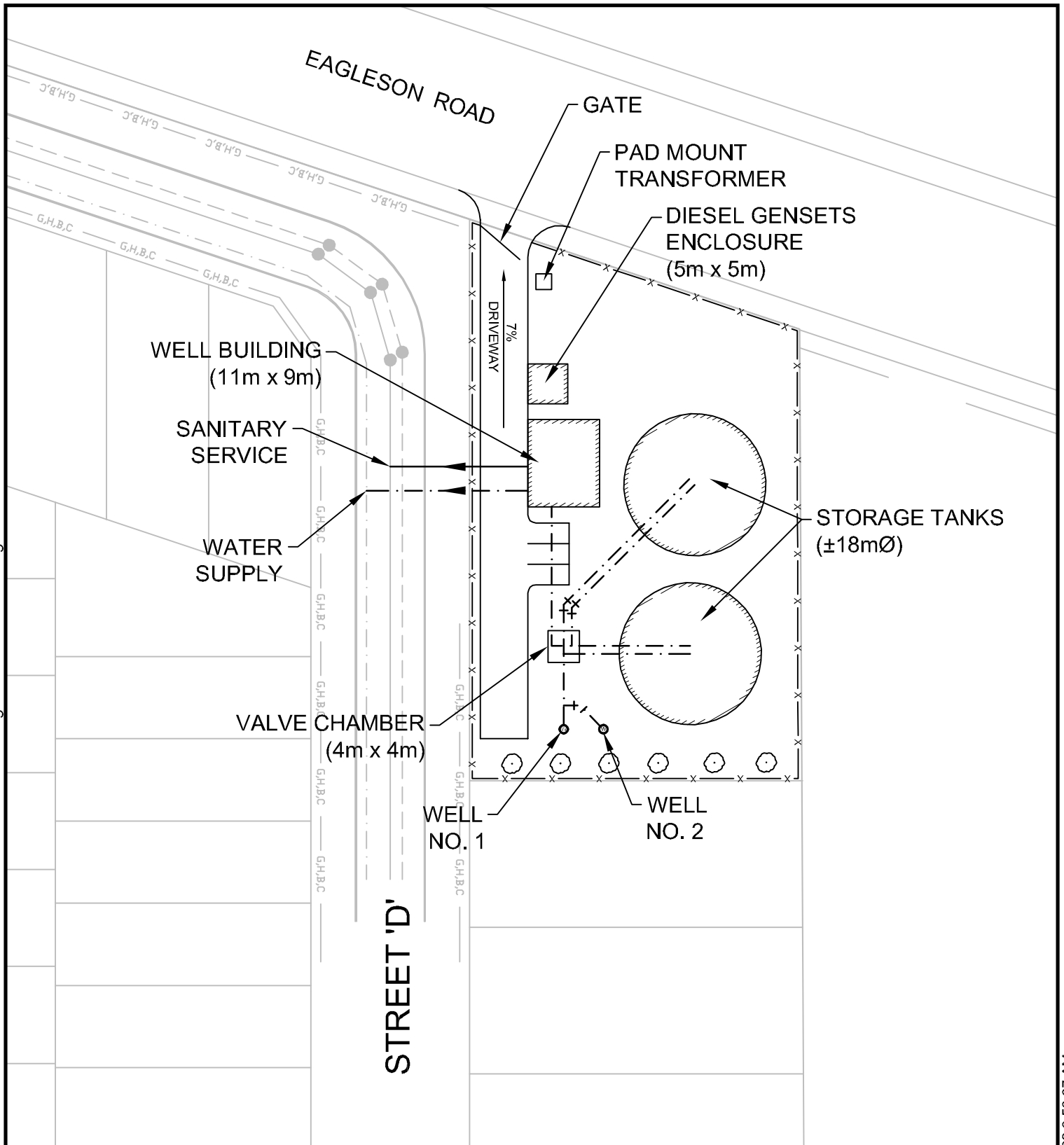
Prepared by:



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Senior Environmental Engineer

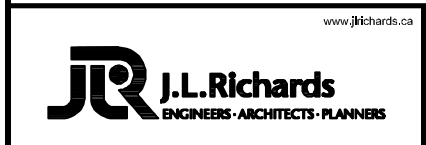
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PROJECT: **CARDEL HOMES - CREEKSIDE 2**
VILLAGE OF RICHMOND

DRAWING: **COMMUNAL WELL CONCEPTUAL SITE PLAN**



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PLOT DATE: Friday, January 28, 2022 9:53:07 AM