

INTERIM REPORT

Submitted to

RIC (Moore Drive) and RIC (Highway 28) Inc.

**Kawartha Downs Redevelopment
Water & Wastewater Treatment Servicing Report**

Clearford Project EH21-080

300-1545 Carling Ave
Ottawa, ON
Canada K1Z 8P9

Tel: 613 599 6474
or 1 866 231 1104
Fax: 613 599 7478

266 South Service Rd
Stoney Creek, ON
Canada L8E 2N9

Tel: 289 965 8440
or 1 866 231 1104

566 Arvin Ave
Stoney Creek, ON
Canada L8E 5P1

Tel: 905 643 1176
Fax: 905 643 1816

212-704 Mara Street
Point Edward, ON
Canada N7V 1X4

Tel: 519 542 7900
or 1 800 704 4188
Fax: 519 542 3020

1-455 Milner Ave
Toronto, ON
Canada M1B 2K4

Tel: 416 208 9884
or 1 888 407 9997
Fax: 416 208 5808



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1.0 INTRODUCTION

A proposed redevelopment of the Kawartha Downs site is expected to comprise both an expansion to the existing casino and entertainment facilities as well as an adjacent rural residential subdivision of up to 588 homes. RIC (Moore Drive) and RIC (Highway 28) are the proponents behind the site development proposal and have retained Clearford Water Solutions, a division of Clearford Water Systems Inc. (Clearford) to prepare the functional servicing plans for the sanitary servicing of the redeveloped site.

The site is presently provided with on-site water and wastewater sanitary servicing, including a packaged wastewater treatment plant with a rated capacity of 60 cubic metres per day (m³/d) and shallow, subsurface disposal trench.

The wastewater treatment system is approved and operates under Environmental Compliance Approval (ECA) no. 2018-5TXLQ5.

The existing on-site systems will not provide sufficient capacity to service the proposed new entertainment complex and homes, and new servicing is required.

1.1 Background

The site is located at 1382 County Road 28 Fraserville ON. The existing site, comprising the casino, racetrack and adjunct buildings and maintenance facilities is shown in Figure 1. The wastewater treatment facility includes both on-grade, modular and mobile equipment as well as below-grade pre-cast concrete process tanks, and a lined filter cell located at the south (rear) side of the casino adjacent to the maintenance buildings.

The L-shaped site is approximately 108 ha (267 ac) res (108 ha) and consists of multiple parcels and zonings. The northern portion of the site is vacant fields zoned agricultural. The southern and eastern areas include the existing site infrastructure. The site is bordered by natural core, rural residential, and agricultural areas to the west, hamlet residential and agricultural to the south, County Road 28 to the north and Moore Drive to the east.

The proposed redevelopment is shown in Figure 2. The redesigned entertainment complex includes both a refitted casino attached to a new 200 room hotel and multi-use venue. The site will retain the horse track; however, the centre area of the existing track will be redeveloped to include an outdoor FIFA size soccer field, an amphitheatre for outdoor concerts and public washrooms. The northeast corner will house a tractor pull and agri-fair area to support the local farming community and history.

The housing development shall be to the west of the entertainment area, and comprise up to 588 homes. The residential component shall be developed as free hold homes in a conventional, rural subdivision model.

Construction of the new site shall initially focus on the redeveloped entertainment sector, followed by the phased construction of the residential development. Communal or decentralized servicing shall be provided for both the entertainment and residential components.

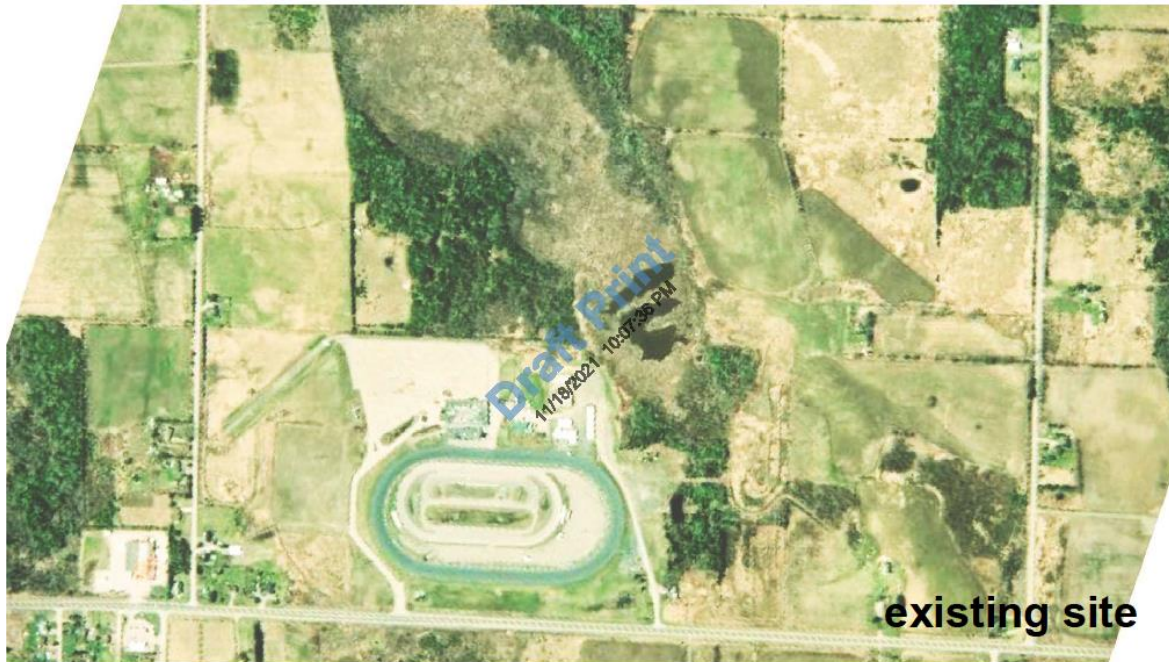


Figure 1 Existing site layout and configuration.

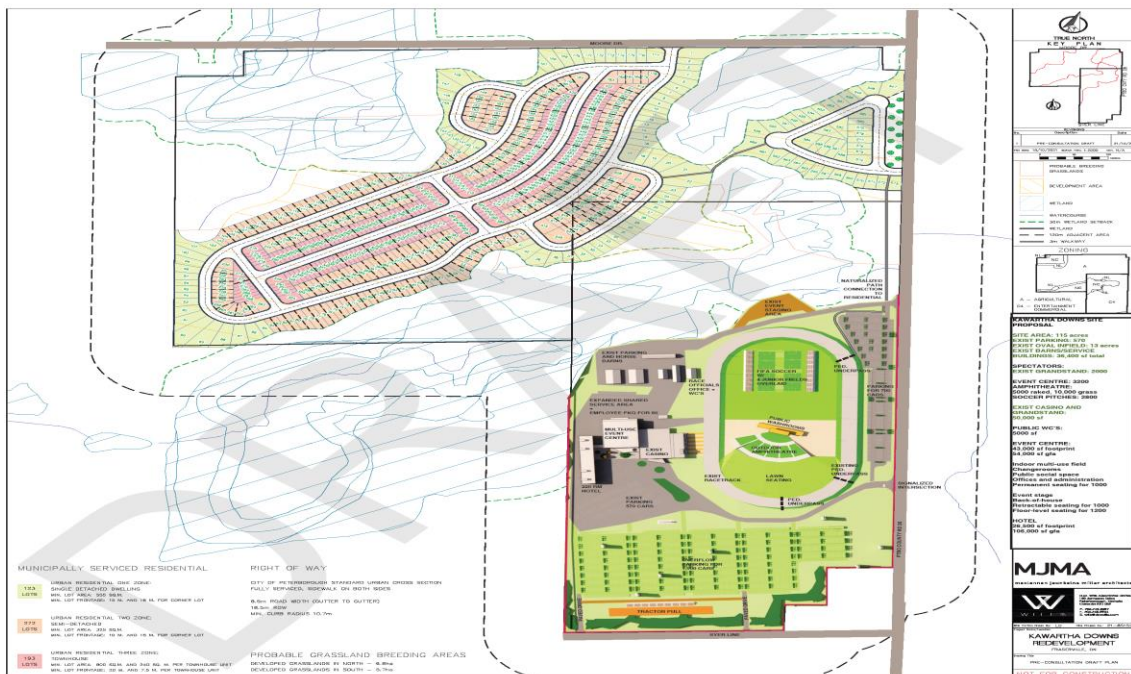


Figure 2 Proposed site development plan.

2.0 SYSTEM DESIGN BASIS

The proposed new entertainment venues shall include multi-use facilities with shared washrooms (casino, park/amphitheatre, soccer field) and a new 200 room hotel. The estimated sanitary flows from the entertainment facilities are 100 m³/d (*Wastewater Feasibility Study*, Cambium Inc., 2021).

The residential development shall consist of a mixture of detached single-family homes, semi-detached single-family homes, and townhomes. A total of 588 homes may be constructed on the site.

2.1 Water System Description

2.1.1 Water Supply and Distribution

Cambium Inc. undertook a detailed water servicing feasibility review for the proposed site development (2021). Their work included a review of existing on-site wells and nearby production wells, as well as a survey of hydrological and hydrogeological features, to determine if a suitable water supply source could be found on site. Their conclusion was no suitable on-site supply was feasible, and off-site supply was recommended.

The Cambium (2021) report noted the Township of Cavan-Monaghan had purchased a property with the intent of increasing the supply of municipal, potable water to the Fraserville settlement area. The subject property is located at 1256 Syer Line, approximately 5km from the Kawartha Downs site. The supply well installed at the Syer Line site in overburden sediments that was pumped continuously for 72 hours and provided a potential yield of ~9000L/min based on the pumping rate and extrapolation of Specific Capacity. This supply rate is more than adequate to meet the expected demands of the proposed development as well as the municipal settlement area.

The off-site groundwater supply is expected to consist of treatment in accordance with Schedule 2 of O.Reg 170/03 for a secure groundwater supply, including secondary disinfection; however, due to the long transmission main and expected cyclic demand from the site, on-site storage to provide maximum day flow and meet the diurnal peak hour flow requirements is recommended. A trickle feed supply to fill on-site storage in on-grade, modular storage tanks is a feasible supply option, with municipal consent to connect to the future water supply system. The on-site storage system will require booster chlorination to ensure adequate secondary disinfection is maintained at all times prior to on-site distribution; however, no additional treatment (filtration, primary disinfection) shall be required.

Water distribution shall consist of jockey/duty pumps to meet low and average day demand flow. Peak hour flow shall be provided by using pumps in parallel to meet the short duration increase in water demand. In line instrumentation shall provide continuous monitoring of water quality, pressure and flow.

Water distribution shall be through two (2) main 'branches' – branch one will service the entertainment complex and associated facilities through a private plumbing system, while branch two will serve the proposed residential development as a municipal distribution system.

The mixed-use water system shall be regulated under the more stringent regime as a municipal residential system, requiring both a municipal water works permit and an Engineering Evaluation Report (EER).

2.1.2 Water Design Flow

Potable Water Flows Water

MECP Guideline D5-5 and the *Design Guidelines for Water Works* (2008) were used to determine the water demand for the site.

Residential Units	Occupancy (pers per unit)	Per Cap Flow (l/day)	Avg Day Flow (l/d)	Avg Day Flow (l/min)
588	2.4	450	635,040	441
Entertainment	-	-	100,000	69
Total Avg Day Flow	-	-	735,040	510
Peaking Hour				5,500*

*Water Supply Summary, Cambium Inc. (2021)

Table 1 Water Design Flow Basis

Fire Fighting Water

Fire fighting water for the proposed development shall be provided from on-site storage. MECP *Design Guidelines* recommend storage to meet 25% of the ADF flow plus fire flow requirements. Fire flow requirements vary with municipality; however, the general range is 950 l/min to 1,900 l/min for a minimum duration of 25 min.

Site water storage shall be sized to accommodate the fire fighting requirements for the development.

Supplementary fire fighting water shall be available on site in the SWM ponds to provide additional flow, if required.

2.2 Wastewater Collection and Treatment

The proposed site development includes the redeveloped entertainment area as well as the residential development. The ideal location for the servicing bloc (Figure 3) is adjacent to the maintenance and facilities buildings, separated from the residential development by the wetland area and from the hotel by the adjunct facilities buildings.

Sewage flows are expected to be distributed across the site, and the topography (Figure 4) indicates that sewage collected by gravity will need to be pumped to the communal wastewater treatment facility. It is expected that a minimum of two (2) sewage pumping stations shall be required for the site – one (1) serving the remote areas of the entertainment complex and one (1) for the residential development.

Cambium Inc. undertook a detailed wastewater servicing feasibility review for the proposed site development (2021). Their work included a discussion of continued use of the existing on-site system, and an expansion of the sub-surface beds to service the entire development. Their conclusion was no suitable on-site area sufficient to provide sub-surface disposal to service the proposed development.

The Cambium (2021) report reviewed a number of treatment systems including conventional activated sludge (CAS), extended aeration (EA), sequencing batch reactor (SBR), and membrane bioreactor (MBR) systems. All technologies reviewed included tertiary disinfection to reduce effluent *e. coli* prior to discharge.

A modular, packaged wastewater treatment system was determined to be a viable option to provide sanitary servicing for the site (Cambium 2021). The use of a modular treatment system will provide the ability to scale the treatment provided to match the build-out of the development, avoiding the problems associated with providing too large or too small of a treatment system and permitting phased development of the site as well as demonstrating the ability to meet the expected stringent effluent limits associated with a surface water receiver in this area.

The wastewater treatment system shall require an ECA issued by the MECP. Pre-consultation with the MECP and the Otonabee River Conservation Authority (ORCA) is required as part of the planning process, and a request for pre-consultation has been submitted to the MECP.

2.2.1 Effluent Receiver

There are three (3) potential receivers in close proximity to the site,

- The Otonabee River, approximately 3 km from the proposed wastewater treatment facility following a municipal road allowance;
- Cavan Creek, a tributary to the Otonabee River, approximately 2 km from the proposed wastewater treatment facility; and,
- The wetland complex proximal to the site infrastructure.

All three (3) potential receivers outlet to Rice Lake, with both Cavan Creek and the wetland complex discharging to the Otonabee River as an intermediate receiver.

Earlier reports prepared for Cavan-Monaghan under the Fraserville Master Servicing Plan Environmental Assessment (EA) included earlier work by XCG Ltd. (2006) to determine the assimilative capacity of both Cavan Creek and the Otonabee River at Fraserville. This early work identified expected, stringent limits on both Total Phosphorus (TP) and Total Ammonia Nitrogen (TAN) of 0.1 mg/l and 2 mg/l (summer) and 4 mg/l (winter), respectively.

The low TP requirement suggests the use of 'best available technology, economically achievable' or BATEA for the on-site wastewater treatment system. Membrane bioreactor, or MBR, technology is considered BATEA with respect to low effluent TP, providing a positive barrier (membrane filtration) to the passage of floc and pin floc generated in the wastewater treatment process. This recommendation goes against the preliminary findings presented by Cambium (2021) which did not recommend MBR systems as a result of expected higher capital and operating costs.

MBR technology also lends itself to scaled or phased construction, permitting additional modules to be added as the demand increases with build out of the site. Modular MBR systems also provide a relatively small footprint compared to conventional activated sludge (CAS) systems commonly employed in municipal facilities. The ability to realize treatment in a contained, small footprint using modular technology is the recommended servicing option for the site.

2.2.2 Wastewater Flows

Ministry of the Environment, Conservation and Parks (MECP) Design Guidelines for Sewage Works (2008) was used to provide an estimate of the sewage flows for the residential development (Table 2).

Residential Units	Occupancy (pers per unit)	Per Cap Flow (l/day)	Avg Day Flow (l/d)
588	2.4	275	388,080
Entertainment	-	-	100,000
Total Avg Day Flow	-	-	488,080
Peaking Factor	2	-	776,160

Table 2 Wastewater Design Flow Basis

2.2.3 Wastewater Quality

The *MECP Design Guidelines for Sewage Works* (2008) recommend the following influent quality for the proposed development (Table 3).

Parameter	Concentration (mg/l)
cBOD5	150 to 200
TSS	150 to 200
TP	6 to 9
TKN	30 to 40
TAN	20 to 25

Table 3 Literature influent sewage characteristics

Experience with similar communal residential and commercial developments suggest the realized influent composition will be closer to the values in Table 4.

<i>Parameter</i>	<i>Concentration (mg/l)</i>
cBOD5	250 to 325
TSS	300 to 400
TP	12 to 18
TKN	50 to 70

Table 4 Expected influent sewage composition

The earlier assimilative capacity (2006) and effluent criteria imposed for similar mixed-use developments of comparable size discharging to surface water receivers suggest the following effluent limits, subject to confirmation through consultation with the MECP and ORCA. The expected effluent criteria are presented in Table 5.

<i>Parameter</i>	<i>Limit (Objective) (mg/l)</i>
cBOD5	5 (10)
TSS	5 (10)
TP	0.1 (0.07)
TAN	2 (summer)/4 (winter) (1 summer/3 winter)
e. coli	100 CFU/100 ml (non-detect)

Table 5 Expected effluent quality limits and objectives

2.2.4 Proposed Site Sewage Works

The site shall be serviced by a modular MBR packaged treatment system (Newterra or equal) and comprised of the following unit operations,

- Screening;
- Equalization/pumping;
- Aeration/biological reduction;
- Chemical addition/coagulation;
- Membrane filtration;
- Disinfection (ultraviolet or equal); and,
- Effluent equalization and discharge pumping.

The wastewater treatment system is expected to be enclosed and provided with odour control due to the proximity to sensitive uses on the site.

Examples of similar operating facilities and approvals in Ontario are provided in Appendix A.

2.3 Summary of Servicing

2.3.1 Water

The proposed site development shall be provided water from an off-site municipal source supply which provides treatment in accordance with the requirements of Schedule 2 under O.Reg. 170/03. Water shall be provided to the site via a dedicated supply main (trickle feed or equal) at a rate matching the ADF demand of 510 l/min.

Water shall be stored on site in dedicated on-grade storage facilities, provided with booster chlorination systems to ensure adequate provision of secondary disinfection and distributed to the development areas by on-site pumping systems with in-line instrumentation to ensure continuous monitoring of water quality, flow and pressure. The distribution pumps shall be sized to meet the expected peak flow requirement of 5,500 l/min.

Firefighting water shall be provided for the site through on-site storage and pumping in the distribution system.

2.3.2 Wastewater

Wastewater generated on site shall be collected by conventional gravity sewers and pumped to the communal wastewater treatment facility by a minimum of two (2) pumping stations.

A modular MBR treatment system with a rated capacity (ADF) of 500 m³/d and peak day capacity of 1,000 m³/d shall be provide to treat the influent sewage to meet the expected effluent limits presented in Table 4.

The treated effluent shall discharge to a surface water receiver proximal to the proposed development.

3.0 CONCLUSIONS AND SUMMARY

The proposed Kawartha Downs redevelopment encompasses both an expanded entertainment and commercial sector as well as a new residential development planned for up to 588 new homes. The site sanitary servicing flows are summarized in Table 6.

	Average Day (m ³ /d)	Maximum Day (m ³ /d)	Peak Hour (l/min)
Potable Water	735	1,470	5,500
Wastewater	500	1,000	

Table 6 Summary of servicing flows required.

The site shall be provided with water from an off-site municipal supply. Water shall be stored on site and distributed to the site areas for use via dedicated pumping.

Wastewater shall be collected from site areas and conveyed via pumping stations to a communal wastewater treatment facility. The treatment system shall comprise a modular MBR system, providing BATEA quality effluent to meet the expected stringent discharge limits associated with

a surface water receiver and potential 'dry ditch' conditions. The modular treatment system shall be designed with future expansion in mind to potentially provide servicing to adjacent employment lands.

4.0 LIMITATIONS

The conclusions and recommendations (where offered) presented in this servicing report are based, in part, on the findings of reports prepared by Others, and interviews conducted with the proponents. Any conclusions cannot and are not extended to information or records which were not reasonably available, in Clearford's opinion, for direct observation and review.

It should be noted that Clearford is an engineering and operational organization and, therefore, the contents of this report should not be interpreted as providing legal advice, opinions or interpretations.

No other warranties or representations, either expressed or implied, are made as to the professional services provided under the terms of the Contract, or the conclusions presented.

The conditions at the proposed site were assessed, within the limitations set out above, having due regard for applicable Regulations and procedures as of the date of the inspection, as well as original design drawings and reports where available.

The site history research included obtaining information from third parties and employees or agents of the proponents. No attempt has been made to verify the accuracy of any information provided, unless specifically noted in the report.

This report is for the sole use of the RIC (Moore Drive) and RIC (Highway 28) Inc., to whom it is addressed, unless expressly stated otherwise in the report or contract. Any use which any third party makes of the report, in whole or the part, or any reliance thereon or decisions made based on any information or conclusions in the report is the sole responsibility of such third party. Clearford accepts no responsibility whatsoever for damages or loss of any nature or kind suffered by any such third party as a result of actions taken or not taken or decisions made in reliance on the report or anything set out therein.

Appendix A Examples of Similar Facilities and Approvals





- Easements 550 m;
- Chandelle Private 670 m;
- Tailslide Private 415 m;
- TaxiwayE 300 m,

all complete with SAP type cleanouts;

- an inverted syphon, consisting of two (2) 100 mm diameter pipes, approximately 145 m in length, and one (1) 250 mm diameter sanitary sewer, approximately 30.7 m in length from the Wastewater Treatment Plant (described below), all discharging to the sanitary lift station, described below.
- one (1) 200mm diameter sanitary sewer, approximately 16.7m in length from the pump building, discharging to the equalization tanks located at the Wastewater Treatment Plant (described below);

Sanitary Lift Station

- a sanitary lift station, to convey sewage flows to the equalization tanks located at the wastewater treatment plant, and consisting of:
 - one (1) wet well with a minimum operating volume of approximately 1,840 L;
 - two (2) submersible pumps (one standby), each pump rated at 7.66 L/s at 6 m TDH, complete with a high liquid level alarm, and discharging via a 75 mm diameter forcemain to a 200 mm diameter sanitary sewer, approximately 21.6 m in length, discharging to the equalization tanks at the Wastewater Treatment Plant (described below);
 - one (1) covered control panel.

Wastewater Treatment Plant

A modular package type wastewater treatment system rated at an average daily flow of 186 m³/day for Phase 1 of the development and an additional average daily flow of 186 m³/day for Phase 2 of the development (progressing to average daily flow of 910 m³/day at full build-out in Phase 5 in future), consisting of the following:

Phase 1

- an equalization tank system (multiple tanks) with a volume of 103 m³ for Phase 1 of the development (309 m³ at full build-out in Phase 5 in future), complete with an ultrasonic level transmitter to control pump operation and back-up high level alarm float switch.
- two rotary lobe blowers for aeration of the equalization tank system, as required.
- two variable speed pumps (one duty and one standby) to transfer wastewater through the screening system.
- two rotary brush screens (one duty and one standby) with 2 mm openings, each with a capacity of approximately 983 L/min, equipped with water level sensor and two feed forwards pumps (one duty and one standby).
- an aerobic tank with a storage volume of approximately 41 m³, equipped with two rotary lobe blowers (one duty and one standby) for fine bubble aeration, complete with dissolved oxygen and pH transmitters, and chemical metering pumps to feed sodium hydroxide for pH adjustment (as needed) and alum to promote