GROUNDWORK ENGINEERING LIMITED

12 August, 2026

Graham Potter, MASc, MBA, P.Eng., PMP
Vice President
Jewell Engineering Inc.
1-71 Millenium Pkwy.
Belleville, ON K8N 4Z5

RE: Revised Wastewater Servicing Brief Campfire Circle – Prince Edward County – GW-23003-16

Dear Graham,

Pursuant to your request, Groundwork Engineering Limited (GEL) has completed a wastewater review of the revised design for the proposed camp, Campfire Circle – Prince Edward County, at 565 Wesley Acres Road, Bloomfield Ontario.

The theoretical daily design sewage flow was determined using the building occupancy and type as defined in Part 8 of the Ontario Building Code. Our assessment has been completed using the drawing - Concept Site Plan – A014 – Revised February 4, 2026 by Teeple Architects Inc. Please see the attached Wastewater Servicing Brief.

Should you require further information or have any questions, please do not hesitate to contact the undersigned.

Sincerely,

Martin Burger
MEng., P.Eng.

cc. via email Sean McGregor, Cope Group Inc.

Attachments:
Wastewater Servicing Brief
ECA Application Preliminary Design Brief

CFC-PEC Wastewater Servicing Brief - Revised

This Wastewater Servicing Brief is provided as an overview of the wastewater design flows and treatment options for the proposed development at 565 Wesley Acres Road, Bloomfield ON, K0K 1G0. The assessment has been completed using the drawing - Concept Site Plan – A012 – Revised January 15, 2026 by Teeple Architects Inc. The proposed development Campfire Circle – PEC, is for a year-round children's camp. It will include thirteen (13) boarding house style residences with sleeping space for 180 campers and 223 staff, a lodge that will serve as the Site's restaurant/cafeteria with three-hundred and sixty (360) seats, several indoor activity spaces, a 2-bedroom director's cabin, and a small hospital with eight (8) staff and five (5) patient beds. There is a combined total of five-hundred (415) bed spaces at the camp including the director's cabin.

The total theoretical daily design sewage flows (Q) for the proposed buildings at the site are calculated using the building use and occupancy type as per Part 8 of the Ontario Building Code (OBC). Occupancy of the facility will vary throughout the year with full or nearly full capacity anticipated in the summer period and half capacity or less anticipated in the winter months.

The thirteen (13) residences are most accurately represented as Boarding Houses with meals and laundry facilities as per OBC 8.2.1.3.A.(2)(a)(i). The lodge is most accurately described as a Cafeteria with serving three-hundred and sixty (360) meals three (3) times per day per seat as per OBC 8.2.1.3.B.(11)(i). The hospital is most accurately described as a Hospital Including Laundry Facilities as per OBC Table 8.2.1.3.B.(12)(a). The indoor activity spaces are most accurately described as an Assembly Hall with no food service as per OBC Table 8.2.1.3.B.(2)(a). The director's cabin is most accurately described as a 2-bedroom residence as per OBC Table 8.2.1.3.A(2)(4)(b). The pool is most accurately described as a Swimming and Bathing Facility as per OBC Table 8.2.1.3.B.(23).

Determination of total daily theoretical sewage flows for each of the buildings are outlined below. It is proposed that one (1) wastewater treatment system (WWTS) be utilized for the development.

The flows generated by the lodge, indoor activity spaces, pool, and hospital are included in the residential flow as the they will not serve non campers. Most of the facility's food preparation and dining space are located within the lodge with the exception of a kitchen in the director's cabin and kitchenets containing microwaves in the staff residences. As such 19 000 L has been subtracted from the flows associated with the residential buildings and added to the lodge, activity spaces, and pool.

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Buildings serviced by WWTS 1

Camper Residence #1: 32 beds at 153.77L/day per bed as per OBC 8.2.1.3.A.(2)(a)(i)	= 4 921 L/day
Camper Residence #2: 32 beds at 153.77 L/day per bed as per OBC 8.2.1.3.A.(2)(a)(i)	= 4 921 L/day
Camper Residence #3: 32 beds at 153.77 L/day per bed as per OBC 8.2.1.3.A.(2)(a)(i)	= 4 921 L/day
Camper Residence #4: 32 beds at 153.77 L/day per bed as per OBC 8.2.1.3.A.(2)(a)(i)	= 4 921 L/day
Camper Residence #5: 32 beds at 153.77 L/day per bed as per OBC 8.2.1.3.A.(2)(a)(i)	= 4 921 L/day
Camper Residence #6: 32 beds at 153.77 L/day per bed as per OBC 8.2.1.3.A.(2)(a)(i)	= 4 921 L/day
Camper Residence #7: 32 beds at 153.77 L/day per bed as per OBC 8.2.1.3.A.(2)(a)(i)	= 4 921 L/day
Camper Residence #8: 32 beds at 153.77 L/day per bed as per OBC 8.2.1.3.A.(2)(a)(i)	= 4 921 L/day
Camper Residence #9: 32 beds at 153.77 L/day per bed as per OBC 8.2.1.3.A.(2)(a)(i)	= 4 921 L/day
Summer Staff Residence: 66 beds at 153.77 L/day per bed as per OBC 8.2.1.3.A.(2)(a)(i)	= 10 149 L/day
Mature Staff Residence: 10 beds at 153.77 L/day per bed as per OBC 8.2.1.3.A.(2)(a)(i)	= 1 518 L/day
Hospital: 8 staff beds at 153.77 L/day per bed as per OBC 8.2.1.3.A.(2)(a)(i)	= 1 230 L/day
Flex: 39 beds at 151.8 L/day per bed as per OBC 8.2.1.3.A.(2)(a)(i)	= 5 997 L/day
Directors Cabin: 2-bedroom residence 1100 L/day as per Table 8.2.1.3.A(2)(4)(b)	= 1 100 L/day
Indoor Activity Space: 200 seats at 8 L/day per seat as per OBC 8.2.1.3.B.(2)(a)	= 1 600 L/day
Drama Building: 75 seats at 8 L/day per seat as per OBC 8.2.1.3.B.(2)(a)	= 600 L/day
Greenhouse: 75 seats at 8 L/day per seat as per OBC 8.2.1.3.B.(2)(a)	= 600 L/day
Equestrian Stables: 30 seats at 8 L/day per seat as per OBC 8.2.1.3.B.(2)(a)	= 240 L/day
Pool: 75 people at 40 L/day per person as per Table 8.2.1.3.B.(23)	= 3 000 L/day
Lodge: 1080 meals per day at 12 L per meal as per OBC 8.2.1.3.B.(2)(a)	= 12 960 L/day
	Total: = 83 300 L/day

One (1) wastewater treatment system is proposed to treat the total theoretical daily design sewage flow of 83 300 L. Wastewater treatment system 1 (WWTS 1) will treat all flows from the site. The lodge will require a grease separator to prevent cooking oils and greases from entering the treatment system.

On November 14, 2023 Groundwork Engineering Limited (GEL) conducted a geotechnical investigation of the Site. A total of six (6) boreholes were completed and two percolation tests were performed as part of the geotechnical investigation. Percolation Test Site #2 (PTS 2) is located near the location of Proposed WWTS 1. The native soil at PTS 2 has an estimated T-time greater than 50 min/cm. The borehole depths ranged from 3.0 m to 6.1 m. None of the six (6) boreholes encountered bedrock. Given the depth to bedrock it is recommended that gravity sewers be used where possible to convey wastewater to limit the use of sanitary force mains.

Sewage flows to WWTS 1 would be considered commercial in nature due to the lodge, indoor activity spaces, pool, and hospital.

An advanced treatment system consisting of a Moving Bed Bioreactor (MBBR) provided by Bergmann North America (BNA) and a Type A dispersal bed is proposed to maximize nutrient reduction and minimize the effluent dispersal bed area. The system has been designed to accommodate medications that will be present in the sewage from those campers being treated for cancer.

To aid in the removal of residual medications from the wastewater the proposed treatment system is designed to have a combined tank capacity for the balancing and primary treatment phases of 191,500 L. This will provide 2.3 days of retention time based on the theoretical daily sewage flow rate of 83,300 L. Most oral cancer drugs have half life of less than 24 hours with some drugs having a half life of less than an hour. Based on a half life of 24 hours the balancing and primary treatment tanks will allow for a 79.7% reduction in residual medication.

Given the land area available we recommend the use of a large subsurface dispersal bed over direct discharge of the effluent to West Lake. The operation and maintenance cost of a direct discharge system would be more than for a subsurface dispersal system. Due to existing soil conditions, the bed will need to be fully raised or fit to the topography to ensure the dispersal bed can function as required. The required sand area is 10 413 m^2 for WWTS 1. The attached drawing Proposed Wastewater Treatment Systems C-101 identifies the proposed dispersal bed and treatment system location.

West Lake is a shallow body of water with limited flushing capability. It is located adjacent to the Area of Concern of the Great Lakes that is affected by the Bay of Quinte Remedial Action Plan (BQRAP). This plan identifies that nutrient concentrations in the affected waters are elevated and imposes nutrient limits of 2.5 mg/L for nitrates (N) and 0.1 mg/L for total phosphorous (P) for effluent discharged to the affected water bodies. However, West Lake is not part of the BQRAP.

Further study has been completed to review effluent nutrient attenuation and groundwater mounding to determine concentration levels at property boundaries. Attenuation calculations are provided in Appendix C. This analysis will use the more restrictive criteria of the BQRAP as a conservative approach. To meet the nutrient limits outlined in the BQRAP, nitrate removal of 90.5% and phosphorous removal of 98.2% will need to be provided by the wastewater treatment system.

As the total theoretical daily design sewage flow is greater than 10 000 L the Ministry of Environment, Conservation and Parks (MECP) will be the regulatory approval authority for the wastewater system design. An application will be made to MECP for an Environmental Compliance Approval for private sewage works. Pre-consultation with District Staff has been completed. A preliminary design brief is attached.

Should there be any questions on any aspect of this submission, please do not hesitate to contact the undersigned.

Sincerely,

Martin Burger
MEng., P.Eng.

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GROUNDWORK ENGINEERING LIMITED

Appendix A

ECA Application Preliminary Design Brief

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GROUNDWORK ENGINEERING LIMITED

Design Brief

Campfire Circle – Prince Edward County

565 Wesley Acres Road
Bloomfield, ON, K0K 1G0

Prepared for: **Campfire Circle**

Project No: **GW-23003-16**

Date: **January 23, 2026**
Revised: **August 12, 2026**

GEOTECHNICAL • CIVIL • STORMWATER • ONSITE WASTEWATER

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Contents

Executive Summary

This design brief is in support of an application for a new Environmental Compliance Approval (ECA) for the proposed Campfire Circle – Prince Edward County (Site) for sewage works for the collection, treatment and subsurface disposal of up to 83.30 cubic meters (m^3) of combined domestic/commercial sewage flow per day.

Campfire Circle – Prince Edward County (CFC-PEC) is a proposed 33.7-hectare (ha) year-round children's camp consisting of thirteen (13) boarding house style residences with sleeping space for one-hundred and eighty (180) campers and two-hundred and twenty-three (223) staff, a lodge that will serve as the Site's restaurant/cafeteria with three-hundred and sixty (360) seats, several indoor activity spaces, a 2-bedroom director's cabin, and a small hospital with eight (8) staff and five (5) patient beds. There are a combined total of four-hundred and fifteen (415) bed spaces at the camp including the director's cabin.

The Site is currently unserviced. The proposed wastewater treatment system (WWTS) will consist of an advanced treatment system consisting of a Moving Bed Bioreactor (MBBR) provided by Bergmann North America (BNA) and a Type A dispersal bed. The MBBR treatment system is designed to provide direct discharge quality effluent that will be discharged via subsurface dispersal to reduce impacts on West Lake.

The Site does not currently have an Environmental Compliance Approval (ECA) for sewage works.

1.0 Introduction

Groundwork Engineering Limited (GEL) was retained by Campfire Circle (CFC) to provide engineering services in order to support an Environmental Compliance Approval (ECA) Application for a new onsite wastewater treatment system.

This brief, prepared by GEL on behalf of CFC, details the proposed wastewater treatment system. The proposed design will consist of a sanitary sewage network, an advanced treatment system consisting of a Moving Bed Bioreactor (MBBR) provided by Bergmann North America (BNA), and a Type A dispersal bed. The MBBR treatment system is designed to provide direct discharge quality effluent that will be discharged via subsurface dispersal to reduce impacts on West Lake.

2.0 Site Overview

CFC-PEC is a 33.7 ha proposed year-round children's camp that will operate at full capacity from May to October and at a reduced capacity for the remainder of the year. It is located at 565 Wesley Acres Road, Bloomfield, Ontario and can be legally described as Part Lot 2 Concession 1 Military Tract Part Point M or Gibsons Point Part 1 47R7639; Ward 2 (Bloomfield/Hallowell), Prince Edward County.

The site is bordered by Wesley Acres Road and the Bloomfield Creek Wetland to the north, the Bloomfield Creek Wetland to the west, agricultural lands to the east, and West Lake to the south. There are no existing structures on the property. There are three (3) drilled wells on the property.

The site does not currently have an Environmental Compliance Approval (ECA). A detailed description of the proposed wastewater treatment system components is provided in Section 4 of this brief.

3.0 Theoretical Sewage Flows

Theoretical sewage flows were calculated for the Lodge, Summer Staff Residence, Mature Staff Residence, nine (9) Camper Residences, Hospital, Pool Building, Drama Building, Indoor Activity Building, Equestrian Stables, Greenhouse, Directors Cabin, and Flex Building. The daily design sewage flow was calculated using Ontario Building Code (OBC) Table 8.2.1.3.A and OBC Table 8.2.1.3.B.

The only people using the non-residential buildings will be staying in the residential buildings on site. Therefore, to avoid duplication of wastewater flows and to more accurately determine the required pump chamber sizing the flow from the residential buildings is reduced from 200 L/day per bed to 153.77 L/day per bed. This reduction in residential flow is equivalent to subtracting 19,000 L/day from the flows associated with the residential buildings and added 19,000 L/day to the lodge, activity spaces, and pool.

3.1. Lodge

The lodge is most accurately described as a Cafeteria with three-hundred and sixty (360) seats that serve three (3) meals per day per seat as per OBC 8.2.1.3.B.(11)(i).

1080 meals @ 12 L/day per meal per day OBC 8.2.1.3.B.(11)(i). **= 12,960 L/day**

3.2. Summer Staff Residence

The Summer Staff Residence is most accurately represented as a Boarding House with meal and laundry facilities as per OBC 8.2.1.3.A.(2)(a)(i).

66 beds @ 153.77 L/day per bed OBC 8.2.1.3.B.(11)(i). **= 10,149 L/day**

3.3. Mature Staff Residence

The Mature Staff Residence is most accurately represented as a Boarding House with meal and laundry facilities as per OBC 8.2.1.3.A.(2)(a)(i).

10 beds @ 153.77 L/day per bed OBC 8.2.1.3.B.(11)(i). **= 1,538 L/day**

3.4. Camper Residences

The nine (9) Camper Residences are most accurately represented as Boarding Houses with meal and laundry facilities as per OBC 8.2.1.3.A.(2)(a)(i).

9 Residences @ 32 beds each @ 153.77 L/day per bed OBC 8.2.1.3.B.(11)(i). **= 44,286 L/day**

3.5. Hospital

The Hospital is most accurately represented as Boarding House with meal and laundry facilities as per OBC 8.2.1.3.A.(2)(a)(i) for the eight (8) staff bedrooms. The hospital also contains five (5) patient beds. However, the patient beds will only be used for campers that are receiving medication and as such will not contribute any additional flow to the site.

8 beds @ 153.77 L/day per bed OBC 8.2.1.3.B.(11)(i). **= 1,230 L/day**

3.6. Pool Building

The Pool Building is most accurately represented as a Swimming and Bathing Facility as per OBC Table 8.2.1.3.B.(23).

75 people @ 40 L/day per person OBC 8.2.1.3.B.(23). **= 3,000 L/day**

3.7. Drama Building

The Drama Building is most accurately represented as an Assembly Hall with no food service as per OBC Table 8.2.1.3.B.(2)(a).

75 people @ 8 L/day per person OBC 8.2.1.3.B.(2)(a). **= 600 L/day**

3.8. Indoor Activity Building

The Indoor Activity Building is most accurately represented as an Assembly Hall with no food service as per OBC Table 8.2.1.3.B.(2)(a).

200 people @ 8 L/day per person OBC 8.2.1.3.B.(2)(a). **= 1,600 L/day**

3.9. Equestrian Stables

The Equestrian Stables are most accurately represented as an Assembly Hall with no food service as per OBC Table 8.2.1.3.B.(2)(a).

30 people @ 8 L/day per person OBC 8.2.1.3.B.(2)(a). **= 240 L/day**

3.9. Greenhouse

The Greenhouse is most accurately represented as an Assembly Hall with no food service as per OBC Table 8.2.1.3.B.(2)(a).

75 people @ 8 L/day per person OBC 8.2.1.3.B.(2)(a). **= 600 L/day**

3.10. Director's Cabin

The Director's Cabin is most accurately described as a 2-bedroom residence as per OBC Table 8.2.1.3.A(2)(4)(b).

2-bedroom residence OBC 8.2.1.3.A(2)(4)(b). **= 1,100 L/day**

3.11. Flex Building

The Flex Building is most accurately represented as a Boarding House with meal and laundry facilities as per OBC 8.2.1.3.A.(2)(a)(i).

39 beds @ 153.77 L/day per bed OBC 8.2.1.3.B.(11)(i). **= 5,997 L/day**

Total Daily Design Sewage Flow = 83,300 L/day

**Volume is over 10,000 L/day and falls under the authority of Ministry of Environment, Conservation and Parks (MECP). This system shall be operated under an Environmental Compliance Approval (ECA) for Private Sewage Works.*

4.0 Proposed Sewage Works

A new Advanced Wastewater Treatment System is being proposed to service the entire site. The new sewage system will utilize new wastewater infrastructure as described in Section 4.1. The new wastewater infrastructure includes a gravity sanitary sewer pipe network, seven (7) pump chambers, forcemains, and a wastewater treatment system consisting of a Moving Bed Bioreactor (MBBR) provided by Bergmann North America (BNA), and a Type A dispersal bed. Proposed site plan drawings can be found in Appendix A.

The proposed treatment system has a combined tank capacity for the balancing and primary treatment phases of 191,500 L. This will provide 2.3 days of retention time based on the theoretical daily sewage flow rate of 83,300 L. Most oral cancer drugs have half life of less than 24 hours with some drugs having a half life of less than an hour. Based on a half life of 24 hours the balancing and primary treatment tanks will provide for a 79.7% reduction in active medication.

4.1. Pump Chambers (PC1 to PC7)

Seven (7) pump chambers of volumes ranging from 450 L to 8,000 L and a sanitary sewer network are proposed to convey wastewater to the advanced treatment system.

Pump Chamber 1 (PC1) services a washroom building located in the southwest part of the property. PC1 has a working volume of 1,200 L and conveys wastewater via a 193 m long 50 mm diameter forcemain to Maintenance Hole 1 (MH1). MH1 discharges to Pump Chamber 2 (PC2).

PC2 services the Summer Staff Residence, Mature Staff Residence, and four (4) Camper Residences and also receives flow from PC1. PC2 has a working volume of 7,200 L and conveys wastewater via a 270 m long 50 mm diameter forcemain to Pump Chamber 3 (PC3).

PC3 services the Hospital and also receives flow from PC2 and Pump Chamber 5 (PC5). PC2 has a working volume of 8,000 L and conveys wastewater via a 270 m long 50 mm diameter forcemain to Maintenance Hole 8 (MH8).

Pump Chamber 4 (PC4) services the Lodge, Drama Building, Pool Building, and three (3) Camper Residences. PC4 has a working volume of 6,000 L and conveys wastewater via a 95 m long 50 mm diameter forcemain to Pump Chamber 7 (PC7).

PC5 services the Director's Cabin. PC5 has a working volume of 450 L and conveys wastewater via a 29 m long 50 mm diameter forcemain to PC3.

Pump Chamber 6 (PC6) services the Flex Building, Greenhouse, and Equestrian Stables. PC6 has a working volume of 2,900 L and conveys wastewater via a 227 m long 50 mm diameter forcemain to MH8.

PC7 services the indoor activity building and also receives flow from PC4. PC2 has a working volume of 7,200 L and conveys wastewater via a 108 m long 50 mm diameter forcemain to Maintenance Hole 7 (MH7).

Pump chamber volume calculations, pump sizing calculations, and sanitary sewer calculations can be found in Appendix B.

**All forcemains unless otherwise noted have a diameter of 50 mm. All pump chambers will be equipped with audible and visual warning alarms.*

4.2. Moving Bed Bioreactor (MBBR)

Wastewater treatment will be provided by a BNA MBBR treatment system with the unit processes and tank specifications as follows;

- An Influent Equalization unit consisting of two (2) single chamber precast concrete tanks with a total working volume of approximately 78,300 L with wastewater to flow via forcemain to the Primary Treatment and Sludge Storage Unit;
- A Sludge Storage unit consisting of two (2) single chamber precast concrete tanks with a combined total working volume of approximately 76,900 L with wastewater to flow via gravity through the unit to the Primary Treatment Unit Primary Clarifier;
- A Primary Clarifier consisting of one (1) single chamber precast tank with an approximate working volume of 36,300 L with primary effluent to flow via gravity through the clarifier to Secondary Treatment Unit- Bioreactor 1;
- Bioreactor 1 MBBR consisting of one (1) single chamber precast tank with an approximate working volume of 30,200 L, equipped with fine bubble aeration diffusers and carrier media, with process water to flow via gravity to the Secondary Treatment Unit- Bioreactor 2;
- Bioreactor 2 MBBR consisting of one (1) single chamber precast tank with an approximate working volume of 29,400 L, equipped with fine bubble aeration diffusers and carrier media, with some wastewater (process effluent recirculation) to be recirculated via forcemain to the Sludge Storage unit with supplemental carbon (primary) dosed into the recirculation line to ensure mixing in the primary treatment tanks; remainder of the process water to flow via gravity to the Secondary Treatment Unit- Secondary Clarifier;
- A Secondary Clarifier consisting of one (1) single chamber precast tank with an approximate working volume of 14,100L equipped with three (3) specialized hoppers, scum skimmer system and three (3) sludge return pumps, such that scum and sludge (process effluent sludge return) are returned to the Sludge Storage unit and the secondary effluent to flow to the Tertiary Treatment Unit- Anoxic Bioreactor;
- Anoxic Bioreactor consisting of one (1) single chamber precast tank with an approximate working volume of 17,100 L, equipped with carrier media, supplemental carbon (tertiary) dosing is flow paced based on the influent equalization pump operation and proportioned to limit residual nitrate; the carbon supplement is intermittently mixed in the reactor via (3) mixing pumps; with process water to flow via gravity to the Tertiary Treatment Unit- Bioreactor 3;
- Bioreactor 3 MBBR consisting of the first chamber of one (1) precast dual chamber tank with an approximate working volume of 9,800 L; with fine bubble aeration diffusers and carrier media, with process water to flow via gravity to the Tertiary Treatment Unit- Floc Reactor;

- Floc Reactor phosphorous reduction system consisting of one (1) single chamber precast tank with an approximate working volume of 1,800L which eliminates phosphorous by chemical precipitation with Clariphos® rare earth coagulant, stored and dosed via pump from a vessel in the control shed, with process water to flow via gravity to the Tertiary Treatment Unit- Tertiary Clarifier;
- Tertiary Clarifier consisting of the second chamber of Bioreactor 3 MBBR tank with a working capacity of 12,600 L; equipped with two (2) specialized hoppers, scum skimmer system and two (2) sludge return pumps, such that scum and sludge (process effluent sludge return) are returned to the Secondary Sludge Storage tank and the tertiary effluent to flow to the Intermediate Pump Tank;
- Intermediate Pump Tank consisting of one (1) single chamber precast tank with an approximate working volume of 23,300L equipped with duplex effluent pumps and high-level audio/visual alarm system discharging via forcemain to a Tertiary Filtration system;
- A Tertiary Filtration system housed in a control shed consisting of an Enhanced (tertiary) phosphorus reduction and filtration system which further reduces phosphorus by chemical precipitation with Clariphos® rare earth coagulant, stored and dosed via pump from a vessel in the control shed which will discharge treated effluent to the Effluent Pump Tank; and
- An Effluent Pump Tank consisting of one (1) precast single chamber tank with an approximate working volume of 23,300 L equipped with duplex effluent pumps and high-level audio/visual alarm system discharging via forcemain to the Type A Dispersal Bed.

Detailed design and specifications for the MBBR can be found in Appendix C.

4.3. Type A Dispersal Bed (DB1)

The proposed dispersal bed will consist of four (4) identical cells that will each treat 25% of the effluent. Each of the four (4) cells in the dispersal bed will consist of 16 runs of 25.5 m long 100 mm diameter perforated PVC pipe in a 424 m^2 stone area (the combined stone area is 1,696 m^2). The sand area will be combined for the bed and will have a total area of 10,902 m^2.

The main variables in the determination of the capacity of a dispersal bed are the percolation rate of the soils in which the pipes are laid and the daily sewage flow. The daily sewage flows are calculated using OBC tables 8.2.1.3.A.& 8.2.1.3.B. Two soil samples were tested for estimated percolation rate (T- time) with the T-time of the sample from the proposed dispersal bed location having a T-time of over 50 min/cm.

The capacity of each dispersal bed is based on the size of the stone area and the sand area. The size of the stone area is determined as:

$A = Q/B$ (OBC 8.7.7.1. (6)(e))

A = Area of stone in Type A dispersal bed
Q = Daily flow capacity
B = 50 if Q>3,000 L/day or 75 if Q<3,000 L/day

When the percolation time of the native soils is more than 15 minutes the size of the sand area is determined as:

A = (QT)/400 (OBC 8.7.7.1.(5)(b))

A = Area of sand in Type A dispersal bed
Q = Daily flow capacity
T = Percolation time of native soil

PROPOSED DISPERSAL BED (TYPICAL)

LOADING - NATIVE SOIL:
T-TIME >50 *Silty sand, trace clay

A = AREA OF STONE OR SAND
Q = DAILY DESIGN SEWAGE FLOW
T = PERCOLATION TIME OF NATIVE SOIL
B = 50 if Q>3,000 L/day or 75 if Q<3,000 L/day

STONE AREA
A = 1,696 m^2 → Q/B → 83,300/50 = 1,666 m^2 (REQ'D)

SAND AREA
A = 10,902 m^2 → QT/400 → (83,300*50)/400 = 10,412.5 m^2 (REQ'D)

Figure 1: Daily rated subsurface Type A dispersal bed capacities.

Infiltration rates for the sanitary gravity pipe network were calculated based on 1.8 L/day/m of public sewer (Stevens-Schutzbach Method).

There are 450 m of 100 mm diameter sanitary sewers and 67 m of 150 mm diameter sanitary sewers on the site which results in a total maximum infiltration rate of 931 L/day for the site during periods of high groundwater.

Design details for the proposed wastewater treatment system can be found in the design drawings in Appendix A. Infiltration calculations can be found in the sanitary sewer calculation sheet in Appendix B.

5.0 Effluent Attenuation

Attenuation is used to reduce the concentration of Phosphorus and Nitrogen in effluent. Under O. Reg. 169/03: Ontario Drinking Water Quality Standards Nitrate (as nitrogen) in potable water should be less than 10 mg/L and under the Bay of Quinte Remedial Action Plan (BQRAP) the Nitrate (as nitrogen) concentration should be less than 2.5 mg/L and the Phosphorus concentration should be less than 0.1 mg/L.

5.1. Phosphorus

Prediction of Contaminant Attenuation (Ministry of Environment Design Guidelines for Sewage Works 2008, Chapter 22 – Section 22.5.8)

$$V_A = A_D \times k$$

$$V_T = V_A + V_S$$

$$C_{PB} = \frac{C_S \times V_S}{V_T}$$

V_A = Annual attenuation volume [m^3]
A_D = Attenuation Area 1 [m^2]
V_T = Total volume of water [m^3]
V_S = Annual sewage Volume [m^3]
C_{PB} = Concentration at property boundary or water course [mg/L]
C_s = Concentration in sewage [mg/L]
k = 0.25m [SI]

Type A dispersal bed servicing a maximum theoretical daily design sewage flow of 83,300 L/day in the summer and 41,650 L/day in the winter.

Calculation:

V_A = 11,380m^3	Attenuation Volume.
A_D = 45,520m^2	Attenuation Area WWTS 1 (See attached drawing)
V_T = 33,579m^3	Total Volume of water based on 168-day summer and 197-day winter operational season.
V_S = 22,199m^3	Annual sewage volume based on 168-day summer and 197-day winter operational season.
CPB = 5.42mg/L	Concentration after attenuation.
Cs = 8.2mg/L	Typical Concentration of Phosphorus in Septic Tank Effluent as per Table 1.2 Sharaf, Ahmed, On-Site Sewage Systems Ministry of Municipal Affairs and Housing. 2013.
k = 0.25m [SI]	Assumes 250 mm annual attenuation precipitation rate.

$$V_A = 45{,}520\text{m}^2 \times 0.25\text{m}$$
$$V_A = 11{,}380\text{m}^3$$

$$V_T = 11{,}380\text{m}^3 + 22{,}199\text{m}^3$$
$$V_T = 33{,}579\text{m}^3$$

$$C_{PB} = \frac{8.2\text{mg/L} \times 22{,}199\text{m}^3}{33{,}579\text{m}^3}$$

$$C_{PB} = 5.42\text{mg/L}$$

This assumes worst case with no phosphorus retention in sand and soils around the dispersal bed

The annual phosphorus loading into wetland based is on a 168-day summer and 197-day winter operational season.

Summer:
$P_{loading}$ = C_{PB} x Daily Sewage Flow = 5.42 mg/L x 83,300 L/day = 0.451 Kg/day

Winter:
$P_{loading}$ = C_{PB} x Daily Sewage Flow = 5.42 mg/L x 41,650 L/day = 0.226 Kg/day

0.451 Kg/day X 168 days/year + 0.226 Kg/day X 197 days/year = 120.29 Kg/year

West Lake is not part of the Bay of Quinte Remedial Action Plan (BQRAP) but due to low flow turnover in West Lake it is assumed that concentration limits similar to the BQRAP would be required by MECP.

A phosphorus concentration of 5.42 mg/L exceeds the maximum allowable phosphorus concentration in effluent entering a surface water body. Phosphorus concentration limits vary by water body; however, for water bodies affected by the BQRAP they are 0.1 mg/L or less. Achieving a phosphorus concentration after attenuation of 0.1 mg/L would require a pre-attenuation concentration of 0.15 mg/L or less. This would require a phosphorus reduction of 98.2% during treatment.

5.2. Nitrate (as nitrogen)

Prediction of Contaminant Attenuation (Ministry of Environment Design Guidelines for Sewage Works 2008, Chapter 22 – Section 22.5.8)

$$V_A = A_D \times k$$

$$V_T = V_A + V_S$$

$$C_{PB} = \frac{C_S \times V_S}{V_T}$$

V_A = Annual attenuation volume [m^3]
A_D = Attenuation Area 1 [m^2]
V_T = Total volume of water [m^3]
V_S = Annual sewage Volume [m^3]
C_{PB} = Concentration at property boundary or water course [mg/L]

C_s = Concentration in sewage [mg/L]
k = 0.25m [SI]

Type A dispersal bed servicing a maximum theoretical daily design sewage flow of 83,300 L/day in the summer and 41,650 L/day in the winter.

Calculation:

$V_A = 11{,}380m^3$	Attenuation Volume.
$A_D = 45{,}520m^2$	Attenuation Area WWTS 1 (See attached drawing)
$V_T = 33{,}579m^3$	Total Volume of water based on 168-day summer and 197-day winter operational season.
$V_S = 22{,}199m^3$	Annual sewage volume based on 168-day summer and 197-day winter operational season.
$C_{PB} = 26.44mg/L$	Concentration after attenuation.
$C_s = 40mg/L$	Typical Concentration of Nitrate in Septic Tank Effluent.
k = 0.25m [SI]	Assumes 250mm annual attenuation precipitation rate.

$$V_A = 45{,}520m^2 \times 0.25m$$
$$V_A = 11{,}380m^3$$

$$V_T = 11{,}380m^3 + 22{,}199m^3$$
$$V_T = 33{,}579m^3$$

$$C_{PB} = \frac{40mg/L \times 22{,}199m^3}{33{,}579m^3}$$

$$C_{PB} = 26.44mg/L$$

This assumes worst case with no nitrogen retention in the sand and soils around the dispersal bed

The annual nitrate loading into wetland based on a 168-day summer and 197-day winter operational season.

Summer:
$N_{loading}$ = C_{PB} x Daily Sewage Flow = 26.44 mg/L x 83,300 L/day = 2.20 Kg/day

Winter:
$N_{loading}$ = C_{PB} x Daily Sewage Flow = 26.44 mg/L x 41,650 L/day = 1.10 Kg/day

2.20 Kg/day X 168 days/year + 1.10 Kg/day X 197 days/year = 586.3 Kg/year

West Lake is not part of the BQRAP but due to low flow turnover in West Lake we are assuming that concentration limits similar to the BQRAP would be required by MECP.

A nitrate concentration of 26.44 mg/L exceeds the BQRAP and MECP B7 Reasonable Use Guidelines limit of 2.5 mg/L or less for surface water. Achieving a nitrate concentration after

attenuation of 2.5 mg/L would require a pre-attenuation concentration of 3.78 mg/L or less. This would require a nitrate reduction of 90.5% during treatment.

The attenuation area map can be found in Appendix D.

6.0 Recommendations

The proposed wastewater treatment system is designed to provide nitrate (as nitrogen) reduction of 90.5% and phosphorus reduction of 98.2%. This nutrient reduction combined with attenuation will result in a nitrate concentration of 2.5 mg/L or less and a phosphorus concentration of 0.1 mg/L or less at the wetland boundary meeting the effluent objectives outlined in the BQRAP and the MECP B7 Reasonable Use Guidelines.

The proposed wastewater treatment system will also provide Total Suspended Solids (TSS) reduction and Biochemical Oxygen Demand (BOD_5) reduction resulting in TSS concentrations of 10 mg/L and BOD_5 concentrations of 10 mg/L in the effluent as per MECP requirements.

The proposed monitoring locations are the balancing/equalization tanks, the effluent pump tank, and three (3) monitoring wells installed below the dispersal between the garden and the wetland.

It is recommended that Campfire Circle – Prince Edward County have an operation and maintenance manual produced for the proposed sewage works. This manual should include start up and shut down procedures. Maintenance procedures should include annual inspection of pump chambers, holding tanks, treatment units and system controls. Maintenance should also include cleaning of effluent filters, grease tank and measurement of the sludge depth in tanks. Pump out/removal of sludge is required when this depth reaches approximately 1/3 the total working height of the tanks. It is necessary to have an active maintenance agreement to service the Moving Bed Bioractor (MBBR) treatment units annually.

The report recommendations are applicable only to the project described in the report. Any changes to the project will require review by Groundwork Engineering Limited to ensure compatibility with the recommendations contained in this brief.

We trust this brief provides sufficient information for your present purposes. If you have any questions concerning this report or if we may be of further service to you, please do not hesitate to contact the undersigned.

Report Prepared by: Lucas McCallum

Lucas McCallum, B. Eng., C. Tech.

Report Reviewed by: _____

Martin Burger, M.Eng., P.Eng.

Statement of Qualifications and Limitations

The attached Report has been prepared by Groundwork Engineering Limited (the Consultant) for the benefit of the Client in accordance with their Agreement.

The information, data, recommendations and conclusions contained in the Report:

1. is subject to the scope, schedule, and other constraints and limitations in the Agreement and the qualifications contained in the Report;
2. represents the Consultant's judgement in light of the limitations and industry standards for the preparation of similar reports;
3. may be based on information provided to Consultant which has not been independently verified;
4. has not been updated since the date of issuance of the Report and its accuracy is limited to the time and circumstances in which it was prepared; and
5. must be read as a whole and sections should not be read out of context.

The Consultant shall be entitled to rely upon the accuracy and completeness of information that was provided to it and has no obligation to update such information. Consultant accepts no responsibility for any events or circumstances that may have occurred since the date on which the Report was prepared.

Any estimates or opinions regarding expected construction costs or construction schedule provided by Consultant represent Consultant's judgement in light of its experience and the knowledge and information available to it at the time of preparation. The Consultant does not make any representations, with respect to such estimates or opinions, and accepts no responsibility for any loss or damage arising from them. Persons relying on such estimates or opinions do so at their own risk.

Except as agreed to in writing by the Consultant and the Client; as required by-law; or to the extent used by governmental reviewing agencies for the purpose of obtaining permits or approvals, the Report and the Information may be used and relied upon only by the Client.

The Consultant accepts no responsibility, to parties other than the Client who may obtain access to the Report or the information for any injury, loss or damage suffered by such parties arising from their use of, reliance upon, or decisions or actions based on the Report, except to the extent those parties have obtained the prior written consent of the Consultant to use and rely upon the Report and the information. Any injury, loss or damages arising from improper use of the Report shall be borne by the party making such use.

GROUNDWORK ENGINEERING LIMITED

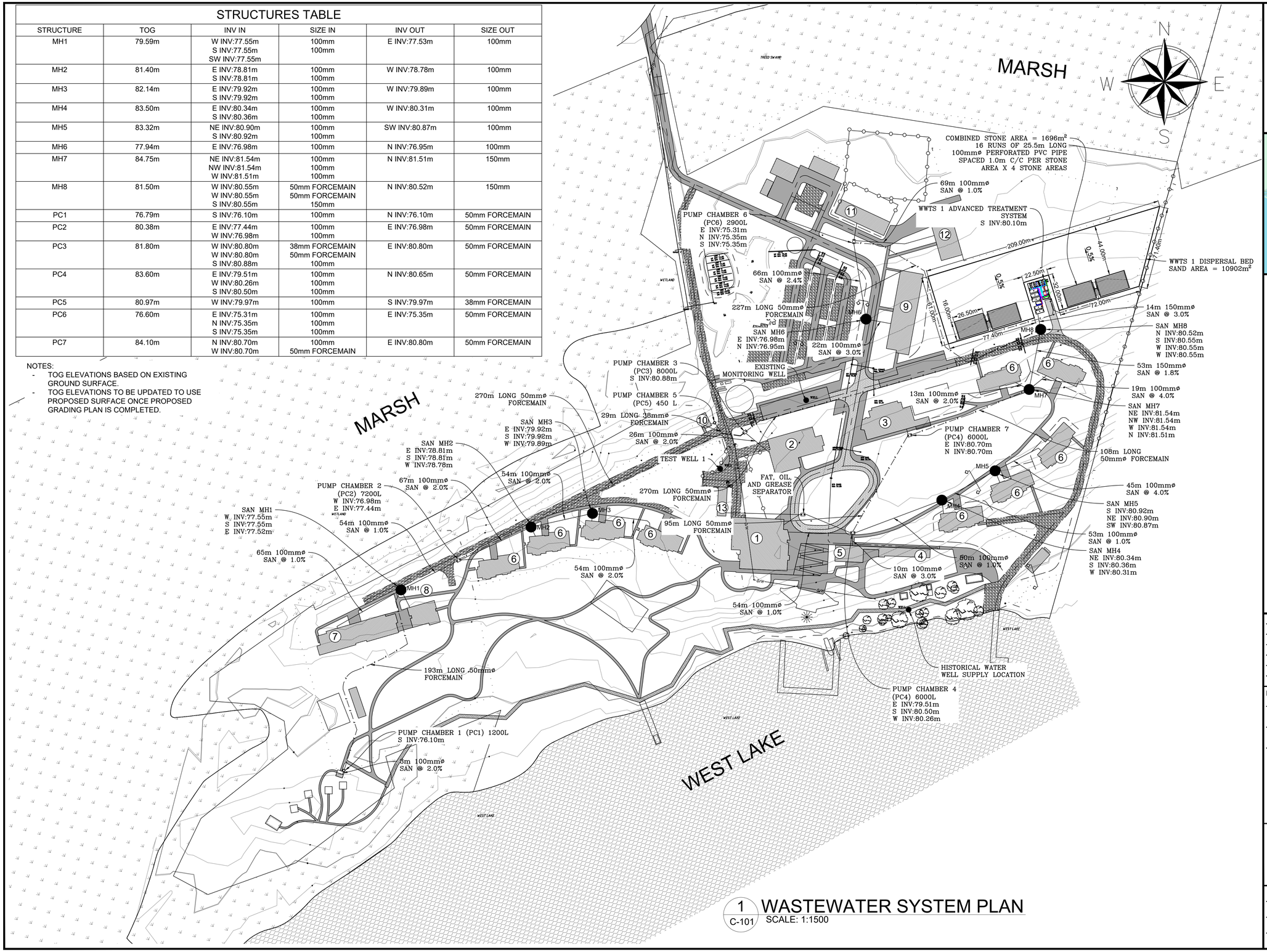
Appendix A

Drawings

STRUCTURES TABLE

STRUCTURE	TOG	INV IN	SIZE IN	INV OUT	SIZE OUT
MH1	79.59m	W INV:77.55m S INV:77.55m SW INV:77.55m	100mm 100mm	E INV:77.53m	100mm
MH2	81.40m	E INV:78.81m S INV:78.81m	100mm 100mm	W INV:78.78m	100mm
MH3	82.14m	E INV:79.92m S INV:79.92m	100mm 100mm	W INV:79.89m	100mm
MH4	83.50m	E INV:80.34m S INV:80.36m	100mm 100mm	W INV:80.31m	100mm
MH5	83.32m	NE INV:80.90m S INV:80.92m	100mm 100mm	SW INV:80.87m	100mm
MH6	77.94m	E INV:76.98m	100mm	N INV:76.95m	100mm
MH7	84.75m	NE INV:81.54m NW INV:81.54m W INV:81.51m	100mm 100mm 100mm	N INV:81.51m	150mm
MH8	81.50m	W INV:80.55m W INV:80.55m S INV:80.55m	50mm FORCEMAIN 50mm FORCEMAIN 150mm	N INV:80.52m	150mm
PC1	76.79m	S INV:76.10m	100mm	N INV:76.10m	50mm FORCEMAIN
PC2	80.38m	E INV:77.44m W INV:76.98m	100mm 100mm	E INV:76.98m	50mm FORCEMAIN
PC3	81.80m	W INV:80.80m W INV:80.80m S INV:80.88m	38mm FORCEMAIN 50mm FORCEMAIN 100mm	E INV:80.80m	50mm FORCEMAIN
PC4	83.60m	E INV:79.51m W INV:80.26m S INV:80.50m	100mm 100mm 100mm	N INV:80.65m	50mm FORCEMAIN
PC5	80.97m	W INV:79.97m	100mm	S INV:79.97m	38mm FORCEMAIN
PC6	76.60m	E INV:75.31m N INV:75.35m S INV:75.35m	100mm 100mm 100mm	E INV:75.35m	50mm FORCEMAIN
PC7	84.10m	N INV:80.70m W INV:80.70m	100mm 50mm FORCEMAIN	E INV:80.80m	50mm FORCEMAIN

NOTES:
- TOG ELEVATIONS BASED ON EXISTING GROUND SURFACE.
- TOG ELEVATIONS TO BE UPDATED TO USE PROPOSED SURFACE ONCE PROPOSED GRADING PLAN IS COMPLETED.



1 C-101 WASTEWATER SYSTEM PLAN
SCALE: 1:1500

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UNIT 640 - 654 NORRIS COURT
KINGSTON ONTARIO
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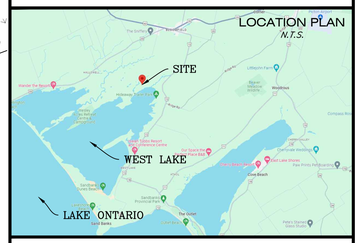


LEGEND

—, —, —, —, —, — NEW 50mm FORCEMAIN

BUILDING NUMBER	BUILDING NAME
1	LODGE
2	HOSPITAL
3	INDOOR ACTIVITY SPACE
4	POOL BUILDING
5	DRAMA BUILDING
6	CAMPER RESIDENCE
7	SUMMER STAFF RESIDENCE
8	MATURE STAFF RESIDENCE
9	FLEX
10	DIRECTOR'S CABIN
11	EQUESTRIAN STABLES
12	GREENHOUSE
13	COOKING PROGRAM

REVISIONS

No.	Description	Date
05	ISSUED FOR SITE PLAN APPLICATION	2025/08/05
06	REVISED PER DECEMBER 2025 DRAWING	2026/01/23
07	REVISED PER FEBRUARY 2026 DRAWING	2026/02/10
08	REVISED PER JULY 2026 DRAWING	2026/07/06
09	REVISED PER AUG 6, 2026 DRAWINGS	2026/08/12

BENCHMARK:

No.	DESCRIPTION	ELEVATION
##.	XXX	XXX.XX

LICENSED PROFESSIONAL ENGINEER
12 AUG 2026
M. H. BURGER
PROVINCE OF ONTARIO

Client / Land Owner:
CAMPFIRE CIRCLE

Project:
565 WESLEY ACRES ROAD
BLOOMFIELD ONTARIO

Drawing Title:
SANITARY WASTEWATER PLAN

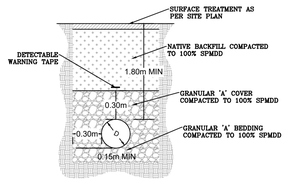
Drawn by: LM
Checked By: MB
Scale: 24"x36" 1:1500
Date: AUG 12, 2026

Project Number: GW-23003-16
Drawing Number: C-101
SHEET 1 of 3

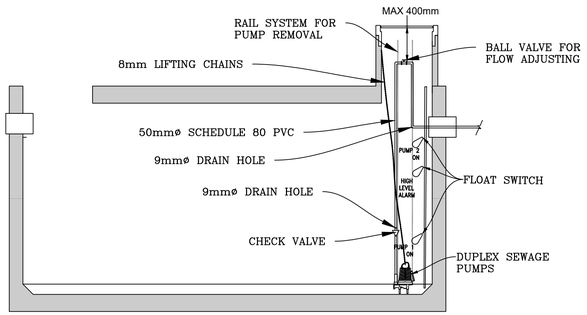
P:\Projects\23000\23003 – Geotechnical Investigations and Inspections\23003-16 – 565 Wesley Acres Road-Jewell BSS\02 – Design\03 – Drawings\08 – For CAD release\GW-23003-16 – Wesley Acres (For CAD Release).dwg
8/12/2026 8:59 AM

NOTES:

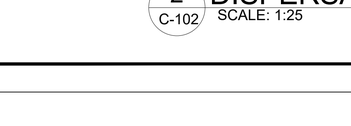
1. SANITARY OUTLET INVERT IS ASSUMED TO BE 1.0m BELOW FINISHED FLOOR ELEVATION (FFE)
2. SANITARY OUTLET FROM 2-STORY BUILDINGS IS ASSUMED TO BE 1.0m BELOW UPPER FLOOR FFE.
3. MANHOLES TO BE AS PER OPSD 701.010.
4. ALL GRAVITY SEWER MAIN PIPE TO BE PVC SDR35.
5. ALL FORCEMAINS TO BE 150 PSI POLYETHYLENE.
6. ALL FORCEMAINS UNLESS OTHERWISE NOTED ARE 50mmØ.
7. ALL FORCEMAINS IF NOT SELF DRAINING TO BE BURIED 1.5m DEEP, INSULATED, OR HEAT TRACED TO PREVENT STANDING WATER FROM FREEZING.



SANITARY TYPICAL TRENCH



TYPICAL PUMP CHAMBER
SCALE:NTS



NOTES:
1. INCREMENTS OF THICKNESS SHALL BE 50MM.

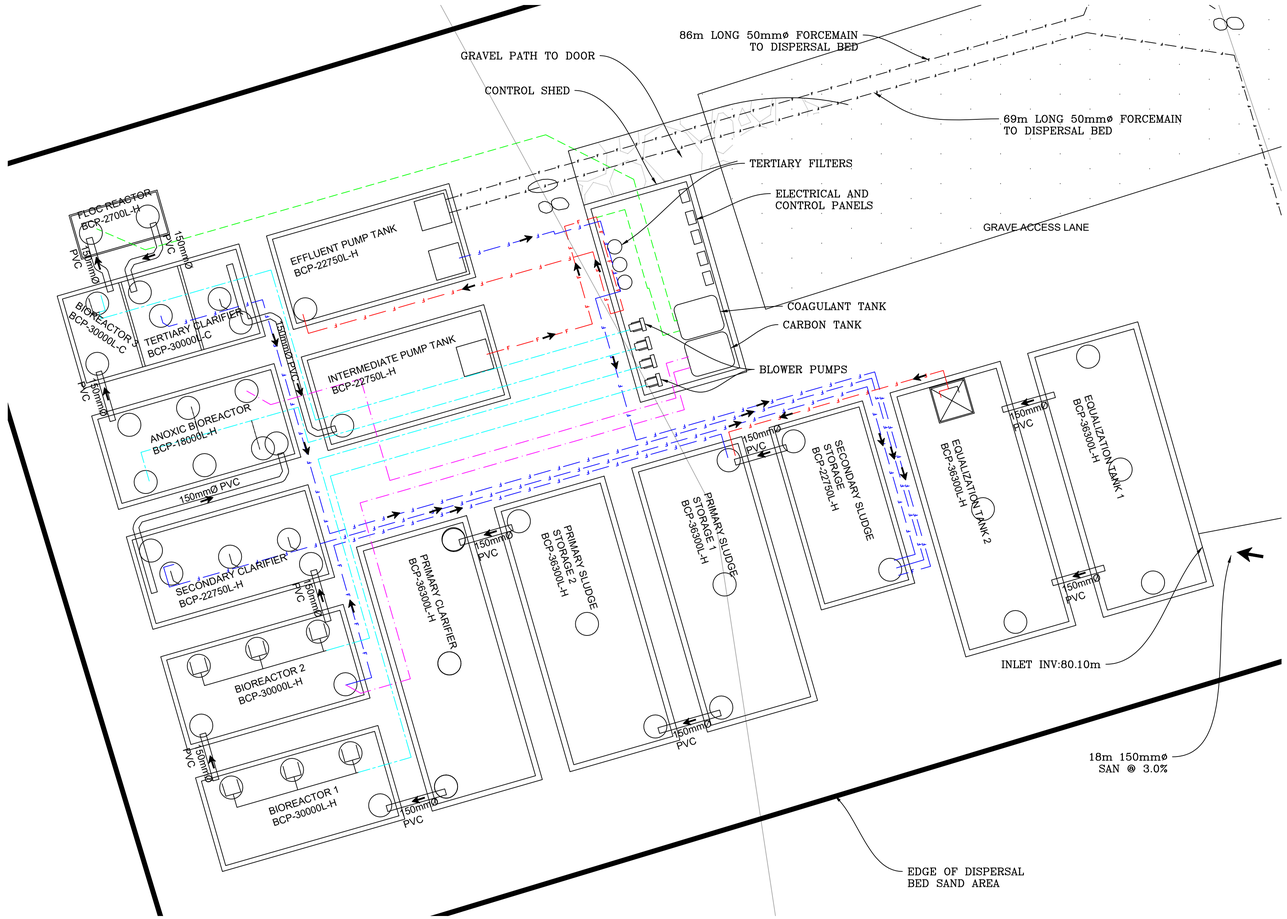
2. INSULATION TO BE STYROFOAM SM HI-40 OR EQUIVALENT.

3. TO BE USED WHEN GROUND COVER IS LESS THAN 1.2m FOR STORM SEWER, 1.5m FOR SANITARY SEWER AND 1.7m FOR WATERMAIN.

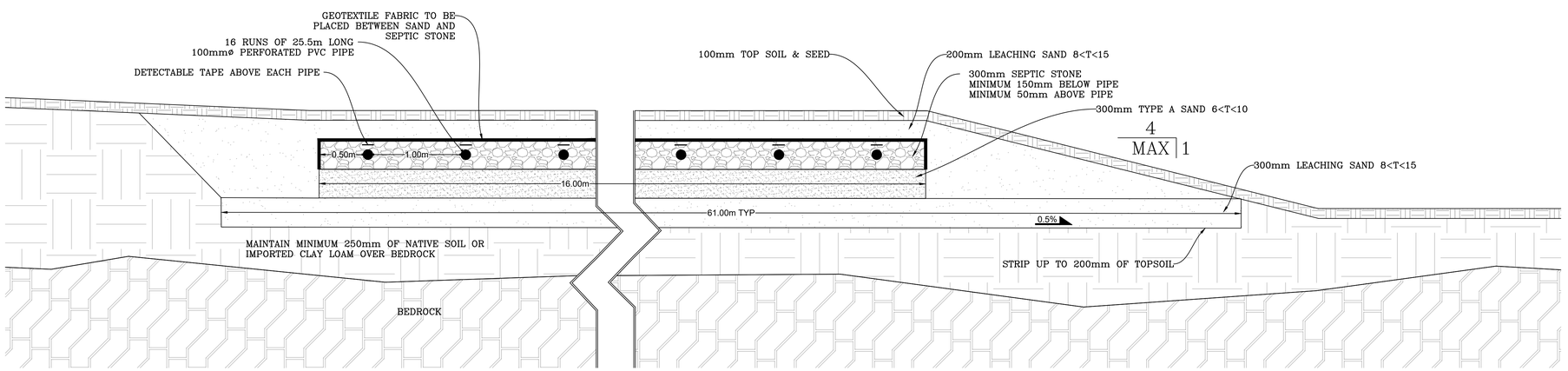
PIPE INSULATION TABLE

GROUND COVER	INSULATION THICKNESS (mm)
500 to 1500mm	100
1500mm and over	50

PIPE INSULATION DETAIL



1 WASTEWATER TREATMENT SYSTEM DETAILS
C-102 SCALE: 1:75



2 DISPERSAL BED PROFILE
C-102 SCALE: 1:25

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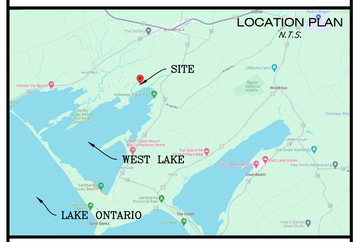

LEGEND

- NEW 50mm FORCEMAIN
- NEW 50mm FORCEMAIN
- NEW 6mm CARBON LINE
- NEW 50mm AERATION
- NEW 6mm COAGULANT LINE

REVISIONS

No.	Description	Date
05	ISSUED FOR SITE PLAN APPLICATION	2025/08/05
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BENCHMARK:

No.	DESCRIPTION	ELEVATION
##.	XXX	XXX.XX

LICENSED PROFESSIONAL ENGINEER
12 AUG 2026
M. H. BURGER
PROVINCE OF ONTARIO

Client / Land Owner:
CAMPFIRE CIRCLE

Project:
565 WESLEY ACRES ROAD
BLOOMFIELD ONTARIO

Drawing Title:
NOTES AND DETAILS

Drawn by: LM
Checked By: MB
Scale: 24"x36" AS NOTED
Date: AUG 12, 2026

Project Number: GW-23003-16
Drawing Number: C-102
SHEET 2 of 3

P:\Projects\23000\23003 - Geotechnical Investigations and Inspections\23003-16 - 565 Wesley Acres Road-Jewell BSS\02 - Design\03 - Drawings\08 - For CAD release\GW-23003-16 - Wesley Acres (For CAD Release).dwg
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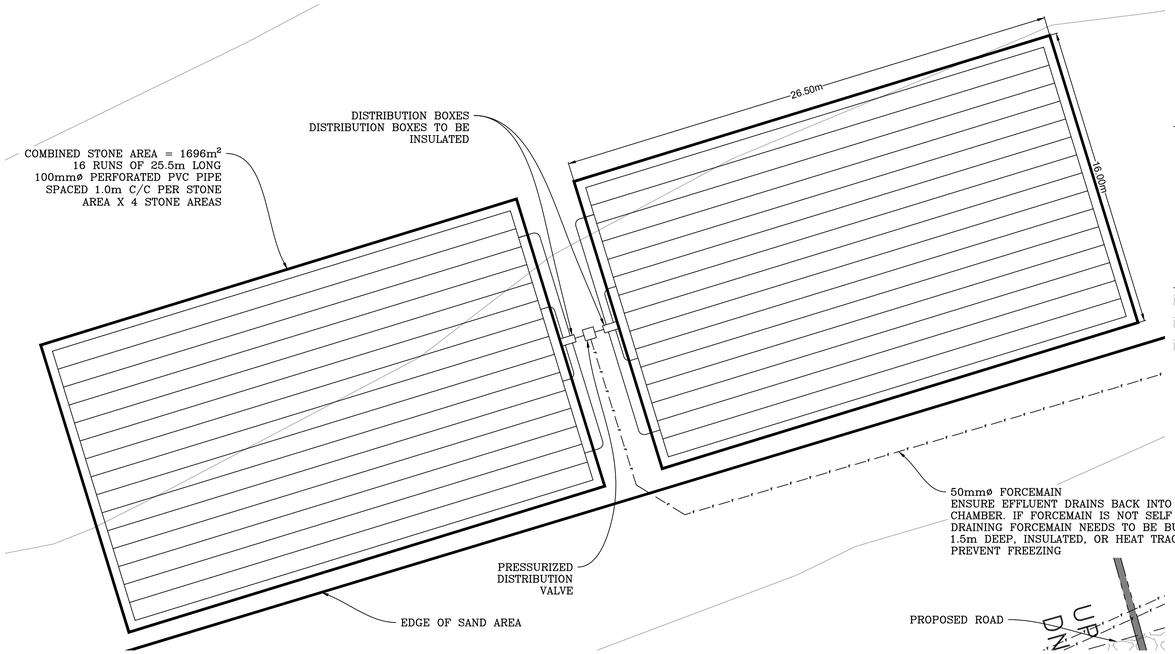
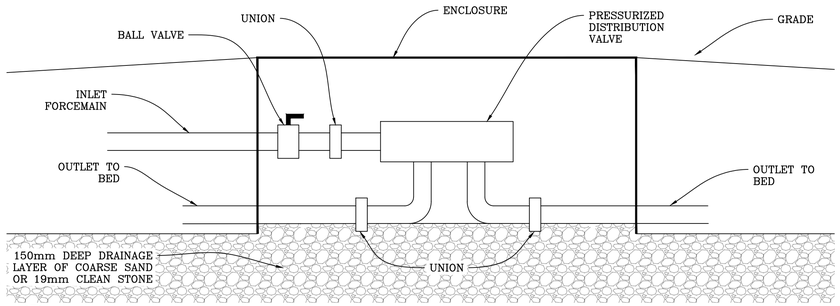


1 C-103 **DISPERSAL BED STONE AREA AND PIPE DETAIL**
SCALE: 1:150



2 C103 **DISTRIBUTING VALVE DETAIL**
NTS

Pump Chambers and Pumps

Pump Chamber	Working Volume (L)	Maximum Combined Head (m)	Pump Required	Flow (L/s)
PC1	1200	11.58	LIBERTY LEH100 Series	3
PC2	7200	17.51	LIBERTY LEH200 Series	3
PC3	8000	13.44	LIBERTY LEH100 Series	3
PC4	6000	6.78	LIBERTY LE100 Series	3
PC5	450	6.13	LIBERTY LE50 Series	3
PC6	2900	16.94	LIBERTY LEH200 Series	3
PC7	7200	7.04	LIBERTY LE100 Series	3

GENERAL NOTES:

1. THE ORIGINAL TOPOGRAPHY AND GROUND ELEVATIONS, SERVICING AND SURVEY DATA SHOWN ON THIS PLAN ARE SUPPLIED FOR INFORMATION PURPOSES ONLY. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE ACCURACY OF ALL INFORMATION OBTAINED FROM THESE PLANS. ALL DIMENSIONS AND INVERTS MUST BE VERIFIED PRIOR TO CONSTRUCTION. IF THERE IS ANY DISCREPANCY THE CONTRACTOR IS TO NOTIFY THE ENGINEER PROMPTLY.
2. ALL ELEVATIONS PROVIDED ARE GEODETIC AND UTILIZE METRIC UNITS UNLESS OTHERWISE NOTED.
3. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATIONS OF ALL EXISTING UTILITIES PRIOR TO COMMENCING CONSTRUCTION. PROTECT AND ASSUME ALL RESPONSIBILITY FOR EXISTING UTILITIES WHETHER OR NOT SHOWN ON THE DRAWINGS. IF THERE ARE ANY DISCREPANCIES THE CONTRACTOR IS TO NOTIFY THE ENGINEER PROMPTLY. GAS, HYDRO, CABLE, TELEPHONE, OR ANY OTHER UTILITY THAT MAY EXIST ON SITE MUST BE LOCATED BY ITS OWN UTILITIES AND VERIFIED.
4. ALL UNDERGROUND SERVICES, MATERIALS AND INSTALLATIONS TO BE IN ACCORDANCE WITH ONTARIO PROVINCIAL STANDARDS AND SPECIFICATIONS UNLESS OTHERWISE STATED (OPSS).
5. ALL DISTURBED AREAS TO BE RESTORED TO ORIGINAL CONDITION OR BETTER UNLESS OTHERWISE SPECIFIED. ANY GRASSED AREAS DISTURBED ARE TO BE REINSTATED WITH MINIMUM 100mm TOP SOIL AND SEED. ROAD CUTS TO BE REINSTATED WITH TOPSOIL AND SEED.
6. THE CONTRACTOR IS RESPONSIBLE FOR ALL LAYOUT FOR CONSTRUCTION PURPOSES.
7. TREES DESIGNATED BY THE ENGINEER MUST BE PROTECTED AND MAINTAINED DURING CONSTRUCTION AS PER OPSD 220.010
8. CONTRACTOR TO OBTAIN AND PAY FOR ALL NECESSARY PERMITS FROM THE COUNTY, MUNICIPALITY AND/OR CONSERVATION AUTHORITY PRIOR TO COMMENCING CONSTRUCTION.
9. EXCAVATE AND DISPOSE OF ALL EXCESS EXCAVATED MATERIAL, SUCH AS ASPHALT, CURBING AND DEBRIS, OFF SITE TO THE SATISFACTION OF THE ENGINEER OR THE COUNTY, MUNICIPALITY OR CONSERVATION AUTHORITY.
10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TRAFFIC CONTROL AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING THE SUPPLY, INSTALLATION, AND REMOVAL OF ALL NECESSARY SIGNAGE AND SPECIFICATIONS.
11. ALL DIMENSIONS AND INVERTS MUST BE VERIFIED BEFORE CONSTRUCTION, IF THERE IS ANY DISCREPANCY THE CONTRACTOR MUST NOTIFY THE ENGINEER PROMPTLY.
12. CONTRACTOR TO PROVIDE SHOP DRAWINGS FOR ALL PROPOSED MATERIALS FOR REVIEW AND APPROVAL BY THE STAMPING ENGINEER OR THEIR REPRESENTATIVE.
13. TOPSOIL TO BE STRIPPED.
14. GRANULAR 'A' AND GRANULAR 'B' TO BE COMPACTED TO 98% SPD UNLESS OTHERWISE STATED.
15. REINSTATE TRENCHES IN GRANULAR AREA WITH 150mm GRANULAR 'A' & 300mm GRANULAR 'B'.
16. BACKFILL TO AT LEAST 300mm ABOVE TOP OF PIPE WITH GRANULAR "A"

ENVIRONMENTAL

17. EROSION AND SEDIMENT CONTROLS SHALL BE INSTALLED PRIOR TO CONSTRUCTION AND MONITORED AND MAINTAINED BY THE CONTRACTOR UNTIL COMPLETION. THE TEMPORARY SEDIMENT AND EROSION CONTROL MEASURES MUST BE REMOVED ONCE THE SITE HAS BEEN STABILIZED AND SITE WORKS COMPLETED.
18. REGARDLESS OF SITE SPECIFIC ITEMS DETAILED ON THE PLANS, THE CONTRACTOR SHALL INSTALL EROSION CONTROL MEASURES TO SUIT THE PROPOSED WORK METHODS TO CONTROL SEDIMENT FROM RUNNING OFF THE SITE OR INTO WATER BEARING FEATURES PRIOR TO ANY DISTURBANCE. FOLLOWING CONSTRUCTION, DISTURBED AREAS, AS WELL AS PROPOSED GRASSED AND VEGETATED SURFACES SHALL BE REINSTATED..
19. IN THE EVENT THAT HUMAN REMAINS ARE ENCOUNTERED DURING CONSTRUCTION, THE MINISTRY OF CITIZENSHIP, CULTURE AND RECREATION SHALL BE NOTIFIED IMMEDIATELY AND THE REGISTRAR OR DEPUTY REGISTRAR OF THE CEMETARIES REGULATION UNIT OF THE MINISTRY OF CONSUMER AND COMMERCIAL RELATIONS (416) 362-8392, SHALL BE NOTIFIED IMMEDIATELY.
20. IN THE EVENT THAT BURIED ARCHEOLOGICAL REMAINS ARE FOUND DURING CONSTRUCTION ACTIVITIES, THE MINISTRY OF CITIZENSHIP, CULTURE AND RECREATION SHALL BE NOTIFIED IMMEDIATELY.
21. WHILE UNDERTAKING CLEARING, DEMOLITION, EXCAVATION OR CONSTRUCTION THE OWNER AND THEIR CONTRACTORS SHALL BE VIGILANT FOR THE POTENTIAL PRESENCE OF UNDERGROUND FUEL TANKS, CONTAMINATED SOIL OR GROUNDWATER, BURIED WASTE OR ABANDONED WATER WELLS. IF ANY OF THE ABOVE ARE ENCOUNTERED OR SUSPECTED, THE OWNER SHALL ENSURE THAT:
    - 21.1. ANY SOIL OR GROUNDWATER CONTAMINATION ENCOUNTERED IS REMEDIATED TO APPLICABLE STANDARDS AS DEFINED WITHIN O.REG OR AS REVISED;
    - 21.2. ANY WASTES GENERATED BY SITE CLEAN-UPS ARE MANAGED IN ACCORDANCE WITH APPLICABLE LAWS AND STANDARDS;
    - 21.3. ANY ABANDONED FUEL TANKS ENCOUNTERED ARE DECOMMISSIONED IN ACCORDANCE WITH APPLICABLE LAWS AND STANDARDS;
    - 21.4. ANY UNUSED WATER WELLS (DRILLED OR DUG) ARE PROPERLY ABANDONED IN ACCORDANCE WITH ONTARIO REGULATIONS 903 WELLS OR AS ADVISED;
    - 21.5. IF IT APPEARS LIKELY THAT CONTAMINATION EXTENDS BEYOND THE BOUNDARIES OF THE SUBJECT PROPERTY, THE OWNER NOTIFIES THE LOCAL OFFICE OF THE MINISTRY OF ENVIRONMENT.
    - 21.6. CONSTRUCTION WASTES ARE NOT TO BE BURIED WITHIN THE PROPERTY THAT IS THE SUBJECT OF THIS AGREEMENT, AND
    - 21.7. THE OWNER AND THEIR CONTRACTORS REPORT ALL SPILLS TO THE MINISTRY OF THE ENVIRONMENT'S SPILLS ACTION CENTRE (1-800-268-6060) AND TO THE MUNICIPALITY FORTHWITH.

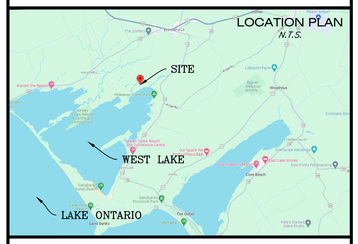
SANITARY

22. EACH DISTRIBUTION BED TO BE SPLIT INTO TWO (2) CELLS. FLOW TO BE SPLIT AND ALTERNATE BETWEEN CELLS USING AN AUTOMATIC DISTRIBUTING VALVE ASSEMBLY. AUTOMATIC DISTRIBUTING VALVE TO BE ORENCO MODEL: V6402A OR APPROVED EQUIVALENT.
23. DISTRIBUTING VALVE TO BE LOCATED NOT MORE THAN 600mm BELOW DISTRIBUTION LINES.
24. DISTRIBUTING VALVE TO BE INSTALLED AS PER MANUFACTURERS INSTALLATION INSTRUCTIONS AND GUIDLINES.
25. CONTRACTOR IS RESPONSIBLE FOR COMMISSIONING THE DUPLEX EFFLUENT PUMP SYSTEM.
26. TYPE A DISPERSAL BED TO BE CONSTRUCTED AS PER OBC 8.7.7.1. SEPTIC STONE GRADATIONS AS PER OBC 8.7.3.3.
27. TYPE A SAND TO BE 6<T<10 WITH A MAXIMUM 5% OF PARTICLES WITH A DIAMETER OF 75µm OR LESS, PASSING THROUGH A 0.074mm (No. 200) SIEVE. AS PER OBC 8.7.7.1.(4)(a).
28. SEPTIC STONE AS PER OBC 8.7.7.1.(6), 8.7.3.3.(2) AND TABLE 8.7.3.3
29. THE HEADER AND DISTRIBUTION LINES SHALL BE INSTALLED AS PER OBC 8.7.2.2.
30. DISTRIBUTION BOXES TO BE RAISED, INSULATED AND LEVELED ON A COMPACTED BASE.
31. PUMP CHAMBERS AND PUMPS AS PER TABLE.
32. SEWAGE PUMP CONTROL PANELS TO BE TO BE SJE RHOMBUS IFS SERIES DUPLEX CONTROLLER 240V, 15 AMP, OR APPROVED EQUIVALENT.
33. NEW DUPLEX DEMAND CONTROLLERS WITH AUDIBLE & VISUAL ALARMS TO BE INSTALLED ON 100mm X 100mm X 1.5m PRESSURE TREATED WOOD POST ADJACENT TO SEWAGE PUMP CHAMBERS OR ON WALL OF BUILDING FOR EASE OF MAINTENANCE. IF MOUNTED IN MECHANICAL ROOM SEAL ALL DUCTS ENTERING BUILDING WITH EYS FITTING TO PREVENT GAS TRANSFER.
34. ALL ELECTRICAL WORK MUST BE COMPLETED IN ACCORDANCE WITH ELECTRICAL CODE & BE PREFORMED BY A LICENCED ELECTRICIAN IN GOOD STANDING WITH THE ESA.
35. FORCEMAIN IF NOT SELF DRAINING TO BE BURIED 1.5m DEEP, INSULATED OR HEAT TRACED TO PREVENT STANDING WATER FROM FREEZING.
36. SEWER TRENCHING AND BEDDING SHALL CONFORM TO OPSD 802.010 AND 802.013 UNLESS NOTED OTHERWISE.
37. ALL PIPE ELBOWS TO BE LONG SWEEP RADIUS.
38. ANY AREAS WHERE TRAFFIC IS EXPECTED TO CROSS OVER FORCEMAINS INSTALL FORCEMAINS INSIDE 100mmØ SDR 35 PVC PIPE.
39. BNA-MBBR PUMP CHAMBER TO BE EQUIPPED WITH ON/OFF FLOAT SWITCH. PUMP CHAMBER TO BE EQUIPPED WITH HIGH LEVEL ALARM FLOAT. REDUNDANT LAG FLOAT CONTROL SWITCH TO BE INSTALLED ABOVE HIGH LEVEL ALARM FLOAT CONTROL SWITCH.
40. HIGH LEVEL ALARM CONTROL WIRE AND PUMP CONTROL WIRE TO BE INSTALLED IN SEPARATE CONDUIT, FROM ELECTRICAL SUPPLY TO PUMP CHAMBER
41. TANKS TO BE BACKFILLED WITH 300mm OF GRANULAR 'A' OR SAND FILL.
42. TANKS TO BE PLACED ON 300mm OF GRANULAR 'A' COMPACTED TO 98% SPD.
43. TANKS TO BE EQUIPPED WITH RISERS. TANKS TO HAVE MINIMUM 300mm COVER.
44. ALL TANKS TO BE INSTALLED AS PER MANUFACTURERS SPECIFICATIONS AND INSTALLATION INSTRUCTIONS.
45. BNA-MBBR TREATMENT PLANT TANKS AND PRE-TREATMENTS TANK TO BE INSTALLED AS PER MANUFACTURERS SPECIFICATIONS.

ELECTRICAL

46. ALL ELECTRICAL WORK TO BE COMPLETED IN ACCORDANCE WITH ESA STANDARDS.
47. ELECTRICAL CONDUIT FOR CONTROLLER TO BE 50mmØ RIGID PVC AND 25mmØ RIGID PVC FOR ALARM UNLESS SPECIFIED OTHERWISE.
48. ELECTRICAL CONDUIT TO BE INSTALLED WITH SWEEPS ON EACH CORNER.
49. EXTERNAL ELECTRICAL PANEL TO BE IN NEMA 4 CERTIFIED OUTDOOR LOCKABLE ENCLOSURE MOUNTED ON TWO (2) 4X4 PRESSURE TREATED POSTS AND 20mm PLYWOOOD.
50. PANEL TO BE SIZED TO ACCOMMODATE BREAKERS AND CIRCUITRY FOR CONTROLLERS, PUMP CHAMBER CONTROLLER, AND TWO (2) SPARES.

GROUNDWORK ENGINEERING LIMITED
GEOTECHNICAL • CIVIL • STORMWATER • ONSITE WASTEWATER
UNIT 640 - 654 NORRIS COURT
KINGSTON ONTARIO
OFFICE (613) 634-1789
www.groundengineer.ca



CALCULATIONS AS PER ONTARIO BUILDING CODE PART 8
DAILY DESIGN SEWAGE FLOW DETERMINATION (Q)

- RESIDENTIAL UNITS (CAMPER AND STAFF RESIDANCES)
  - -411 BEDS @ 200L/DAY PER BED = 82,200 L/DAY
  - *NOTE: ACCESSORY AND COMMUNAL BUILDING INCLUDED IN RESIDENTIAL FLOWS
- -2 DIRECTORS CABIN
  - -2 BEDROOMS = 1,100 L/DAY

TOTAL (Q) = 83,300 L/DAY

LOADING
EXISTING SOIL:
T-TIME > 50 (CLAY)
TYPE A DISPERSAL BED:
FLOW RATE > 3000L/DAY
THEREFORE RATE IS 50L/m²
STONE AREA= 1696m² → Q/50→ $\frac{83,300}{50}$=1666m² (REQ'D)
SAND AREA= 10902m² →Qx1/400→ $\frac{83,300 \times 50}{400}$ = 10412.5m² (REQ'D)

REVISIONS

No.	Description	Date
05	ISSUED FOR SITE PLAN APPLICATION	2025/08/05
06	REVISED PER DECEMBER 2025 DRAWING	2026/01/23
07	REVISED PER FEBRUARY 2026 DRAWING	2026/02/10
08	REVISED PER JULY 2026 DRAWING	2026/07/06
09	REVISED PER AUG 6, 2026 DRAWINGS	2026/08/12

BENCHMARK:

No.	DESCRIPTION	ELEVATION
##.	XXX	XXX.XX

LICENSED PROFESSIONAL ENGINEER
12 AUG 2026
M. H. BURGER
PROVINCE OF ONTARIO

Client / Land Owner:
CAMPFIRE CIRCLE

Project:
565 WESLEY ACRES ROAD
BLOOMFIELD ONTARIO

Drawing Title:
NOTES AND DETAILS 2

Drawn by: LM
Checked By: MB
Scale: 24"x36" AS NOTED
Date: AUG 12, 2026

Project Number: GW-23003-16
Drawing Number: C-103
SHEET 3 of 3

P:\Projects\23000\23003 – Geotechnical Investigations and Inspections\23003-16 – 565 Wesley Acres Road–Jewell BSS\02 – Design\03 – Drawings\08 – For CAD release\GW-23003-16 – Wesley Acres (For CAD Release).dwg
8/12/2026 8:59 AM

GROUNDWORK ENGINEERING LIMITED

Appendix B

Wastewater Calculation Sheets

GROUNDWORK ENGINEERING LIMITED

GW-23003-16

System 1

Building	Capacity	Unit	OBC Reference	Flow per unit (L/day)	Total Flow (L/day)	Notes	Pump Chamber	Flow to Pump Chamber (L/day)
Summer Staff Res.	66	bed	Table 8.2.1.3.A(2)(a)(i)	153.77	10149		PC2	31369
Mature Staff Residence	10	bed	Table 8.2.1.3.A(2)(a)(i)	153.77	1538			
CAMPER RESIDENCE #6	32	bed	Table 8.2.1.3.A(2)(a)(i)	153.77	4921			
CAMPER RESIDENCE #7	32	bed	Table 8.2.1.3.A(2)(a)(i)	153.77	4921			
CAMPER RESIDENCE #8	32	bed	Table 8.2.1.3.A(2)(a)(i)	153.77	4921			
CAMPER RESIDENCE #9	32	bed	Table 8.2.1.3.A(2)(a)(i)	153.77	4921			
HOSPITAL	8	staff bed	Table 8.2.1.3.A(2)(a)(i)	153.77	1230		PC3	36350
	0	Exam rooms	NA	0	0	Included in Residential		
	5	Patent Beds	NA	0	0	Included in Residential		
CAMPER RESIDENCE #3	32	bed	Table 8.2.1.3.A(2)(a)(i)	153.77	4921		PC4	31322
CAMPER RESIDENCE #4	32	bed	Table 8.2.1.3.A(2)(a)(i)	153.77	4921			
CAMPER RESIDENCE #5	32	bed	Table 8.2.1.3.A(2)(a)(i)	153.77	4921			
LODGE	1080	Meal	Table 8.2.1.3.B.(11)(i)	12	12960	360 seats serving 3 meals per day per seat		
Pool Building	75	Person	Table 8.2.1.3.B.(23)	40	3000			
Drama Building	75	Person	Table 8.2.1.3.B.(2)(a)	8	600			
CAMPER RESIDENCE #1	32	bed	Table 8.2.1.3.A(2)(a)(i)	153.77	4921		Gravity	NA
CAMPER RESIDENCE #2	32	bed	Table 8.2.1.3.A(2)(a)(i)	153.77	4921			
INDOOR ACTIVITY	200	Person	Table 8.2.1.3.B.(2)(a)	8	1600			
DIRECTOR'S CABIN	2	bedrooms	Table 8.2.1.3.A(2)(4)(b)	NA	1100		PC5	1100
Equestrian Stables	30	Person	Table 8.2.1.3.B.(2)(a)	8	240		PC6	6837
Greenhouse	75	Person	Table 8.2.1.3.B.(2)(a)	8	600			
FLEX	39	bed	Table 8.2.1.3.A(2)(a)(i)	153.77	5997			

Total 83300 L/day

Total number of beds 411

Flow from Residental Units @ 200L/day 82200 L/day

Flow from Residental Units @ 200L/day + Directors Cabin 83300 L/day

Note residential flow reduced to 153.77L/day for residential building without kitchens to account for duplication of flows at restaurant, pool and assembly areas

Note: Laundry included in other flows

sand	stone	
10413	1666	Required
10902	1696	Provided

Pump Sizing Table

Wastewater type	from	to	Pipe Length (m)	Pump Elevation (m)	Receiver Elevation (m)	elevation head (m)	friction head (m)	MAX HEAD (m)	MAXIMUM COMBINED HEAD (m)	pump required	Flow (L/s)	Forcemain Diameter (mm)
Sewage	PC1	MH1	193	74.90	77.55	2.65	8.93	11.58	11.58	LIBERTY LEH100 Series	3	50
Sewage	PC2	PC3	270	75.78	80.80	5.02	12.49	17.51	17.51	LIBERTY LEH200 Series	3	50
Sewage	PC3	MH8	270	79.60	80.55	0.95	12.49	13.44	13.44	LIBERTY LEH100 Series	3	50
Sewage	PC4	PC7	95	78.31	80.70	2.39	4.39	6.78	6.78	LIBERTY LE100 Series	3	50
Sewage	PC5	PC3	29	79.77	80.80	1.03	5.10	6.13	6.13	LIBERTY LE50 Series	3	38
Sewage	PC6	MH8	227	74.11	80.55	6.44	10.50	16.94	16.94	LIBERTY LEH200 Series	3	50
Sewage	PC7	MH7	108	79.50	81.54	2.04	5.00	7.04	7.04	LIBERTY LE100 Series	3	50

Pump assumed to be 1.2 m below pump chamber inlet

Groundwork Engineering Limited

Sanitary Sewer Calculation Sheet

DRAINAGE AREA DESCRIPTION							SANITARY FLOWS								PIPE DATA									
	MANHOLE			INCREMENTAL AREA			Σ	Σ	q	Peak Factor M	Peak Flow	Σ	Infiltration	Q	SIZE	SLOPE	DR	AREA (m^2)	WETTED PERIMETER	HYDRAULIC RADIUS	CAPACITY	Q/Qfull	VELOCITY	LENGTH	FALL
LOCATION	FROM	TO	Catchment	Floor Area	Area (ha)	Population	Population	P(1000)	(L/day)		(L/s)	AREA (ha)	(L/s)	(L/s)	(mm)	(%)					(L/s)		(m/s)	(m)	(m)
Staff Residences	MH1	PC2	PC2			-	-	-	11687	4.000	0.54	0.00	0.00	0.54	100	1.00	0.04	0.0079	0.3142	0.0250	5.17	0.10	0.66	54	0.540
Campers 8 and 9	MH3	MH2	PC2			-	-	-	9842	4.000	0.46	0.00	0.00	0.46	100	2.00	0.04	0.0079	0.3142	0.0250	7.31	0.06	0.93	54	1.080
Campers 6, 7, 8, and 9	MH2	PC2	PC2			-	-	-	19684	4.000	0.91	0.00	0.00	0.91	100	2.00	0.05	0.0079	0.3142	0.0250	7.31	0.12	0.93	67	1.340
Lodge	Lodge	PC4	PC4			-	-	-	12960	4.000	0.60	0.00	0.00	0.60	100	1.00	0.04	0.0079	0.3142	0.0250	5.17	0.12	0.66	54	0.540
Campers 1 and 2	MH5	MH4	PC4			-	-	-	9842	4.000	0.46	0.00	0.00	0.46	100	1.00	0.04	0.0079	0.3142	0.0250	5.17	0.09	0.66	53	0.530
Campers 1, 2, and 3, Drama, Pool	MH4	PC4	PC4			-	-	-	18363	4.000	0.85	0.00	0.00	0.85	100	1.00	0.05	0.0079	0.3142	0.0250	5.17	0.16	0.66	80	0.800
Flex	Flex	MH6	PC6			-	-	-	5997	4.000	0.28	0.00	0.00	0.28	100	3.00	0.03	0.0079	0.3142	0.0250	8.95	0.03	1.14	22	0.660
Flex	MH6	PC6	PC6			-	-	-	5997	4.000	0.28	0.00	0.00	0.28	100	2.40	0.03	0.0079	0.3142	0.0250	8.00	0.03	1.02	66	1.584
PC7	MH7	MH8	WWTS			-	-	-	42764	4.000	1.98	0.00	0.00	1.98	150	2.20	0.06	0.0177	0.4712	0.0375	22.59	0.09	1.28	53	1.166
All Buildings	MH8	WWTS	WWTS			-	-	-	83300	4.000	3.86	0.00	0.00	3.86	150	3.00	0.07	0.0177	0.4712	0.0375	26.38	0.15	1.49	14	0.420
					-																				

DESIGN PARAMETER

Mannings n = 0.0130
Average Daily Flow (q)= As per Part 8 OBC
Infiltration Rate (I) = 1.8 L/day/m of puplic sewer*

***Infiltration rate based on the Stevens-Schutzbach Method**

Designed By: Lucas McCallum

Checked By: Martin Burger

Dwg. Reference: C-101

PROJECT: **565 Wesley Acres Road**

LOCATION: **565 Wesley Acres Road, Bloomfield, ON**

Project Number: GW-23003-16

Date: July 23, 2026

565 Wesley Acres Road - PC1 Daily Breakdown

GROUNDWORK ENGINEERING LIMITED

Pump Chamber (1,200 L) - Daily

Peak Daily Flow = 2,000 L			Pump Chamber Vol. (L)	
Hour of Day	**Hourly Flow (L)**	**Vol. out to Treatment Unit (L)**	**At Start of Hr**	**At End of Hr**
6:00 AM	233	10800	0	0
7:00 AM	233	7920	0	0
8:00 AM	233	7920	0	0
9:00 AM	0	7920	0	0
10:00 AM	0	7920	0	0
11:00 AM	167	7920	0	0
12:00 AM	167	7920	0	0
1:00 PM	167	7920	0	0
2:00 PM		7920	0	0
3:00 PM		7920	0	0
4:00 PM		7920	0	0
5:00 PM	267	7920	0	0
6:00 PM	267	7920	0	0
7:00 PM	267	7920	0	0
8:00 PM		7920	0	0
9:00 PM		7920	0	0
10:00 PM		7920	0	0
11:00 PM		7920	0	0
12:00 AM		7920	0	0
1:00 AM		7920	0	0
2:00 AM		7920	0	0
3:00 AM		7920	0	0
4:00 AM		7920	0	0
5:00 AM		7920	0	0
Balancing Capacity	**Daily Design Flow = 2,000 L**			

Daily Flow	2000	L
Pump Chamber Volume	1200	L
Pipe Length	193	m
Pipe Diameter	0.05	m
Pipe volume	379	L
Max Combined Volume	646	
FOS	85.85%	

565 Wesley Acres Road - PC2 Daily Breakdown

GROUNDWORK ENGINEERING LIMITED

Pump Chamber (7,200 L) - Daily

Peak Daily Flow = 31,369 L			**Pump Chamber Vol. (L)**	
Hour of Day	**Hourly Flow (L)**	**Vol. out to Treatment Unit (L)**	**At Start of Hr**	**At End of Hr**
6:00 AM	3660	10800	0	0
7:00 AM	3660	10800	0	0
8:00 AM	3660	10800	0	0
9:00 AM	0	10800	0	0
10:00 AM	0	10800	0	0
11:00 AM	2614	10800	0	0
12:00 AM	2614	10800	0	0
1:00 PM	2614	10800	0	0
2:00 PM		10800	0	0
3:00 PM		10800	0	0
4:00 PM		10800	0	0
5:00 PM	4183	10800	0	0
6:00 PM	4183	10800	0	0
7:00 PM	4183	10800	0	0
8:00 PM		10800	0	0
9:00 PM		10800	0	0
10:00 PM		10800	0	0
11:00 PM		10800	0	0
12:00 AM		10800	0	0
1:00 AM		10800	0	0
2:00 AM		10800	0	0
3:00 AM		10800	0	0
4:00 AM		10800	0	0
5:00 AM		10800	0	0
Balancing Capacity	**Daily Design Flow = 31,369 L**			

Daily Flow	31369	L
Pump Chamber Volume	7200	L
Pipe Length	270	m
Pipe Diameter	0.05	m
Pipe volume	531	L
Max Combined Volume	4714	
FOS	52.75%	

565 Wesley Acres Road - PC3 Daily Breakdown

GROUNDWORK ENGINEERING LIMITED

Pump Chamber (8,000 L) - Daily

Peak Daily Flow = 36,350 L			Pump Chamber Vol. (L)	
Hour of Day	**Hourly Flow (L)**	**Vol. out to Treatment Unit (L)**	**At Start of Hr**	**At End of Hr**
6:00 AM	4241	4241	0	0
7:00 AM	4241	4241	0	0
8:00 AM	4241	4241	0	0
9:00 AM	0	0	0	0
10:00 AM	0	0	0	0
11:00 AM	3029	3029	0	0
12:00 AM	3029	3029	0	0
1:00 PM	3029	3029	0	0
2:00 PM	0	0	0	0
3:00 PM	0	0	0	0
4:00 PM	0	0	0	0
5:00 PM	4847	4847	0	0
6:00 PM	4847	4847	0	0
7:00 PM	4847	4847	0	0
8:00 PM	0	0	0	0
9:00 PM	0	0	0	0
10:00 PM	0	0	0	0
11:00 PM	0	0	0	0
12:00 AM	0	0	0	0
1:00 AM	0	0	0	0
2:00 AM	0	0	0	0
3:00 AM	0	0	0	0
4:00 AM	0	0	0	0
5:00 AM	0	0	0	0
Balancing Capacity	**Daily Design Flow = 36,350 L**			

Daily Flow	36350	L
Pump Chamber Volume	8000	L
Pipe Length	270	m
Pipe Diameter	0.05	m
Pipe volume	531	L
Max Combined Volume	5378	
FOS	48.76%	

565 Wesley Acres Road - PC4 Daily Breakdown

GROUNDWORK ENGINEERING LIMITED

Pump Chamber (7,200 L) - Daily

Peak Daily Flow = 31,322 L			Pump Chamber Vol. (L)	
Hour of Day	**Hourly Flow (L)**	**Vol. out to Treatment Unit (L)**	**At Start of Hr**	**At End of Hr**
6:00 AM	3654	10800	0	0
7:00 AM	3654	10800	0	0
8:00 AM	3654	10800	0	0
9:00 AM	0	10800	0	0
10:00 AM	0	10800	0	0
11:00 AM	2610	10800	0	0
12:00 AM	2610	10800	0	0
1:00 PM	2610	10800	0	0
2:00 PM		10800	0	0
3:00 PM		10800	0	0
4:00 PM		10800	0	0
5:00 PM	4176	10800	0	0
6:00 PM	4176	10800	0	0
7:00 PM	4176	10800	0	0
8:00 PM		10800	0	0
9:00 PM		10800	0	0
10:00 PM		10800	0	0
11:00 PM		10800	0	0
12:00 AM		10800	0	0
1:00 AM		10800	0	0
2:00 AM		10800	0	0
3:00 AM		10800	0	0
4:00 AM		10800	0	0
5:00 AM		10800	0	0
Balancing Capacity	**Daily Design Flow = 31,322 L**			

Daily Flow	31322	L
Pump Chamber Volume	7200	L
Pipe Length	116	m
Pipe Diameter	0.05	m
Pipe volume	228	L
Max Combined Volume	4404	
FOS	63.48%	

565 Wesley Acres Road - PC5 Daily Breakdown

GROUNDWORK ENGINEERING LIMITED

Pump Chamber (450 L) - Daily

Peak Daily Flow = 1,100 L			Pump Chamber Vol. (L)	
Hour of Day	**Hourly Flow (L)**	**Vol. out to Treatment Unit (L)**	**At Start of Hr**	**At End of Hr**
6:00 AM	128	128	0	0
7:00 AM	128	128	0	0
8:00 AM	128	128	0	0
9:00 AM	0	0	0	0
10:00 AM	0	0	0	0
11:00 AM	92	92	0	0
12:00 AM	92	92	0	0
1:00 PM	92	92	0	0
2:00 PM	0	0	0	0
3:00 PM	0	0	0	0
4:00 PM	0	0	0	0
5:00 PM	147	147	0	0
6:00 PM	147	147	0	0
7:00 PM	147	147	0	0
8:00 PM	0	0	0	0
9:00 PM	0	0	0	0
10:00 PM	0	0	0	0
11:00 PM	0	0	0	0
12:00 AM	0	0	0	0
1:00 AM	0	0	0	0
2:00 AM	0	0	0	0
3:00 AM	0	0	0	0
4:00 AM	0	0	0	0
5:00 AM	0	0	0	0
Balancing Capacity	**Daily Design Flow = 1,100 L**			

Daily Flow	1100	L
Pump Chamber Volume	450	L
Pipe Length	29	m
Pipe Diameter	0.05	m
Pipe volume	57	L
Max Combined Volume	204	
FOS	120.95%	

565 Wesley Acres Road - PC6 Daily Breakdown

GROUNDWORK ENGINEERING LIMITED

Pump Chamber (2,900 L) - Daily

Peak Daily Flow = 6,837 L			Pump Chamber Vol. (L)	
Hour of Day	**Hourly Flow (L)**	**Vol. out to Treatment Unit (L)**	**At Start of Hr**	**At End of Hr**
6:00 AM	700	10800	0	0
7:00 AM	700	10800	0	0
8:00 AM	770	10800	0	0
9:00 AM	70	10800	0	0
10:00 AM	70	10800	0	0
11:00 AM	570	10800	0	0
12:00 AM	570	10800	0	0
1:00 PM	570	10800	0	0
2:00 PM	70	10800	0	0
3:00 PM	70	10800	0	0
4:00 PM	70	10800	0	0
5:00 PM	870	10800	0	0
6:00 PM	870	10800	0	0
7:00 PM	870	10800	0	0
8:00 PM	70	10800	0	0
9:00 PM	0	10800	0	0
10:00 PM	0	10800	0	0
11:00 PM	0	10800	0	0
12:00 AM	0	10800	0	0
1:00 AM	0	10800	0	0
2:00 AM	0	10800	0	0
3:00 AM	0	10800	0	0
4:00 AM	0	10800	0	0
5:00 AM	0	10800	0	0
Balancing Capacity	**Daily Design Flow = 6,837 L**			

Daily Flow	6837	L
Pump Chamber Volume	2900	L
Pipe Length	227	m
Pipe Diameter	0.05	m
Pipe volume	446	L
Max Combined Volume	1316	
FOS	120.43%	

565 Wesley Acres Road - PC7 Daily Breakdown

GROUNDWORK ENGINEERING LIMITED

Pump Chamber (6,000 L) - Daily

Peak Daily Flow = 32,922 L			**Pump Chamber Vol. (L)**	
Hour of Day	**Hourly Flow (L)**	**Vol. out to Treatment Unit (L)**	**At Start of Hr**	**At End of Hr**
6:00 AM	2586	2586	0	0
7:00 AM	2586	2586	0	0
8:00 AM	3020	3020	0	0
9:00 AM	1297	1297	0	0
10:00 AM	1297	1297	0	0
11:00 AM	2528	2528	0	0
12:00 AM	2528	2528	0	0
1:00 PM	2528	2528	0	0
2:00 PM	1297	1297	0	0
3:00 PM	433	433	0	0
4:00 PM	1297	1297	0	0
5:00 PM	3266	3266	0	0
6:00 PM	3266	3266	0	0
7:00 PM	3266	3266	0	0
8:00 PM	1297	1297	0	0
9:00 PM	0	0	0	0
10:00 PM	0	0	0	0
11:00 PM	0	0	0	0
12:00 AM	0	0	0	0
1:00 AM	0	0	0	0
2:00 AM	0	0	0	0
3:00 AM	0	0	0	0
4:00 AM	0	0	0	0
5:00 AM	864	864	0	0
Balancing Capacity	**Daily Design Flow = 32,922L**			

Daily Flow	32922	L
Pump Chamber Volume	6000	L
Pipe Length	108	m
Pipe Diameter	0.05	m
Pipe volume	213	L
Max Combined Volume	3479	
FOS	72.48%	

GROUNDWORK ENGINEERING LIMITED

Appendix C

Wastewater Treatment Plant Design and Specifications

September 25, 2025

Bergmann North America Inc.
7-20 Steckle Place
Kitchener, ON N2E 2C3
Phone: (519) 220-0698
Fax: (226) 887-0130
info@bna-inc.ca
www.bna-inc.ca

All Bidders
Groundwork Engineering Limited
Unit 640, 654 Norris Court
Kingston, ON K7P 2R9

Contact : **Lucas McCallum**
Phone : (613) 634-1789
Email : lmccallum@groundengineer.ca

Proposal No
0306

RE: Children's Camp WWTS

We are pleased to present the following proposal for the referenced wastewater treatment system, located at **565 Wesley Acres Rd, Bloomfield, ON K0K 1G0**. Our proposal includes a general process description and scope of supply. The standard terms and conditions, calculation summary, and proposed layout drawing are appended. Detailed construction drawings will be provided on placement of order.

Thank you for the opportunity to provide a proposal for this project; we look forward to working with you. Should you have any questions or concerns please call me at your convenience.

Sincerely,
Bergmann North America Inc.

Miles MacCormack, P.Eng. | President
miles@bna-inc.ca

Please sign and return a copy of this cover letter as your acceptance and approval of this proposal. The specified deposit is required to begin ordering and production.	
Authorization Signature:	
Provisional Items Included (#):	
Requested Delivery Date:	

Table of Contents

Appendices:

1. Project Understanding and Design Criteria

The design parameters for this facility as requested by **Groundwork Engineering Limited** **(the Engineer)** are summarized in Table 1 below:

Table 1. – Process Design Parameters

Flowrate				Influent (mg/L)			Effluent Objectives *			
Average	≤	57.3	m^3/d	BOD_5	≤	350	**$CBOD_5$**	≤	10	mg/L
Design	≤	81.85	m^3/d	TSS	≤	300	**TSS**	≤	10	mg/L
Equalized	≤	3.41	m^3/hr	TKN	≤	100	****TIN**	≤	3.9	mg/L as N
				TP	≤	15	**TP**	≤	0.15	mg/L

* Effluent objectives are based on monthly average basis.
**Total Inorganic Nitrogen.

The wastewater treatment system is installed in sub-grade precast-concrete tanks consisting of the following unit processes (in order of process flow) as per Table 2 below:

Table 2. – Unit Processes and Tank Volumes

Unit Process		# of Tanks	Tank ID #	Nominal Volume	~ Working Volume *
				IG	m^3
Influent Equalization Tanks		2	1,2	10,000	78.3
Secondary (offline) Sludge Storage		1	3	5,000	23.3
Primary Treatment	Sludge Storage	2	4,5	10,000	76.9
	Primary Clarifier	1	6	10,000	36.3
Secondary Treatment	Bioreactor 1	1	7	6,600	30.2
	Bioreactor 2	1	8	6,600	29.4
	Secondary Clarifier	1	9	5,000	14.1
Tertiary Treatment	Anoxic Bioreactor	1	10	4,000	17.1
	Bioreactor 3	1	11	6,600	9.8
	Tertiary Clarifier				12.6
	Floc Reactor	1	12	600	1.8
Intermediate Pump Tank		1	13	5,000	23.3
Effluent Pump Tank		1	14	5,000	23.3

* Approximate working volumes take invert levels into account; therefore, may be slightly different than rated (nominal) tank sizes. For the sedimentation tanks complete with hoppers and sloped side walls, working tank volumes would be significantly less than nominal tank sizes. Equivalent volume tanks may be considered pending cost review and proposal revision.

2. Process Description

The following summarizes unit processes and associated tanks as specified in Table 2.

Flow Balancing

Balancing of maximum daily inflow as per Table 1 is provided using (2) Equalization Tanks (hydraulically connected at bottoms) equipped with duplex equalization pumps. Wastewater is pumped from the Equalization Tanks at a time dose rate as noted in Table 1 into the primary treatment stage.

Primary Treatment

Dosed wastewater from the Equalization Tanks undergoes primary treatment using (2) Primary Sludge Storage tanks followed by (1) Primary Clarifier tank. The Primary Sludge Storage tanks provide settling and storage of primary solids. The Primary Clarifier tank provides additional settling and conditioning of the wastewater including pre-anoxic denitrification with carbon supplementation.

Secondary Treatment

Secondary treatment is accomplished through the iQ.MBBR™ system which utilizes a moving bed biofilm reactor (MBBR) process. The biological stage consists of (2) aerobic bioreactors in series containing specially designed plastic carrier media having a specific surface area of 500 m^2/m^3. Microorganisms attach to the carrier media and consume the organic material in the wastewater. Oxygen needed for the aerobic treatment process is supplied by (2) regenerative air blowers and distributed in the biological reactors stage by fine bubble diffusers. The blowers are controlled using dissolved oxygen (DO) sensors to run only when required. Media retaining screens are installed in each bioreactor to keep the carrier media in place while allowing the process wastewater and excess biosolids (sludge) to pass through.

In Bioreactor 2, (1) recirculation pump returns part of the process mixed liquor at up to **3 x design flow** to the Primary Sludge Storage tank to achieve a minimum level of 75% total nitrogen reduction. Supplemental carbon (primary) is dosed into the recirculation line to ensure mixing in the primary treatment tanks; dosing is flow paced based on the influent Equalization Pump operation.

Tertiary Denitrification

Tertiary denitrification is provided using (1) Anoxic Bioreactor to remove any residual nitrate nitrogen to the objective indicated in Table 1. The Anoxic Bioreactor is an MBBR containing specially designed plastic carrier media having a specific surface area of 500 m^2/m^3. Denitrifying bacteria attach to the carrier media and consume the nitrate and nitrite in the secondary effluent using supplemental carbon as an energy source under low oxygen conditions. The Anoxic Bioreactor sized to remove up to **20.1 mg/L** of residual nitrate at design flow (**1.65 kgNO_3/d**) based on a recommended loading rate of 0.5 gNO_3/m^2-d. Supplemental carbon (tertiary) dosing is flow paced based on the influent Equalization Pump operation and proportioned to limit residual nitrate. The carbon supplement is intermittently mixed in the reactor via (3) mixing pumps. The Anoxic

Bioreactor is fully mixed periodically using coarse bubble diffusers and (1) dedicated regenerative air blower to remove any excess biomass while limiting the oxygen added.

Effluent from the Anoxic Bioreactor may contain residual $CBOD_5$ and TSS. To ensure the effluent meets the required criteria, further aerobic treatment and clarification is provided.

Tertiary Effluent Polishing and Phosphorus Reduction

Tertiary effluent polishing is provided using (1) Bioreactor 3 followed by (1) Floc Reactor and (1) Tertiary Clarifier. Bioreactor 3 acts as an aerobic MBBR polisher to consume any excess carbon from the tertiary process, working on the same treatment principles as the two main bioreactors, and includes (1) regenerative air blower to supply air to the process.

The phosphorus reduction system eliminates phosphorus by chemical precipitation. The system doses coagulant (Clariphos or approved equivalent) into the Floc Reactor tank for initial mixing of the chemical. Once the coagulant is added into the system, secondary sludge settles out in the Tertiary Clarifier. The coagulant is stored in a chemical tank equipped with a low-level alarm switch. The coagulant dosing pump doses the calculated amount on a flow proportional basis and (1) mixing pump and eductor assembly, and (1) linear blower and coarse bubble diffuser assemble are used to provide mixing during chemical dosing.

From the Floc Reactor, wastewater flows by gravity into the Tertiary Clarifier equipped with (2) sloped wall hoppers, (1) floating sludge (skimmer) pump and (2) sludge return pumps. Sludge settles to the bottom of the hoppers and is returned to the Sludge Storage tank along with any floating sludge removed by the skimmer pump.

Intermediate Pump Tank

From the Secondary Clarifier, the wastewater is discharged to (1) Intermediate Pump Tank complete with duplex (2) intermediate (effluent) pumps directed to the tertiary filtration system.

Tertiary Filtration

From the Intermediate Pump Tank, the wastewater is discharged to the Tertiary Filtration system. Enhanced (tertiary) phosphorus reduction and filtration is achieved using a pressurized filter system having a nominal 5 µm filtration efficiency to reduce total suspended solids and total phosphorus to the required effluent criteria. A chemical dosing pump doses the calculated amount of coagulant on a flow-proportional basis into a static mixer prior to filtration. This trim dosing of coagulant mineralizes remaining dissolved phosphorus and creates filtrable floc particles which are removed by the filter media and backwashed out to the Secondary Sludge Storage tank. The tertiary filter system consists of (3) filter modules arranged in parallel, each unit rated at 41.7 L/min, (1) static mixer, (1) chemical dosing pump, (1) air compressor unit, (2) backwash pumps located in the Effluent Pump Tank, and (1) controller to automatically initiate backwash based on maximum elapsed time and/or totalized flow. The Backwash Tank is sized to provide sufficient additional storage volume to backwash all filters in parallel using filtered effluent.

Effluent Pump Tank

From the tertiary treatment system, the wastewater is discharged to (1) Effluent Pump Tank complete with duplex (2) filter backwash pumps and duplex (2) effluent pumps (to be confirmed by Engineer) discharging to the subsurface (area bed) infiltration system. The Effluent Pump Tank is sized to provide sufficient fixed storage volume for a full filter backwash cycle.

Secondary Sludge Storage

All biological sludge from the Secondary and Tertiary Clarifiers, and tertiary sludge from the Tertiary Filter is stored in (1) offline Secondary Sludge Storage tank. Supernatant from this tank flows by gravity back to the start of the treatment system at the Primary Sludge Storage tank.

Controls and Infrastructure

Five (5) control panels will control the treatment plant, Equalization and Effluent Pump Tanks, and include GPRS remote monitoring with current sensing on each output. Flow data logging is available on the equalization and effluent pumps based on pump run time, and a flow meter is included for the effluent discharged via the Tertiary Filter system. A control building or mechanical room is required for this system to contain the blowers, chemical dosing system, filter system, and control panels (see Provisional Items below).

3. Scope of Work

Qty	Model	Description
Concrete Tanks, Precast (*may be substituted subject to availability and approval)		
1	Brooklin: BCP-36300L-H	Equalization Tank c/w (1) carbon vent lid and (2) 6" bottom openings for hydraulic interconnection
1	Brooklin: BCP-36300L-H	Equalization Tank c/w (1) 900mm SQ concrete riser & aluminum hatch assy., (1) carbon vent lid, and (2) 6" bottom openings for hydraulic interconnection
1	Brooklin: BCP-22750L-H	Secondary Sludge Storage tank
2	Brooklin: BCP-36300L-H	Primary Sludge Storage tanks
1	Brooklin: BCP-36300L-H	Primary Clarifier
1	Brooklin: BCP-30000L-H	Bioreactor 1
1	Brooklin: BCP-30000L-H	Bioreactor 2
1	Brooklin: BCP-22750L-C	Secondary Clarifier w/ (2) custom half-partition walls
1	Brooklin: BCP-18000L-H	Anoxic Bioreactor
1	Brooklin: BCP-30000L-C	Bioreactor 3 / Tertiary Clarifier w/ (1) full partition and (1) custom half-partition wall
1	Brooklin: BCP-2700L-H	Floc Reactor
1	Brooklin: BCP-22750L-H	Intermediate Pump Tank c/w (1) 900mm SQ concrete riser & aluminum hatch assy.
1	Brooklin: BCP-22750L-H	Effluent Pump Tank c/w (2) 900mm SQ concrete riser & aluminum hatch assys.

iQ.MBBR™ System Equipment Package

lot	20.4 m^3 of carrier media (500 m^2/m^3), (40) MRB20-Sil fine bubble diffusers, (4) 4-port and (6) 3-port aeration manifolds, aeration piping, (3) 6" media retention screens, (1) 6" flap-check valve, and (2) 6" carbon vent filters for Bioreactors 1 & 2
2	Regenerative air blowers (FPZ model SCL R40-MD-4-3, 4 HP, 240 VAC/3-phase) each c/w VFD (Yaskawa model GA50UB018ABA, or eq.), air filter, discharge pressure relief valve, check valve, pressure gauge, piping assembly
2	Dissolved oxygen sensor (optical, 4-20 mA, In-Situ mode RDOX or eq.)
11	Submersible sump pumps (Goulds model LSP0311F, 120 VAC) [sludge return, surface skimmer, recirculation, mixing]
1	Submersible sump pump (Grundfos model KP350, 120 VAC) [recirculation]
5	PE hopper assemblies for Secondary and Tertiary Clarifier
lot	Carbon dosing system, including (2) chemical dosing pumps (Stenner model E10-LHH), (2) chemical flow meters (Keyence model FD-XS8), tubing, 1,000 L storage tote, 920 L of carbon (Micro-C 2000 or equivalent), and low-level float switch
lot	Coagulant dosing system, including (2) chemical dosing pumps (ProMinent model CNPb-0704 and Stenner model E10-LHH), (1) back-pressure valve, (2) chemical flow meters (Keyence model FD-XS8), tubing, (1) 2" static mixer, 1,000 L storage tote, 920 L of coagulant (Clariphos or equivalent), and low-level float switch
2	Sewage pumps (**Liberty model LE52M-2, 0.5 HP, 208-240 VAC/1-ph, or eq.**), c/w c/w (2) guide rail and discharge base assy., (2) level floats, isolation & check valves, and discharge piping assemblies for Equalization Tanks
2	Intermediate (effluent) pumps (**Liberty model FL102M-2, 1 HP, 208-240 VAC/1-ph, or eq.**), c/w (2) guide rail and discharge base assy., (2) level floats, isolation & check valves, and discharge piping assemblies for Intermediate Pump Tank
lot	Tertiary filter system c/w (3) filter units (**Ropen model VPMF-MQ-TB3**, (1) set of automatic isolator valves for treated water backwash, (1) filter inlet/outlet pressure gauge assy., and misc. piping installed in Control Shed
2	Ultrasonic flow meters (Keyence model FDQ-50C, or eq.) for filter discharge and filter backwash
2	Backwash pumps (**Liberty model FL52M-2, 0.5 HP, 208-240 VAC/1-ph, or eq.**), c/w (2) guide rail and discharge base assy., (1) level float, isolation & check valves, and discharge piping assemblies for Effluent Pump Tank
2	Effluent pumps (**Liberty model FL52M-2, 0.5 HP, 208-240 VAC/1-ph, or eq.**), c/w (2) guide rail and discharge base assy., (2) level floats, isolation & check valves, and discharge piping assemblies for Effluent Pump Tank
5	Control panels [click + clean® model **CP8-B22-C13-IM-4G:32A(1), CP8-B22-C13-IM-4G:32A(1), CP8-D02-B22-C12-4G:32A(1), CP8-D02-C13-IM-4G:32A(1), and CP8-B24-C12-4G:32A(1)]** c/w 1-year Remote Monitoring (GPRS)

Additional Scope

Delivery and placement of tanks onsite including 20 h (2 days) crane rental (additional extra)
All access risers to grade (includes 24" of riser height)
Installation by our technicians of all pumps and process equipment within tanks, and internal and interconnecting piping and fittings within the treatment system envelope (excludes areas in Owner scope as shown in layout drawing)

	Operation & Maintenance Manual
	Installation assistance (4 trips, 9 days, 3 technicians)
	Startup and Training for Maintenance Staff (1 trips, 2 days, 2 technicians)
	(1) Year of Service (4 service visits, excluding sampling and additional chemical)

4. Price Breakdown

Item Description	[redacted]
Tanks & Equipment Package	
Installation / Startup Labour	
Transportation	
Service (see above scope)	
Total	

Availability: Estimated 12 – 16 weeks from deposit receipt.
Terms: 25% Deposit, 40% on delivery, 25% Net 30 from delivery, 10% Net 30 from commissioning, OAC subject to credit application. This price is valid for 60 days from the date of this proposal.

5. Exclusions to Scope of Work

- Any excavation or backfill (BNA is not responsible for any settling of tanks, pipes etc. due to improper backfill and compaction around tanks).
- Any grading to ensure surface water runoff around treatment plant area.
- Any insulation, anchoring, tank wrapping, or additional measures for high water table / flooding (BNA is not responsible for any issues caused by tank flotation).
- Any leakage or water-tightness testing of tanks or piping (tanks generally must be backfilled prior to any water filling/testing, consult BNA prior to filling).
- Any electrical works including power supply, electrical connections, wiring, or conduit (electrical scope may be quoted on request).
- Any inspections, permits, fees or locates.
- Any plumbing connections or piping outside of treatment system area.
- Control building (see Provisional Items below).
- Any additional tankage or equipment not included in this scope of work, i.e., leaching bed components, external pump stations (may be quoted on request), etc.

6. Provisional Items

Item	Item Description	Price
1	**Control Shed:** Supply and install (1) concrete control shed, Brooklin Concrete Products **Model 105** (13'6" x 8'4" x 7'10" [4102mm x 2540mm x 2387mm] ID, or equivalent), delivered and placed at site c/w exhaust fan and thermostat (electrical, insulation, heating & lighting are by others)	[redacted]

7. Construction Requirements

To complete the installation of our product, the Owner shall procure its own Contractor(s) to complete all excavation and electrical works. BNA will provide delivery of the tanks and equipment to the site, and our installation team will install the process equipment and provide assistance to the Contractor(s). All of the equipment and piping within the treatment system envelope will be provided and installed as part of our scope of work. Project schedule and tank delivery plan must be submitted a minimum of two (2) weeks in advance to ensure delivery timing.

The Contractor shall be required to sign a construction scope check list prior to delivery to indicate understanding and acceptance of scope.

8. Electrical Requirements

The required electrical power supply to the Blower Control Building is 120 – 240VAC/1-phase/60Hz with a connected/peak load of approximately 96.2/65.2 A at 240VAC/1-ph, and 67.8 A at 120VAC/1-ph (peak load of approximately 99.1 A at 240 VAC/1-ph, excludes utility loads); if electrical supply differs from this specification, Owner or Contractor must inform BNA with equipment order. The system as proposed is estimated to require the following power supply circuits (to be determined based on final pump and blower specification):

- **4 x 240 VAC/1-phase @ 30 A**
- **1 x 240 VAC/1-phase @ 20 A**
- **4 x 120 VAC/1-phase @ 20 A**
- **2 x 120 VAC/1-phase @ 15 A**

9. Service Requirements

The iQ.MBBR™ process is a cost effective and easy to operate system with relatively low maintenance requirements. In basic terms, the Owner of the system is responsible to have a service contract in place with a BNA authorized Service Provider, that the system is operated within the specified design parameters, that the system is functioning normally (i.e., no local alarms or visible problems), and that the accumulated sludge is pumped out by licensed sewage hauler as requested by the Service Provider. The Service Provider shall, using standard industry practice and based on recommended service frequency and/or remote monitoring, ensure that the system equipment is functioning properly, the system is meeting performance specifications, and if not, adjust the system operational parameters accordingly to mitigate performance requirements and/or provide additional services as required.

Basic routine maintenance on the system will take approximately 2 h onsite. BNA recommends for a large/complex commercial application that the system be serviced on at least a bi-monthly basis. One day of training along with one (1) year of service (6 service visits) is included in the purchase price of the system (excluding sampling and chemical beyond the included 6 months estimated supply). Should our services be retained after the included first year, our service fees for this treatment system will be billed at a current rate of **$850.00** for one service visit plus $145.00 per hour for any additional hours onsite. We can also provide training or field support if required for a local service provider. Phone support is included in the remote monitoring Package (see below).

10. GPRS Remote Monitoring

The click+clean® control panel comes standard with a GPRS module that allows the maintenance provider to remotely connect to the control panel via wireless connection. This also allows for the control panel to instantly send information to the maintenance provider in case of an alarm or problem should arise with the treatment plant (i.e., power outage, mechanical failure, etc.). Through GPRS and the operation of the treatment plant, the amount of scheduled maintenance visits can be reduced as well as provide assurance of 24/7 round the clock operation. The initial cost for the module is included in the purchase price of the panel and includes one year of data monitoring fee. A yearly service fee of **$960.00** plus taxes will be required to maintain this service for the (5) WWTS control panels. Ethernet options are also available on request.

11. Advantages of the iQ.MBBR™ Process

The iQ.MBBR™ process offers a custom designed solution which can be installed in a small footprint and offer low energy and operating costs. The process can also be retrofit in existing tanks or to upgrade existing systems. One of the unique benefits of the iQ.MBBR™ process is the ease of operating the system. The carrier media in the system is self-cleaning, does not clog and never has to be replaced. The process is designed for intermittent aeration allowing flexible operational settings with minimal energy consumption. Should influent strength or flow increase, the operator can simply increase aeration times in the bioreactors or add media. The operation cycle of the sludge return pump is designed so that the final clarifier is completely clean of secondary sludge. As a result of denitrification, the formation of floating sludge may occur in the final clarifier; this material is removed through a floating skimmer and returned to the sludge storage chamber. The two most common situations that cause failure in other wastewater process are overload and under-load conditions. Overloading occurs during concentrated periods of water usage in a short time while under-loading occurs during periods of inactiveness. These conditions in other biological processes cause the treatment performance to stop functioning. These problems are minimized in the iQ.MBBR™ process and unlike activated sludge processes, secondary sludge is not returned to the bioreactors in order to maintain the bacterial culture.

BNA has developed a unique control unit for the electrical supply and automatic control of the system. Each control panel comes standard with GPRS remote monitoring and data logging. This allows for instant notification of alarms and also allows the operator to change settings remotely. Each output also monitors current (amperage) instead of relying on floats or pressure sensors alone for mechanical failures. Current sensors can allow for issues to be detected before major problems occur. The control panel also has analog inputs for additional sensors should they be required on any project (i.e., turbidity, dissolved oxygen, etc.). A battery backup is provided for the panel to ensure that notifications are still sent during power outages.

In summary, the iQ.MBBR™ process is a robust cost-effective wastewater treatment process that takes up a small footprint while providing optimal performance. The system allows for significant operational flexibility and provides peace of mind in cases where influent strengths and flows may vary from anticipated design.

Appendix 1 – Standard Terms and Conditions

BERGMANN NORTH AMERICA INC.
GENERAL TERMS AND CONDITIONS OF SALE

The following terms and conditions of sale ("Terms") shall apply and incorporated by reference into all transactions between the parties to any sale of goods ("Products") and/or services ("Services") by Bergmann North America Inc. ("BNA") to the purchaser ("Purchaser"). By placing an order, Purchasers accept or shall be deemed to have full knowledge of the Terms herein and agree to BNA's Terms, including the Limited Warranty, which are subject to change from time to time without prior notice.

1) **GENERAL**: In the event of any conflict or inconsistency between these Terms and the terms and conditions contained in Purchaser's order or in any other form issued by Purchaser, whether or not any such form has been acknowledged or accepted by BNA, these Terms & Conditions of Sale shall prevail. No waiver, alteration or modification of these Terms shall be binding upon BNA unless made in writing and signed by a duly authorized representative of BNA.

2) **ORDER ACCEPTANCE & CONFIRMATION**: All orders are subject to acceptance by BNA; any errors and omissions are subject to correction. BNA reserves the right to modify unordered Products from time to time, including the right to discontinue the Products.

3) **QUOTATIONS & ESTIMATES**: Unless waived or otherwise stated, BNA quotations and/or estimates shall be null and void unless accepted by Purchaser within thirty (30) days from the date of quotation or estimate.

4) **TAXES**: All prices do not include sales taxes. Applicable Canadian Federal or Provincial taxes will be added and billed at the rate in effect at the time of shipment. Payment of taxes is the sole responsibility of Purchaser unless Purchaser provides BNA with a valid exemption certificate acceptable to the applicable taxing authority.

5) **PRICES | COST OF TRANSPORTATION**: BNA's prevailing prices for Products and Services at the time of shipment will apply, except as otherwise provided in a written quotation or contract. BNA may, in its sole discretion, require advance payment or a deposit for Products and Services. Unless otherwise stated, all prices are in Canadian Dollars F.O.B. shipping point.

6) **DELIVERY SCHEDULES**: BNA makes every effort to meet delivery schedules as requested. Delivery shall depend on the prompt receipt by BNA of the information required to meet production schedules. Delivery schedules (including time for shipment) are approximate and are based on conditions at the time of BNA's quotation or estimate and acceptance of Purchaser's order.

   (a) BNA cannot guarantee and Purchaser expressly releases BNA from any liability for any loss or damage resulting from a failure to deliver or delays in delivery caused by any conditions related to, or caused by, failure to process or inaccurate processing of time-sensitive information and/or mechanisms. BNA may extend delivery schedules or may, at its option, cancel Purchaser's order in full or in part without liability other than to return any deposit which is unearned by reason of the cancellation.

   (b) BNA reserves the right to make partial shipments and to submit invoices for partial shipments.

7) **SITE DELIVERIES – CONCRETE PRODUCTS**: BNA may sub-contract concrete product deliveries via 3rd party mobile crane truck within the rated load and crane reach capacity for the equipment. Product/s will be set in to prepared excavation at the prevailing prices at the time of shipment, subject to equipment availability.

   (a) Purchaser is responsible for providing an accessible, level, and stable surface sturdy enough to accommodate the vehicle and the span of the crane stabilizers/outriggers; BNA is not responsible for driveway or other surface damage due to machine/material delivery weight; Restoration of all affected existing surfaces by others.

   (b) CRANE TRUCK OPERATORS WILL NOT ATTEMPT ANY OPERATION THAT MAY INVOLVE ANY PERSONAL SAFETY HAZARD, CONTRAVENE APPLICABLE LEGISLATION, OR JEOPARDIZE EQUIPMENT.

   (c) Any additional 3rd-Party on site delivery requirements shall be observed.

   (d) BNA does not assume any liability for delay or non-delivery caused by failure of transportation facilities, accident, or any other unforeseen cause/s beyond our control.

   (e) If pre-arranged crane equipment is unable to safely offset at a site due to adverse soil conditions or any other site condition or conditions/s beyond our control, the driver will either unload on the ground or return to the supplier plant as instructed by the Purchaser and/or their agent and/or BNA. HIRING A LONGER REACHING CRANE, ADDITIONAL PERMITS, AND/OR RE-ORDERING THE DELIVERY IS THE RESPONSIBILITY OF THE PURCHASER, AND IS AT THE PURCHASER'S EXTRA COST.

   (f) Special methods of transportation will be used upon Purchaser's request and at Purchaser's own additional expense.

8) **INSTALLATION**: Unless otherwise expressly stipulated, the Products shall be installed by and at the risk and expense of Purchaser. If BNA is requested to supervise such installation, or parts thereof, BNA's responsibility shall be limited to exercising that degree of skill customary in the trade in supervising installations of a similar type. Purchaser shall remain responsible for all other aspects of the work including compliance with the local regulations. Responsibility for site safety and construction means and methods remain with Purchaser and/or its agents.

9) **WASTEWATER TREATMENT SYSTEMS**: Wastewater treatment systems must be installed, commissioned and serviced by certified contractors at recommended intervals. Owners of treatment systems are required to operate their system according to manufacturer's requirements and government regulations.

   (a) Manufacturers and service providers do not, and cannot control the effluent that enters the Owner's system; It is the responsibility of the Owner, as the Operator, to ensure their treatment system meets government standards for operation.

10) **CHANGES & CANCELLATION**: Orders accepted by BNA are not subject to changes or cancellation by Purchaser without prior written consent. In such cases where BNA authorizes changes or cancellation, BNA reserves the right to charge Purchaser reasonable costs based upon expenses already incurred and commitments made by BNA, including, without limitation, any

labour done, material(s) purchased, BNA's usual overhead and reasonable profit and cancellation charges from its' suppliers.

11) ACKNOWLEDGMENTS: Purchaser expressly acknowledges and agrees that Purchaser has accepted the product information and/or drawings, terms and conditions and the necessary installation requirements, suitability for use, and regulatory compliance. The purchaser shall rely entirely on its own inspection and knowledge of the goods being purchased, there being no representations, conditions, warranties or collateral contracts made by or on behalf of BNA other than as set out herein.

(a) Products will be quoted and shipped according to information and specifications provided by Purchaser. Purchaser is responsible to verify all specifications and quantities of Products prior to finalizing and submitting its order;

(b) Purchaser is solely responsible for the proper installation and/or intended use of the Products.

12) NO COPYING OR REVERSE ENGINEERING: No copyrights, patents, trademarks or any other intellectual property rights are assigned to Purchaser hereunder. Purchaser is expressly prohibited and shall not copy, analyze or create derivative works, decompile, or reverse engineer or cause a third party to copy, analyze or create derivative works, decompile or reverse engineer any confidential information, product designs, or other intellectual property for any purpose. Purchaser acknowledges that its failure to comply with the provisions of this section may cause irreparable harm to BNA which cannot be adequately compensated for in damages, and accordingly acknowledges that BNA will be entitled to claim, in addition to any other remedies available to it, interlocutory and permanent injunctive relief to restrain any anticipated, present or continuing breach of this Section.

13) FORCE MAJEURE: BNA will not be responsible for any failure or delay in its performance due to causes beyond its reasonable control, including, but not limited to, labor disputes, strikes, lockouts, shortages of or inability to obtain labor, energy, raw materials or supplies, war, terrorism, riot, natural disasters or governmental action. The acceptance of delivery of Products by Purchaser shall constitute a waiver of all claims for loss or damage due to any delay whatsoever.

14) EXPORT CONTROL LAWS: BNA will not be the exporter under any circumstances. . It is the sole responsibility of Purchaser at its own expense to satisfy all legal requirements for the export and use of the Products from Canada.

15) TITLE: Title and ownership of the products, goods or equipment shall remain with BNA and shall not pass to the Purchaser until all amounts owing by the Purchaser have been paid in full. Purchaser grants to BNA a security interest in such products, goods and equipment and in all other personal property owned by it.

16) TERMS OF PAYMENT: Unless otherwise stated in a quotation, invoices on approved credit accounts are due and payable within thirty (30) days of invoice date. Where credit is not established, payment is due at time of purchase through cash, cheque, Interac Debit, Visa or MasterCard, or other methods that may become available from time to time. All payments must be in Canadian dollars. Unless specifically provided in an invoice, no cash discount shall be available to Purchaser.

(a) PAYMENT IN FULL IS NOT SUBJECT TO HOLDBACKS EXCEPT BY WRITTEN AGREEMENT AT TIME OF ORDER, AND, IN NO CASE IS PAYMENT CONTINGENT ON THE PURCHASER RECEIVING PAYMENT FROM PURCHASER'S CUSTOMER.

(b) Should payment not be made to BNA when due, BNA reserves the right to suspend all future delivery or other performance with respect to Purchaser without liability or penalty; Purchaser agrees that BNA may retain all payments which have been made on account of the purchase price as liquidated damages,

17) CREDIT: Credit requests are subject to the completion and submission of the prevailing BNA Credit Application & Agreement by the Purchaser. Credit approval is at BNA's sole discretion. The applicable terms and conditions of the BNA Credit Agreement shall prevail at the sole discretion of BNA. Charging of interest shall not be construed as BNA granting any extension of time in the terms of payment.

18) NO SET-OFF: Purchaser may not set-off any amounts due to Purchaser against any amount due to BNA in connection with any transaction. Purchaser may not make any deduction from any payment due hereunder by reason of loss or damage to Products in transit.

19) WARRANTY: BNA sub-contracts concrete Products designed for use at maximum one (1) Meter burial depth in non-traffic areas unless otherwise stated. BNA concrete Products are covered by a twelve (12) month limited warranty (the "Limited Warranty") against defects in material and workmanship from the date of delivery to Purchaser unless otherwise stipulated in writing by BNA.

(a) BNA nor its' supplier will be responsible or liable under the Limited Warranty for (i) any defects attributed to normal wear and tear, or failure of any part or parts from external forces, including without limitation corrosive effluents, corrosive soils, vehicular or other impact, frost heave, vandalism, earthquake or other Force Majeure; (ii) Products not installed and/or maintained according to applicable laws, codes and BNA's instructions (iii) use of the Products with incompatible goods or unintended use; (iv) defects in any portion or part of the Products manufactured and/or installed by others.

(b) Purchaser shall give BNA an opportunity to investigate any alleged defects; BNA will make every good faith effort to repair, or at its sole option, replace at no charge any Products found to be defective during the Limited Warranty period.

(c) The Limited Warranty specifically excludes other on-site service time and materials.

(d) For components not supplied by BNA, the warranty is determined by the original equipment manufacturer and/or supplier. Any components found to be defective must be offered at, or shipped freight prepaid to the BNA facility for inspection and examination. BNA's obligation under the manufacturer or supplier warranty is limited to repair or replacement. Manufacturer's warranties specifically exclude other on-site service time & materials.

20) SERVICES: BNA may provide Services pursuant to the specifications, assumptions and such other information set out in a quotation or estimate. Unless otherwise set out in the applicable quotation or estimate, Purchaser will pay all labour time and materials, and usual and customary fees incurred by

BNA and its personnel during the performance of the Services. BNA may, in its sole discretion, subcontract or otherwise provide the Services (or parts thereof) through third parties. PURCHASER SHALL REMAIN RESPONSIBLE FOR ALL OTHER ASPECTS OF THE WORK INCLUDING COMPLIANCE WITH THE LOCAL

REGULATIONS. RESPONSIBILITY FOR SITE SAFETY AND CONSTRUCTION MEANS AND METHODS REMAIN WITH PURCHASER AND/OR ITS AGENTS.

(a) Services will be performed in a professional manner consistent with applicable industry standards. Except as otherwise provided in a quotation or contract, BNA will, within the period of one-hundred & twenty (120) days following the date of installation of Products, repair any defective workmanship in Services. THIS WARRANTY IS EXCLUSIVE. BNA EXPRESSLY DISCLAIMS, AND PURCHASER EXPRESSLY WAIVES, ALL OTHER WARRANTIES, REPRESENTATIONS AND GUARANTEES, WHETHER ORAL OR WRITTEN, IMPLIED OR STATUTORY IN RESPECT OF SERVICES OR ANY PORTION THEREOF, INCLUDING WITHOUT LIMITATION, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

21) **WARRANTY DISCLAIMER**: BNA makes every effort to accurately describe Product information and/or drawings and its Services. Such descriptions are for identification purposes only and do not express or imply a warranty or condition that the Products are appropriate for a particular purpose. No warranty or condition, express or implied, other than as set forth in the Limited Warranty above is made or authorized by BNA.

22) **LIMITATION OF LIABILITY AND TIME FOR CLAIMS**: Any liability for indirect, special, exemplary, punitive, consequential or incidental damages is expressly disclaimed by BNA. BNA's liability in all events for all damages, losses and causes of action (whether in contract, tort or otherwise) shall be limited in the aggregate to, and shall not exceed, the purchase price paid by the Purchaser for the Product in question. Any claims against BNA must be brought within one (1) year after the cause of action arises, notwithstanding any applicable statute of limitations.

23) **PRODUCT RETURNS**: Any cancellation or return must be approved by BNA (in its discretion), be accompanied by proof of purchase, and may be subject to restocking and other charges. In the event of approval of a return request, (a) all returns must be shipped freight prepaid at Purchaser's expense; and (b) only Products of current manufacture in salable for condition will be accepted for credit.

24) **INDEMNITY**: Purchaser hereby assumes and agrees to indemnify, defend, and hold harmless BNA, each of its affiliates and/or all of their respective agents, directors, officers, employees, subcontractors, suppliers and invitees from and against any and all sums, losses, damages, claims, costs, duties, suits, actions, causes of action, liabilities, demands and expenses (including legal fees and other legal expenses on a full indemnity basis) of whatsoever kind and nature arising out of (a) Purchaser's purchase, use, possession, ownership, operation, condition, resale, transfer, import, export, transportation, disposal, operation of the Product or otherwise relating to, connected with in any way, arising out of, or on account of Products, Services or these Terms; and/or (b) Purchaser's violation or alleged violation of any foreign, federal, provincial, county, municipal or local laws or regulation. This indemnity will survive termination of the Terms.

25) **CONFIDENTIALITY**: Except as required by law or with the express written consent of BNA, Purchaser agrees to receive and maintain all information received from BNA, including without limitation, pricing and specifications, in confidence, using the same degree of care which Purchaser employs with its own confidential information, provided this is no less than a reasonable standard of care, and Purchaser will not disclose to any person or entity or make public or authorize the disclosure of any such information and will not use such information for any purpose, except as expressly agreed to by BNA in writing or in another applicable agreement between BNA and Purchaser. Purchaser acknowledges that its failure to comply with the provisions of this section may cause irreparable harm to BNA which cannot be adequately compensated for in damages, and accordingly acknowledges that BNA will be entitled to claim, in addition to any other remedies available to it, interlocutory and permanent injunctive relief to restrain any anticipated, present or continuing breach of this Section.

26) **WAIVER**: BNA's failure to insist on strict performance of these Terms or to enforce a default upon the occurrence of any single, repeated, or continuing violation of any particular term or condition hereof, shall not be considered a waiver of BNA's right to insist on strict performance of these Terms or to enforce a default with respect to the violation of any other term or condition or, at any later time or upon any subsequent occurrence, with respect to that particular term or condition.

27) **SEVERABILITY**: If any provision of the Terms and Conditions is held to be void, null, unlawful or otherwise unenforceable, that provision shall be treated as a separate and independent clause. The remainder of the Terms and Conditions will continue to be in full force and effect.

28) **GOVERNING LAW**: These terms and conditions will be governed by, and interpreted and enforced in accordance with, the laws in force in the Province of Ontario and shall be treated in all respects as an Ontario Contract.

29) **ENTIRE AGREEMENT**: These Terms, and any quotation or estimate that incorporates these Terms by reference, are the complete and exclusive agreement between the parties and supersedes all provisions and concurrent agreements, understanding, negotiations and discussions, whether oral or written of the parties and there are no warranties, representations or other agreements between the parties in connection with its subject matter except as specifically set forth in these Terms.

30) **MISCELLANEOUS**: These Terms are binding upon and inure to the benefit of the parties hereto and their respective successors, permitted assigns and transferees. Each Party's obligations which by their nature are intended to survive beyond the termination, cancellation or expiration of these Terms, shall survive including without limitation, Purchaser's payment obligations, confidentiality obligations, indemnifications, any disclaimer of warranties, limitations of liability and time for claims, severability, governing law, dispute resolution, entire agreement and this Section 30). Purchaser may not assign these Terms or any rights or obligations hereunder without BNA's prior written consent.

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Appendix 2 – Calculation Summary

Wastewater Treatment System Calculation Summary

Project: 0306

Children's Campground - WWTS

Design Parameters:

Influent BOD_5 =	350	mg/L		Effluent BOD_5 =		mg/L	
Influent TSS =	300	mg/L		Effluent $CBOD_5$ =	10	mg/L	
Influent TKN =	100	mg/L		Effluent TSS =	10	mg/L	
Influent TP =	15	mg/L		Effluent TAN =		mg/L	
				Effluent TIN =	3.90	mg/L	(Nitrate)
Average Flow, Q_A =	57.3	m^3/d		Effluent TN =		mg/L	
Design Flow, Q_D =	**81.85**	m^3/d		Effluent TP =	0.150	mg/L	
Peak Flow, Q_P =	8.19	m^3/h	10 h	Effluent EC/FC =		CFU/100 mL	
Equalized Flow, Q_E =	3.41	m^3/h					
Influent BOD5 Load =	28.65	kg/d		Influent $CBOD_5$ Population Equivalent =	477	PE (@0.6 $gCBOD_5$/person-d)	
Influent TN Load =	8.19	kg/d		Influent TN Population Equivalent =	682	PE (@0.12 gTN/person-d)	

Treatment Process Selection:

C+N3+P — Carbon Oxidation + Total Nitrogen Reduction (>90%) + Total Phosphorus Reduction (>0.8 mg/L)

300	= % Internal Recirculation	10.23 m^3/h	170.52 L/min
	= % Effluent Recirculation	- m^3/h	- L/min

Influent Flow Equalization (EQT):

Design Criteria

			Min. Volume
Hydraulic Retention Time (HRT)	≥ 18 h	61.4 m^3	

Parameters as Specified

Hydraulic Retention Time (HRT) = 23.0 h

EQT

Tank Selection (model)	Quantity	Specified Volume
BCP-36300L-H	2	78.3 m^3
Internal Length =	7.011 m	
Internal Width =	2.744 m	
Nominal Depth =	2.036 m	
Depth Override =	m	

Sludge Storage, Inline + Offline (SS1 + SS2):

Design Criteria

			Min. Volume
Min. Sludge Haulage Frequency	= 3.33 months	72.6 m^3	
Hydraulic Retention Time (HRT)	≥ 2 h		
Primary+Secondary Sludge Volume	= 34.9 m^3		
Tertiary Sludge Volume (see below)	= 10.5 m^3		

Parameters as Specified (Inline)

Total Hydraulic Retention Time	= 5.6	h
Estimated Sludge Storage Time	= 10.5	months

Parameters as Specified (Offline)

Total Hydraulic Retention Time	= 68.3	h
Estimated Sludge Storage Time	= 6.3	months

SS1

Tank Selection (model)	Quantity	Specified Volume
BCP-36300L-H	2	76.9 m^3
Internal Length =	7.011 m	
Internal Width =	2.744 m	
Nominal Depth =	2.036 m	
Depth Override =	2.00 m	

SS2 (Offline)

Tank Selection (model)	Quantity	Specified Volume (Offline)
BCP-22750L-H	1	23.3 m^3
Internal Length =	4.801 m	
Internal Width =	2.337 m	**Total Volume**
Nominal Depth =	2.075 m	100.2 m^3
Depth Override =	m	

Primary Clarifier (PC):

Design Criteria

			Min. Volume
Hydraulic Retention Time (HRT)	≥ 2.0 h	27.3 m^3	

Parameters as Specified

$CBOD_5$ Reduction in Primary	= 33.0	%
Unit Flow w/Recirculation	= 13.64	m^3/h
Hydraulic Retention Time (HRT)	= 2.7	h
Surface Overflow Rate (SOR)	= 0.71	$m^3/m^2/h$
SOR MOE Guideline	≤ 1.25	$m^3/m^2/h$

PC

Tank Selection (model)	Quantity	Specified Volume
BCP-36300L-H	1	36.3 m^3
Internal Length =	7.011 m	**Specified Surface Area**
Internal Width =	2.744 m	19.2 m^2
Nominal Depth =	2.036 m	
Depth Override =	1.886 m	

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Wastewater Treatment System Calculation Summary

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Aerobic Bioreactors (BR):

Design Criteria				Min. Volume
Hydraulic Retention Time (HRT)	≥	3	h	51.0 m³
Media $CBOD_5$ Surface Loading	≤	2	$gCBOD_5/m^2$-d	
Media TAN Surface Loading	≤	1	$gTAN/m^2$-d	
Minimum Media Volume	=	19.2	m^3	

Parameters as Specified			
Hydraulic Retention Time (HRT)	=	4.4	h
Media Volume	=	20.4	m^3
Media Surface Area	=	10,200	m^2
Media Filling Degree	=	34	%
Media $CBOD_5$ Surface Loading	=	1.88	$gCBOD_5/m^2$-d
Media TAN Surface Loading	=	0.80	$gTAN/m^2$-d

Aeration Design					
Design Oxygen Demand	=	47.93	kgO_2/d		
Specified Aeration Rate	=	200.	Nm^3/h	Denit. Credit	
Specified Aeration Running %	=	46%		75%	
Specified Aeration Running Time	=	11.1	hr/d		
Specified Oxygen Transfer Efficiency	=	7.7%			
Specified Oxygen Supply @25°C	=	47.93	kgO_2/d		
Specified Mixing per Unit Volume	=	0.93	$L/s\text{-}m^3$		
Specified Mixing per Surface Area	=	2.48	$L/s\text{-}m^2$		

BR1

Tank Selection (model)	Quantity		Specified Volume
BCP-30000L-H	1		30.2 m^3
Internal Length =	4.801	m	**Specified Surface Area**
Internal Width =	2.337	m	11.2 m^2
Nominal Depth =	2.695	m	
Depth Override =		m	

BR2

Tank Selection (model)	Quantity		Specified Volume
BCP-30000L-H	1		29.4 m^3
Internal Length =	4.801	m	**Specified Surface Area**
Internal Width =	2.337	m	11.2 m^2
Nominal Depth =	2.695	m	
Depth Override =	2.620	m	

Specified Total Volume: 59.6 m^3

Specified Total Surface Area: 22.4 m^2

Blower Model	Quantity		
SCL R40-MD-4-3	2		
Diffuser Length =	40	m	
Design Blower Pressure =	310	mbar	4.5 PSI / 124.5 WG (in)
Design Blower Rate / Blower =	100	Nm^3/h	58.9 scfm
Specified Power / Blower =	2.99	kW	4.0 HP
Amperage =	11.1	Amp	VFD spec. BA0018FAA

Secondary Clarifier (SC):

Design Criteria				Min. Volume
Hydraulic Retention Time (HRT)	≥	3.0	h	10.2 m^3
Max. Surface Overflow Loading	≤	0.80	$m^3/m^2/h$	

Parameters as Specified			
Unit Flow w/Recirculation	=	3.41	m^3/h
Hydraulic Retention Time (HRT)	=	4.1	h
Surface Overflow Rate (SOR)	=	0.30	$m^3/m^2/h$
Max. SOR by MOE Guideline	≤	1.38	$m^3/m^2/h$

SC

Tank Selection (model)	Quantity		Specified Volume (with hoppers)
BCP-22750L-H	1		14.1 m^3
Internal Length =	4.801	m	**Specified Surface Area**
Internal Width =	2.337	m	11.2 m^2
Nominal Depth =	2.075	m	
Depth Override =		m	
Number of Hoppers =	3		

Tertiary Denitrification System (ABR):

Design Criteria				Min. Volume	
Design Flow	=	81.85	m^3/d	13.2 m^3	
Remaining Nitrate to Remove	=	20.1	mg/L		
Nitrate Mass Loading	=	1.65	$kgNO_3/d$	75%	Denit Credit.
Maximum Media NO_3 Surface Loading	≤	0.5	gNO_3/m^2-d		
Minimum Media Volume	=	6.6	m^3		

Parameters as Specified			
Hydraulic Retention Time (HRT)	=	5.0	h
Media Volume	=	7.8	m^3
Media Surface Area	=	3,900	m^2
Media Filling Degree	=	45	%
Media NO_3 Surface Loading	=	0.42	gNO_3/m^2-d

ABR

Tank Selection (model)	Quantity		Specified Volume
BCP-18000L-H	1		17.1 m^3
Internal Length =	4.801	m	
Internal Width =	2.337	m	
Nominal Depth =	1.528	m	
Depth Override =		m	

Wastewater Treatment System Calculation Summary

Project: 0306
Children's Campground - WWTS

Tertiary Bioreactor (BR3):

BR3

Design Criteria				Min. Volume
Hydraulic Retention Time (HRT)	≥	2.5	h	8.5 m³
Media $CBOD_5$ Surface Loading	≤	2	$gCBOD_5/m^2$-d	
Minimum Media Volume	=	2.5	m^3	

Tank Selection (model)	Quantity	
BCP-30000L-S-1/3	1	
Internal Length =	1.549	m
Internal Width =	2.337	m
Nominal Depth =	2.644	m
Depth Override =	2.694	m

Specified Volume	
9.8	m^3

Specified Surface Area	
9.8	m^2

Parameters as Specified

Hydraulic Retention Time (HRT)	=	2.9	h
Media Volume	=	3.2	m^3
Media Surface Area	=	1600	m^2
Media Filling Degree	=	32.8	%
Media $CBOD_5$ Surface Loading	=	1.53	$gCBOD_5/m^2$-d

Aeration Design

Design Oxygen Demand	=	6.55	kgO_2/d
Specified Aeration Rate	=	30.0	Nm^3/h
Specified Aeration Running %	=	43%	
Specified Aeration Running Time	=	10.3	hr/d
Specified Oxygen Transfer Efficiency	=	7.6%	
Specified Oxygen Supply @25°C	=	6.55	kgO_2/d
Specified Mixing per Unit Volume	=	0.85	$L/s\text{-}m^3$
Specified Mixing per Surface Area	=	2.30	$L/s\text{-}m^2$

Blower Selection (model)	Quantity			
SCL R30-MD-2-3	1			
Diffuser Length =	6	m		
Design Blower Pressure =	303	mbar	4.39 PSI	121.5 WG (in)
Design Blower Rate / Blower =	30	Nm^3/h	17.66	scfm
Specified Power / Blower =	1.5	kW	2.00	HP
Amperage =	5.96	Amp	VFD spec.	BA0010FAA

Tertiary Clarifier (TC):

TC

Design Criteria				Min. Volume
Hydraulic Retention Time (HRT)	≥	2.5	h	8.5 m³
Maximum Surface Area Loading	≤	0.8	m^3/m^2-d	

Tank Selection (model)	Quantity	
BCP-30000L-S-2/3	1	
Internal Length =	3.175	m
Internal Width =	2.337	m
Nominal Depth =	2.695	m
Depth Override =	2.52	m
Number of Hoppers =	2	

Specified Volume (with hoppers)	
12.6	m^3

Specified Surface Area	
7.4	m^2

Parameters as Specified

Unit Flow w/Recirculation	=	3.41	m^3/d
Hydraulic Retention Time (HRT)	=	3.7	h
Surface Area Loading (SOR)	=	0.46	m^3/m^2-d

Phosphorus Reduction System:

FR

Design Criteria				Min. Volume
Include Coagulant Dosing (Y/N)	=	Y		1.7 m³
Coagulant Molar Ratio (RE300)	=	2.56	mol/L	
Density of Coagulant (RE300)	=	1.63	kg/L	
Stoichiometric Ratio	=	1	mol/molP	
Assumed TP removed in Biomass/Primary	=	20	% of $CBOD_5$	
Remaining TP to Remove	=	11.85	mg/L	
Coagulant Dosing Rate at Design Flow	=	12.23	L/d	
Pump Design Safety Factor	=	8		
Minimum Dosing Pump Flow Rate	=	4.08	L/h	
Storage Capacity (mo)	3 =	770.7	L	
Estimated Tertiary Sludge	=	104.7	L/d	

Tank Selection (model)	Quantity	
BCP- 2700L-H	1	
Internal Length =	2.286	m
Internal Width =	0.99	m
Nominal Depth =	1.295	m
Depth Override =	0.8	m

Chemical Pump (model)	Quantity			
ProMinent CNPb-0704	1			
Specified Pump Capacity =	4.40	L/h	73.33	mL/min
Maximum Pump Pressure =	3.50	bar	50.76	psi

Specified Volume	
1.8	m^3

Intermediate Pump Tank (IPT):

IPT

Design Criteria				Min. Volume
Hydraulic Retention Time (HRT)	≥	6.0	h	20.5 m³

Tank Selection (model)	Quantity	
BCP-22750L-H	1	
Internal Length =	4.801	
Internal Width =	2.337	m
Nominal Depth =	2.075	m
Depth Override =		m

Specified Volume	
23.3	m^3

Parameters as Specified

Hydraulic Retention Time (HRT)	=	6.8	h

Wastewater Treatment System Calculation Summary

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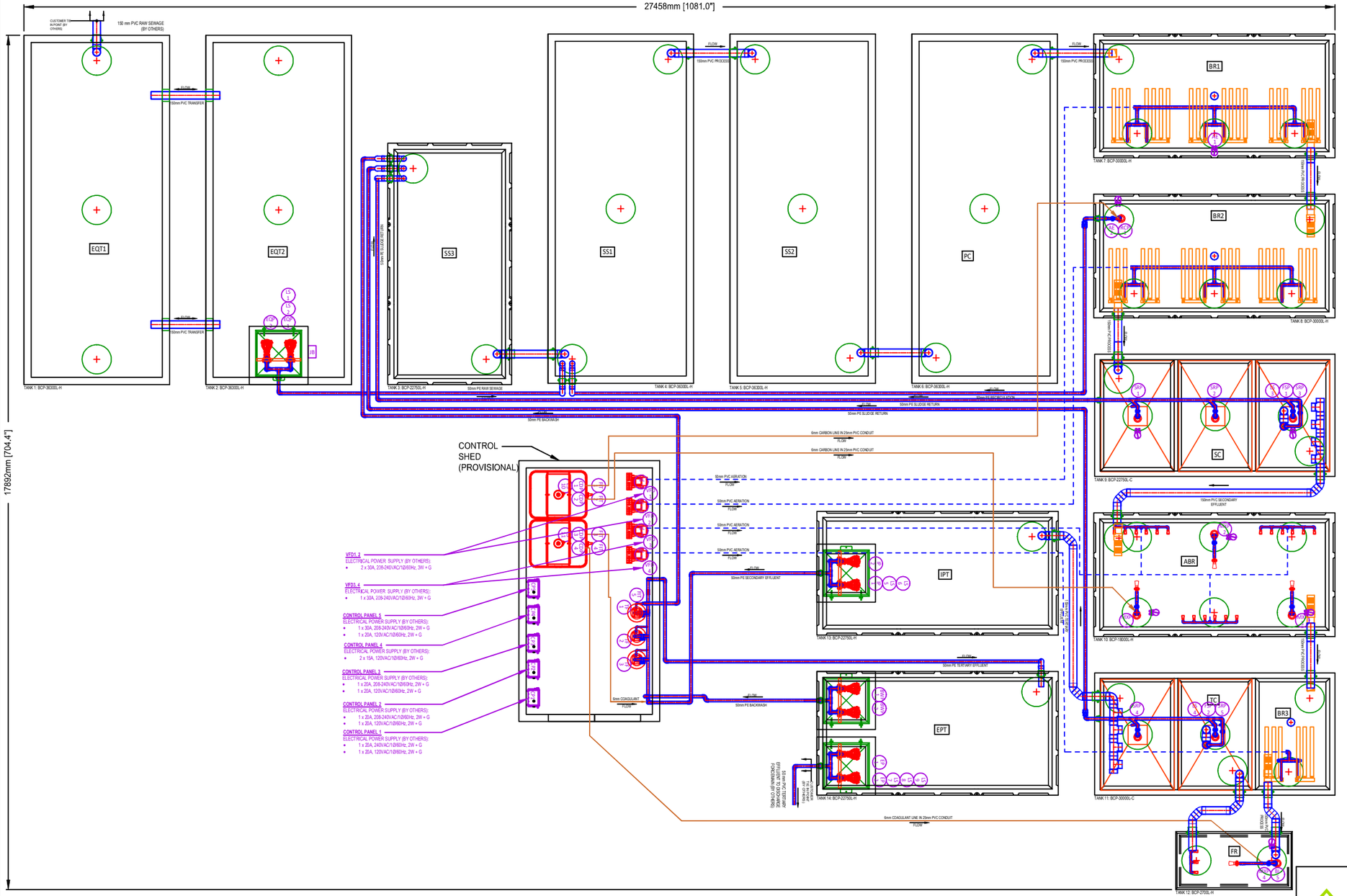
Effluent Pump Tank (EPT):								
Design Criteria			**Min. Volume**		**EPT Tank Selection (model)**	**Quantity**		**Specified Volume**
Hydraulic Retention Time (HRT)	≥ 6.0	h	20.5	m^3	BCP-22750L-H	1		23.3 m^3
					Internal Length =	4.801	m	
					Internal Width =	2.337	m	
					Nominal Depth =	2.075	m	
					Depth Override =		m	
Parameters as Specified								
Hydraulic Retention Time (HRT)	= 6.83	h						

Appendix 3 – Proposed Layout Drawing



TANK LIST

PROCESS NAME		TANK #	~ WORKING VOLUME (m³)
EQP1,2	EQUALIZATION TANK	1,2	78.3
SS3	SECONDARY SLUDGE STORAGE	3	23.3
SS1,2	PRIMARY SLUDGE STORAGE	4,5	76.9
PC	PRIMARY CLARIFIER	6	36.3
BR1	BIOREACTOR 1	7	30.2
BR2	BIOREACTOR 2	8	29.4
SC	SECONDARY CLARIFIER	9	14.1
ABR	ANOXIC BIOREACTOR	10	17.1
BR3	BIOREACTOR 3	11	9.8
FR	FLOC REACTOR	12	1.8
TC	TERTIARY CLARIFIER	11	12.6
IPT	INTERMEDIATE PUMP TANK	13	23.3
EPT	EFFLUENT PUMP TANK	14	23.3

PROCESS FLOW
AERATION
CHEMICAL DOSING
ELECTRICAL

BL BLOWER
VFD VARIABLE FREQUENCY DRIVE
CDP CHEMICAL DOSING PUMP
SRP SLUDGE RETURN PUMP
FSP FLOATING SLUDGE (SKIMMER) PUMP
EQP EQUALIZATION PUMP
RCP RECIRCULATION PUMP
EP EFFLUENT PUMP
LS LEVEL SWITCH (FLOAT)
FIT FLOW INDICATING TRANSMITTER
TF TERTIARY FILTER
UV UV DISINFECTION UNIT
CP CONTROL PANEL
IP INTERMEDIATE PUMP
BWP BACKWASH PUMP

NOTES:

A. ALL WORK, INSTALLATION AND CONNECTIONS IN RELATION TO THE TREATMENT SYSTEM SHALL BE DONE IN ACCORDANCE WITH THE WRITTEN INSTRUCTIONS PROVIDED BY BERGMANN NORTH AMERICA INC. AND IN ACCORDANCE WITH ALL APPLICABLE LOCAL CODES AND REGULATIONS.

B. ALL ACCESS OPENINGS MUST BE INSTALLED TO GRADE AND SECURED TO PREVENT ACCIDENTAL OR UNAUTHORIZED ACCESS.

C. A MAXIMUM OF 1 METRE BURIAL DEPTH IS ALLOWABLE ON TOP OF ANY TANKS IN A NON-TRAFFIC AREA. EXTRA REINFORCEMENT IS REQUIRED FOR USE IN AREAS WITH VEHICULAR TRAFFIC AND BURIAL DEPTHS OVER 1 METRE.

BNA BERGMANN NORTH AMERICA INC.

iQ. MBBR

CHILDREN'S CAMP WWTS

DRAWING: PLAN LAYOUT
FOR PROPOSAL
Rev.0

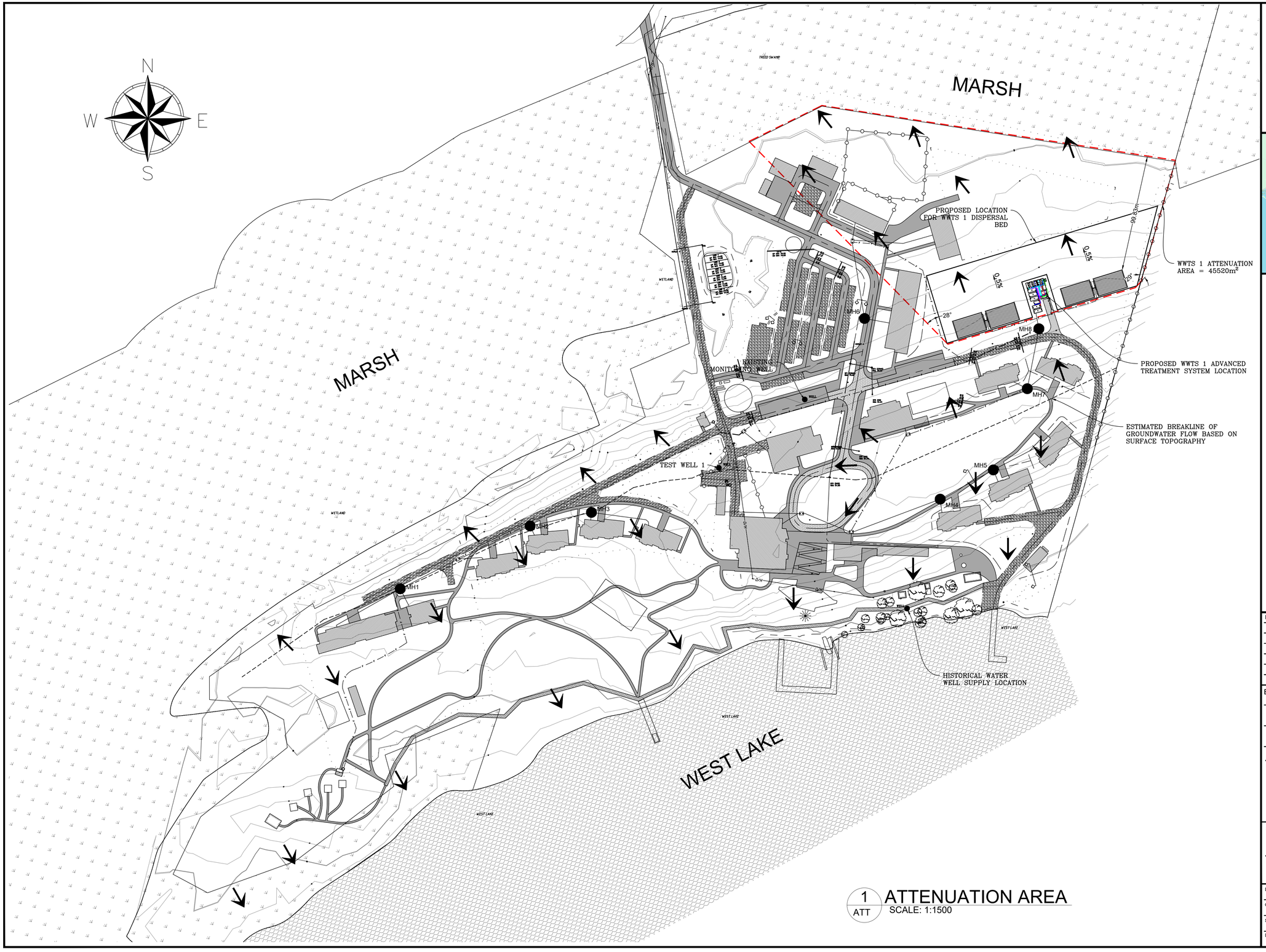
DRAWN BY: MM | APPROVED BY: MM | SHEET 1 of 1

DATE: 2025/09/24 | SCALE: 1:100

GROUNDWORK ENGINEERING LIMITED

Appendix D

Attenuation Drawing



1 ATT **ATTENUATION AREA**
SCALE: 1:1500

GROUNDWORK ENGINEERING LIMITED
GEOTECHNICAL • CIVIL • STORMWATER • ONSITE WASTEWATER
UNIT 640 - 654 NORRIS COURT
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www.groundengineer.ca

LEGEND

—, —, —, —, —, — NEW 50mm FORCEMAIN

GROUNDWATER FLOW ARROW

NOTES:

MARSH BOUNDARIES AS PER ECOLOGICAL SERVICES NATURAL HERITAGE IMPACT ASSESSMENT REPORT DATED APRIL 28, 2024.

REVISIONS

No.	Description	Date
05	ISSUED FOR SITE PLAN APPLICATION	2025/08/05
06	REVISED PER DECEMBER 2025 DRAWING	2026/01/23
07	REVISED PER FEBRUARY 2026 DRAWING	2026/02/10
08	REVISED PER JULY 2026 DRAWING	2026/07/06
09	REVISED PER AUG 6, 2026 DRAWINGS	2026/08/12

BENCHMARK:

No.	DESCRIPTION	ELEVATION
##.	XXX	XXX.XX

LICENSED PROFESSIONAL ENGINEER
12 AUG 2026
M. H. BURGER
PROVINCE OF ONTARIO

Client / Land Owner:
CAMPFIRE CIRCLE

Project:
565 WESLEY ACRES ROAD
BLOOMFIELD ONTARIO

Drawing Title:
ATTENUATION AREA

Drawn by: LM
Checked By: MB
Scale: 24"x36" 1:1500
Date: AUG 12, 2026

Project Number: GW-23003-16
Drawing Number: ATTENUATION
SHEET 1 of 1

P:\Projects\23000\23003 – Geotechnical Investigations and Inspections\23003-16 – 565 Wesley Acres Road-Jewell BSS\02 – Design\03 – Drawings\08 – For CAD release\GW-23003-16 – Wesley Acres (For CAD Release).dwg
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