August 31, 2020 (revised May 28, 2021)

Our File Ref.: 190271

Mrs. Donna Livingston
c/o Jonah Bonn
5254 Bank Street
Ottawa, Ontario K1X 1H2

Attention: Mrs. Donna Livingston c/o Jonah Bonn

Subject: Terrain Analysis and Private Sewage Disposal System Impact Assessment
- Land Rezoning Application
5254 Bank Street, Ottawa, Ontario

Dear Mrs. Livingston,

LRL Associates Ltd. (LRL) has conducted a Terrain Analysis and Private Sewage Disposal System Impact Study for the proposed zoning change on the property located at 5254 Bank Street, Ottawa, Ontario (herein referred to as the "Site"). The property is currently developed with residential use, including a single detached house, a garage and various sheds. It is proposed to rezone the property to a Rural General Industrial Zone to support the future use as a parking lot, or storage yard. However, a conservative conceptual development approach to include a theoretical future warehouse facility was included as part of this terrain analysis to support long term planning for possible Site Plan Application submission with the City of Ottawa. The results of this conceptual development analysis are entirely theoretical and intended for discussion purposes only at this time, as well as to provide a general idea of possible alternate development options with inferred approval by the City of Ottawa.

The proposed development will be supplied by municipal water supply and a private sewage disposal system as is the existing residential development on the Site.

The assessment was carried out to determine if the proposed development:

- Has soil conditions that are suitable for onsite sewage disposal; and
- Will not impair the use of groundwater resources on the Site or on adjacent lands.

The proposed sewage system for the theoretical warehouse will be designed for approximately 2.46 m^3/day of wastewater, as outlined below.

The assessment involved a desktop review of available information on the geology and hydrogeology of the Site and adjacent lands in addition to the findings of a recent geotechnical investigation conducted by LRL[1].

The Site is serviced by municipal water supply, however, neighbouring properties within 500 m of the Site were found to have records of supply wells present.

1 SITE AND AREA DESCRIPTION

The property is situated at the southern extent of the City of Ottawa at 5254 Bank Street. The Site is legally described as Part Lot 28, Concession 4RF as in GL76777; Gloucester. The Site's location is shown in **Figure 1**.

The Site is rectangular shaped, being approximately 20 m wide (north-south) by approximately 75 m deep, for an approximate area of 1,740 m^2 (0.43 acres). The Site is developed with a residence estimated to have been constructed in at least 1965. The residence is serviced by municipal water and is heated by natural gas. Sewage is disposed of via a private septic system. Several detached accessory buildings are situated west of the residence, including a garage, with a footprint of approximately 45 m^2, and two large divided sheds (approximately 160 m^2 each). The garage is of temporary construction, with wood frame construction directly on the asphalt driveway surface. The sheds are constructed of wood and steel panel. Flooring consists of wood, concrete, and dirt.

The neighbouring land use is as follows:

- North: Grandor Lumber;
- South: Forested land followed by a used car lot;
- East: Bank street, with a shed constructed on the forested land beyond; and
- West: Undeveloped portion of a quarry property.

The general topography of the eastern portion of the site is considered to be relatively flat. An approximate 3.5 m high slope is present in the north-south direction at the middle of the site.

These Site features are shown in the **Figure 2**.

2 PROPOSED DEVELOPMENT

It is proposed to rezone the property to a Rural General Industrial Zone to support the future use as a parking lot, or storage yard. These proposed uses will not be required to facilitate a sewage disposal system.

However, consideration has been included herein to support theoretical future use of the Site as a warehouse facility, should a future landowner choose to apply for a Site Plan Application with the City of Ottawa in such regards. A conservative conceptual development approach including a warehouse facility was used for this exercise to support such a potential Site Plan Application submission with the City of Ottawa. The results of this conceptual development analysis are intended for discussion purposes, and to provide a general idea of possible alternate development options, with inferred approval by the City of Ottawa.

[1] Geotechnical Investigation, Proposed Automotive Dealership and Body Shop, 5254 Bank Street, LRL, November 2019

The theoretical warehouse facility, would have a 200 m² footprint, with a single loading bay, and one (1) water closet. The parking and circulation area surrounding the building would be finished with a permeable granular base material such as granular crushed stone. The warehouse would be serviced with municipal water supply and a private sewage disposal system. The proposed size and associated components of the sewage disposal system are outlined below in Section 5. The theoretical sewage disposal system footprint would encompass an area of approximately 428 m², which would include 120 m² for the septic bed and 308 m² of infiltration sand. The theoretical building placement and Site layout is presented in the included **Figure 3**.

3 PHYSICAL SETTING

3.1 Topography

Local topography indicates that the site and general vicinity slope towards the west. It is inferred that the overburden groundwater flow direction would therefore be towards the west, following local topography. The nearest open water body to the Site is a series of man-made quarry lakes, the nearest of which is approximately 520 m to the west. The Rideau River is located approximately 9 km to the west.

3.2 Geology

Surficial soil deposit mapping[2] indicates that the overburden consists of stone-poor, sandy silt to silty sand-textured till on Paleozoic terrain. Bedrock mapping[3] indicates that the underlying bedrock consists of dolomite, minor shale and sandstone, of the Oxford Formation.

Boreholes were previously completed across the Site during a 2019 geotechnical investigation[4]. The boreholes were found to have a thin layer of topsoil in BH1, BH2, BH4 and BH5, which extended to depths between 0.10 to 0.45 m. A 0.05 m thick layer of asphalt was encountered at one (1) location (BH3). The fill and asphalt were underlain by fill to depths ranging from 0.4 to 1.5 m. The fill material generally consisted of a brown sandy material, with some gravel. Underlying the fill material in BH3, a layer of silt was encountered, and extended to a depth of 3.7 m bgs. Practical auger refusal over bedrock was encountered in all boreholes, refusal occurred at depths ranging from 0.7 to 3.7 m bgs. Two (2) boreholes continued into the bedrock (BH2 and BH4). Limestone bedrock was encountered to the termination depths of 1.1 and 0.7 m bgs in BH2 and BH4, respectively.

3.3 Hydrogeology

A search was conducted of the available water well records from the MECP Water Well Record Department. The search by UTM coordinates covered a 500 m radius from the site. The search returned records for fourteen (14) wells. The well records are included in **Appendix A** and their locations are presented in **Figure 4**.

The general subsurface conditions indicated in the well records within 500 m of the site are as follows:

[2] Ontario Geological Survey 2010. Surficial geology of Southern Ontario; Ontario Geological Survey, Miscellaneous Release--Data 128-REV.

[3] Armstrong, D.K. and Dodge, J.E.P. 2007. Paleozoic geology of southern Ontario; Ontario Geological Survey, Miscellaneous Release--Data 219.

[4] Geotechnical Investigation, Proposed Automotive Dealership and Body Shop, 5254 Bank Street, LRL, November 2019

MECP Well Number	Distance and Direction from Site (m)	Depth (m)	Overburden Details			Bedrock Details	Groundwater Encountered (m)	Static Water Level (m)	Type of water
			Clay (m)	Sand (m)	Gravel/ Till (m)	Bedrock			
1502193	410 N	32.9	0 – 1.8	--	--	1.8 – 32.9 (Limestone)	32.9	7.3	Fresh
1502203	80 N	14.6	0 - 1.8	--	--	1.8 – 14.6 (Limestone)	14.6	2.4	Fresh
1502204	220 N	15.2	--	--	0 – 2.4	2.4 – 15.2 (Limestone)	15.2	2.4	Not Reported
1502205	16 S	49.7	--	--	0 – 1.8 (Till)	1.8 – 49.7 (Sandstone)	47.2	2.4	Fresh
1502267	220 N	70.1	0 – 1.4 (Sandy Loam)	--	--	1.4 – 49.4 (Limestone) 49.4 – 70.1 (Sandstone)	28.9 49.4 57.3 65.2	21.3	Fresh
1502268	195 NE	51.8	--	--	--	0 – 19.2 (Previously drilled) 19.2 – 51.8 (Sandstone)	28.0 44.5	15.2	Fresh
1502272	220 SE	15.2	0 – 3.7	--	--	3.7 – 15.2 (Limestone)	15.2	2.4	Fresh
1502273	315 SE	17.7	0 – 4.3 (Loam)	--	4.3 – 4.9	4.9 – 17.7 (Limestone)	17.7	2.7	Fresh
1502274	130 SE	11.0	--	--	0 – 1.2	1.2 – 11.0 (Illegible)	11.0	3.0	Fresh
1502275	295 SE	30.5	--	--	--	0 – 30.5 (Limestone)	30.5	2.4	Fresh
1502276	80 SE	41.8	--	--	--	0 – 30.5 (Limestone) 30.5 – 41.8 (Sandstone)	21.3 41.1	15.2	Fresh
1502277	270 SE	46.3	0 – 1.2 (Topsoil)	1.2 – 1.5	--	1.5 – 46.3 (Limestone)	46.3	6.7	Fresh
1510284	290 SE	14.6	--	0 – 4.3 (Fill)	--	4.3 – 15.2 (Limestone)	14.6	3.0	Fresh
1516460	200 SE	41.2	--	0 – 1.5	--	1.5 – 41.2 (Limestone)	39.0	3.0	Fresh

Review of the records of the wells within 500 m of the site retrieved revealed that the wells in the area are all drilled and completed into the bedrock at depths between 11.0 and 70.1 m. The well records show that that the geological conditions within 500 m are relatively similar, and consist generally of clay, sand or till to the bedrock, encountered at depths from surface to 4.9 m bgs. Bedrock generally consisted of limestone, with sandstone beneath the limestone at two (2) locations. Two (2) locations reported the bedrock to consist of only sandstone, however, one (1) of the locations were previously drilled.

3.4 Groundwater from Test Pits

Groundwater was not encountered in the boreholes advanced as part of the geotechnical investigation.

4 RECEIVING GROUNDWATER

The current and potential uses of the aquifers are identified below.

4.1 Overburden Groundwater

The overburden groundwater is unlikely to be used as a water supply based on the following:

- The Site and the adjacent properties are currently serviced by municipal water although water well records were identified in the area;
- Based on the well records reviewed and the shallow overburden conditions, no shallow wells were identified on the subject site or adjacent lands. Generally, the overburden conditions are not suitable for construction of a well; and
- The buildings in this area are serviced by private septic systems; therefore, the current use of the overburden groundwater is for the attenuation of the septic system effluent.

4.2 Bedrock Aquifer

As discussed in Section 3, records of fourteen (14) wells within 500 m of the Site were available. The records indicate that all fourteen (14) wells tap into bedrock aquifer. Although it is our understanding that municipal water is available for the neighbouring properties, it is unknown at this time if these wells are still present or continue to be used for potable purposes.

5 Terrain Analysis and Septic Design

The terrain analysis was conducted to demonstrate that the unconsolidated material on the Site is appropriate for potential construction of an on-Site subsurface sewage disposal system, with consideration taken regarding the existing installation.

The subsurface conditions indicated for the Site are considered suitable for a Class IV sewage disposal system with a fully raised leaching bed depending on the lot specific soil and groundwater conditions at the actual location of the proposed septic system leaching bed. The leaching bed should be constructed to conform to the specifications set out in the Ontario Building Code (OBC).

A septic disposal system will not be required for the proposed Site uses as a parking lot, or a storage yard. Therefore, a formal terrain analysis and septic design is not required. A conceptual plan to include a warehouse facility has been included in the discussion herein, as a means to evaluate possible future Site Plan Application submissions to the City of Ottawa at a later date. Based on the characteristics of the Site, including area, soil conditions and serviceability, development of a theoretical 200 m² warehouse facility may be permitted on the Site, with use of a tertiary system such as an Ecoflo® Biofilter.

The daily sewage flow for the proposed warehouse, in accordance with Schedule 8 of the OBC, would consist of:

- A 200 m^2 footprint with one (1) loading bay;
- A permeable surface (granular) parking and circulation area; and
- Equipped with one (1) water closet.

It is assumed that 1,100 L/day would be discharged into the septic system. As a conservative approach to determine the expected largest septic system envelope required to service the proposed development, a septic system envelope size was calculated assuming a fully raised bed with mantle, a percolation rate of 12 min/cm for the imported sand required and a daily sewage flow of 1,100 L. The total length of pipe required for the proposed septic bed, assuming imported fill, was calculated as approximately 66 m using the following equation:

L = QT/200

where L = length of pipe (m);

Q = daily sewage flow for the proposed development (L/day); and

T = percolation rate of the imported sand fill material (min/cm).

Therefore, an area of approximately 120 m² is required for the septic bed assuming 5 pipes, each having a length of 15 m and a spacing of 1.6 m between the pipes. A mantle of 15 m in length would be required along the downgradient portion of the bed. Based on the total coverage of the septic bed (raised portion and mantle plus a replacement area) an area of approximately 630 m^2 would be required. This is a conservative approach based on the OBC.

However, due to the total sewage demand of the proposed buildings (1,100 L/day) and available infiltration area on the site (414 m^2), a conventional system for the proposed development is not adequate and tertiary treatment is necessary. It is proposed that a tertiary system such as an Ecoflo® Biofilter be considered for the new development.

The Ecoflo® system includes one (1) 7,500 L septic tank and one (1) STB-650P Ecoflo® Biofilter. The effluent would be pumped from the biofilters to an absorption system, consisting of a 0.3 m thick stone layer underlain with a 0.3 m thick sand layer. The stone layer shall be such that the loading on the surface of the stone layer would not exceed 75 L/m^2 per day for a total daily design sanitary sewage flow not exceeding 3,000 L. Therefore, the minimum stone layer area is calculated as follows:

A = Q/75

where Q = daily sewage flow for the proposed development (L/day).

This gives a minimum area of the stone layer of 33 m^2. It is proposed that a stone layer of 5 m width by 6.6 m length be used. The effluent would be pumped through the five (5) distribution pipes installed on top of the stone layer, each of 15 m in length and spaced 1.6 m apart.

The stone layer is to be installed on a sand bed. The minimum area of the sand layer is calculated as follows:

A = QT/400

Where Q = daily sewage flow for the proposed development (L/day)

T = percolation rate of the imported sand fill material (min/cm); assumed as worst case of 50 min/cm^2.

This gives a minimum area required for the sand layer of 308 m^2. It is proposed that a sand layer of 12.5 m wide by 25 m length be used. This gives a mantle length of 15.4 m.

As mentioned above in Section 4, groundwater was not encountered within the overburden stratum (upper 2.0 m above bedrock interface) at the Site. The Site and the adjacent properties are currently serviced by municipal water although water well records were identified in the area. Based on the well records reviewed and the shallow overburden conditions, no shallow wells were identified on the subject site or adjacent lands. Generally, the overburden conditions are not suitable for construction of a well (i.e. shallow low permeable soils, with bedrock encountered between 0.0 and 4.9 m in depth) as outlined above in Section 2. In the available well records reviewed and discussed above in Section 3, groundwater within the bedrock in the area of the Site was encountered at depths between 11.0 and 47.2 m, beyond the depth considered for possible direct influence of a septic disposal system, as well as being considered a confined aquifer. Based on the proposed septic construction, Site characteristics including the possible

receiving aquifer in the overburden, the risk the septic system effluent to possible supply water sources on, or within the vicinity of the Site, should development occur, is considered unlikely. It is not anticipated that the construction of the septic system would intercept groundwater.

Note that these calculations are strictly theoretical and for discussion purposes only at this time, and that the final design may change.

6 PRIVATE SEWAGE DISPOSAL SYSTEM IMPACT STUDY

The groundwater impact assessment addresses the ability of the land to attenuate the sewage effluent created by the development. Three methods for conducting the assessment are outlined in MOE's *Procedure D-5-4 Technical Guideline for Individual On-Site Sewage Systems: Water Quality Impact Risk Assessment* (1996):

- *Lot Size Consideration* for lot greater than 10 000 m^2 (1 hectare);
- *System Isolation Consideration* for areas where the septic system is hydrogeologically isolated from the potable water source; and
- *Contaminant Attenuation Consideration* for sites that do not meet the above two points.

Bedrock was encountered at depths between less than 2.0 m across the site, therefore the site is considered hydrogeologically sensitive with areas of thin soil over highly permeable soils (i.e., bedrock).

The overburden material generally consisted of a fill material in the geotechnical boreholes with a stratum of silt (BH3) above the bedrock at one location. Groundwater was not encountered in the overburden material on the Site at the time of the borehole advancement. However, should water have been present in the overburden, it would not be considered an aquifer as it would be at depths less than 2.0 m below grade. As stated in Section 4.1, groundwater within the shallow overburden would not be a suitable supply aquifer for potable water based on its assumed poor yield, poor quality, shallow depth and likely use for the attenuation of the Site's existing and the neighbouring properties septic effluents.

Based on the lot size of 1,740 m², the lot size consideration for lots greater than 10,000 m^2 does not apply. The isolation method also does not apply based on the materials encountered in the geotechnical boreholes that primarily consisted of sandy fill over bedrock. Therefore, "***Contamination Attenuation***" was considered in this terrain analysis.

6.1 Contaminant Attenuation Method (Predictive Assessment)

The Contaminant Attenuation Method (Predictive Assessment) was used to determine the impact of the proposed on-Site septic systems at the boundary of the Site. This procedure assesses the risk that the individual on-site systems will cause the concentration of the nitrate-nitrogen to exceed 10 mg/L at the property boundaries. Dilution is the attenuation mechanism considered for nitrates, with precipitation being the only source of infiltration. The following parameters and assumptions were used in the nitrate attenuation calculations:

- Infiltration factors for the site;
  - Flat topography;
  - Infiltration Factors:
    i. An assumption of Sand was used for this calculation;

- The overburden material encountered on the Site at the time of the geotechnical borehole advancement included sand fill, with traces of gravel, therefore "Sand" was applied for the purposes of the calculation;

ii. Approximately 1,740 m² of the site is considered Cultivated Land;

- Moisture Surplus:
  i. The cultivated land is considered Shallow Rooted Crops;
  ii. An assumption of Fine Sand was used for this calculation;
- The average background nitrate concentration was assumed to be 0.0 mg/L;
- Impervious areas (proposed) were calculated to be 200 m^2 for the warehouse building;
- The parking and circulation area would be constructed of granular, permeable material such as granular crushed stone; and
- Moisture surplus values from the Ottawa weather station (Environment Canada, 2011).

The moisture surplus printout is included in **Appendix B**. This location is considered representative of the site located at the south-central extent of the City of Ottawa, Ontario.

Based on the theoretical total proposed sewage volume for the entire Site of 1,100 L/day, the existing lot size, soil conditions, and a nitrate concentration of the sewage of 40 mg/L, the calculated levels of nitrates at the property limits are estimated as 19.7 mg/L as presented in the attached **Table 1A**. This is above the procedure's guideline limit of 10 mg/L at the property line. Based on the "*Contaminant Attenuation Method*", without tertiary treatment the current lot size and soil conditions are not suitable to attenuate the nitrate impacts generated by the septic systems of the proposed development in accordance with D-5-4 guideline.

The above calculations are based on the current D-5-4 guideline which requires the use of 40 mg/L as the contaminant source as per Section 5.6.2 (a). Therefore, the use of an advanced tertiary treatment system such as Ecoflo Biofilter is necessary to reduce the levels of nitrates prior to discharge to the disposal field. This particular system is approved by the OBC and the Building Materials Evaluation Commission of the Ontario Ministry of Municipal Affairs and Housing. Furthermore, Section 5.7 of the D-5-4 guideline states that the Ministry recognises "that as research continues, information and technologies may become available which warrant minor or substantial revisions to this guideline".

According to the report titled Wastewater Technology, NSF/ANSI standard 245 – Wastewater Treatment Systems – Nitrogen Reduction, prepared by Premier Tech Aqua, the Ecoflo Biofilter tertiary treatment system is capable of reduction of nitrates in the effluent nitrate concentrations to between 0.35 mg/L to 8.54 mg/L. A copy of the report is included in **Appendix C**. For the purpose of this assessment a conservative nitrate effluent concentration of 20 mg/L was used.

The calculated nitrates at the property line are estimated based on the theoretical daily sewage volume of the proposed system of 1,100 L, treated with an Ecoflo Bioreactor. The detailed calculations for the proposed development are presented in the attached **Table 1B**. As discussed above, it is assumed that the level of nitrates in the effluent from the proposed Ecoflo Bioreactor are 20 mg/L. Based on these assumptions the nitrate concentration at the property limits is estimated as 9.8 mg/L. This is below the procedure's guideline of 10.0 mg/L.

Based on the "***Contaminant Attenuation Method***" the current lot size and soil conditions would be suitable to attenuate the nitrate impacts generated by the hypothetical development detailed above and the septic systems on the development in accordance with current D-5-4 guidelines, provided an appropriate tertiary treatment is used for the proposed system.

7 CONCLUSIONS

Based on our review of available information we conclude the following:

1. The proposed use of the Site is to include a parking lot or a storage yard. These development options will not require a sewage disposal system. However, a conservative conceptual development approach to include a theoretical warehouse facility was included as part of this terrain analysis to support possible future Site Plan Application submissions with the City of Ottawa. The results of this conceptual development analysis are hypothetical intended for discussion purposes only, and to provide a general idea of possible alternate development options with inferred approval by the City of Ottawa.
2. Sufficient area exists on the property for the installation of a septic system in accordance with the OBC to service a theoretical 200 m² warehouse structure, with a single loading bay, and single water closet, predicted to have a sewage flow of up to 1,100 L/day.
3. Pre-treatment of the sewage from the proposed sewage disposal systems with tertiary treatment such as an Ecoflo Biofilter certified treatment system yields a calculated nitrate concentration at the property line of 9.8 mg/L based on the *"Contaminant Attenuation Method"*.
4. Hydrogeologically sensitive conditions are present on the site due to thin overburden. The overburden generally consists of sand fill to bedrock, with silt observed at one (1) of the boreholes.
5. Records of domestic and commercial wells were retrieved within 500 m of the site. The potable water source of these wells is the bedrock aquifer. A thin layer of clay, sand or till, being up to 4.9 m thick are described over the bedrock.

8 RECOMMENDATIONS

Based on our results of this investigation the following recommendations are made:

1. Should a future landowner choose to develop the Site with a private sewage system, the septic system should be placed at least 15 m from any drilled wells/water service and 30 m from any dug well. It is recommended that the water table be surveyed prior to installation.
    a) One (1) drilled well has been identified within 30 m of the property limits. Well 1502205, a drilled well extending to approximately 49.7 m, is identified as being approximately 16 m south of the Site. As the exact location of this well could not be confirmed, the placement of the proposed septic should be placed as far from the southern property boundary as possible to account for possible well positioning, and respective setbacks.
2. Due to the thin soils and sensitive site conditions it is recommended that the leaching bed of the proposed system be fully raised.
3. Pre-treatment of the sewage from the proposed sewage disposal system with tertiary treatment such as an Ecoflo Biofilter would be required.
4. A formal septic design and terrain analysis for possible alternate land development options, other than the proposed parking lot or storage yard (i.e. warehouse) would be required prior

to development. The findings herein make no guarantee that possible alternate developments would be permitted in accordance with applicable municipal or federal requirements.

9 LIMITATIONS

The findings contained in this report are based on data and information reported in the Geotechnical Investigation previously conducted by LRL Associates Ltd. The conclusions and recommendations are based on the soil conditions reported in the Geotechnical Investigation, supplemented by historical information and data obtained as described in this report. The information presented in this report represents the groundwater conditions reported in the Geotechnical Investigation. Due to natural variations in geological conditions, no inference is made to the soil or groundwater conditions between sampling points. No assurance is made regarding changes in conditions subsequent to the time of this investigation. If additional information is discovered or obtained, LRL Associates Ltd. should be requested to re-evaluate the conclusions presented in this report and to provide amendments as required.

In evaluating the subject property, LRL Associates Ltd. has relied in good faith on information provided by individuals as noted in this report. We assume that the information provided is factual and accurate. We accept no responsibility for any deficiencies, misstatements or inaccuracies contained in this report as a result of omissions, misinterpretation or fraudulent acts of the persons contacted.

Yours truly,
LRL Associates Ltd.

Jessica Arthurs
Senior Environmental Technician
Partner, Environmental Services Team Lead

Alex Wood, P. Eng
Lead Environmental Engineer

Encl.

Figure 1 – Site Location
Figure 2 – Site Plan
Figure 3 – Conceptual Site Plan
Figure 4 – Well Locations, Ontario Well Records Within 500 m of the Site
Table 1A – Nitrate Attenuation Calculations
Table 1B – Nitrate Attenuation Calculations – Ecoflo Biofilter Tertiary Treatment
Appendix A – Ontario Well Record Printouts
Appendix B – Moisture Surplus Printout
Appendix C – Premier Tech Aqua Report

FIGURES

LRJ
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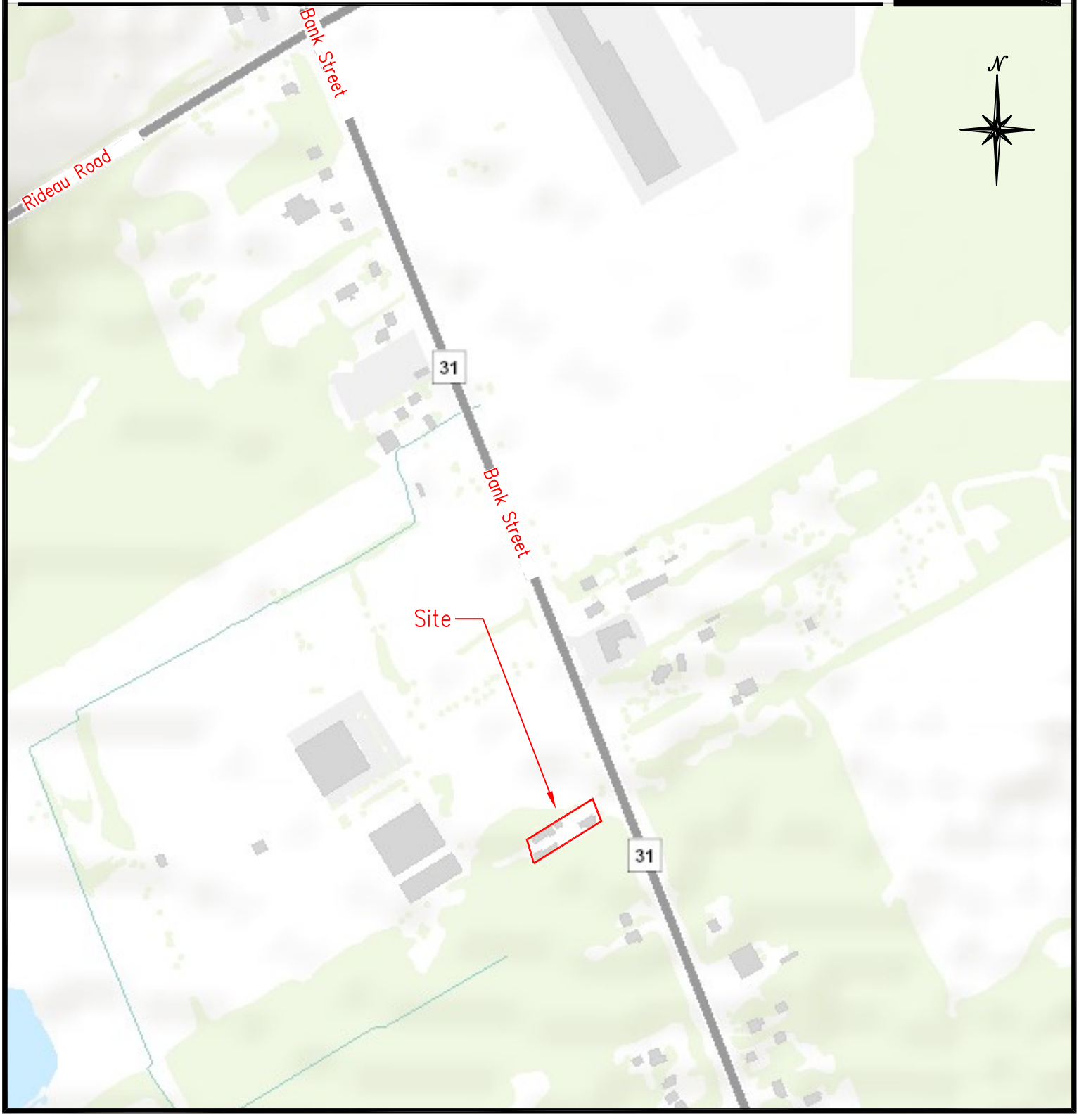
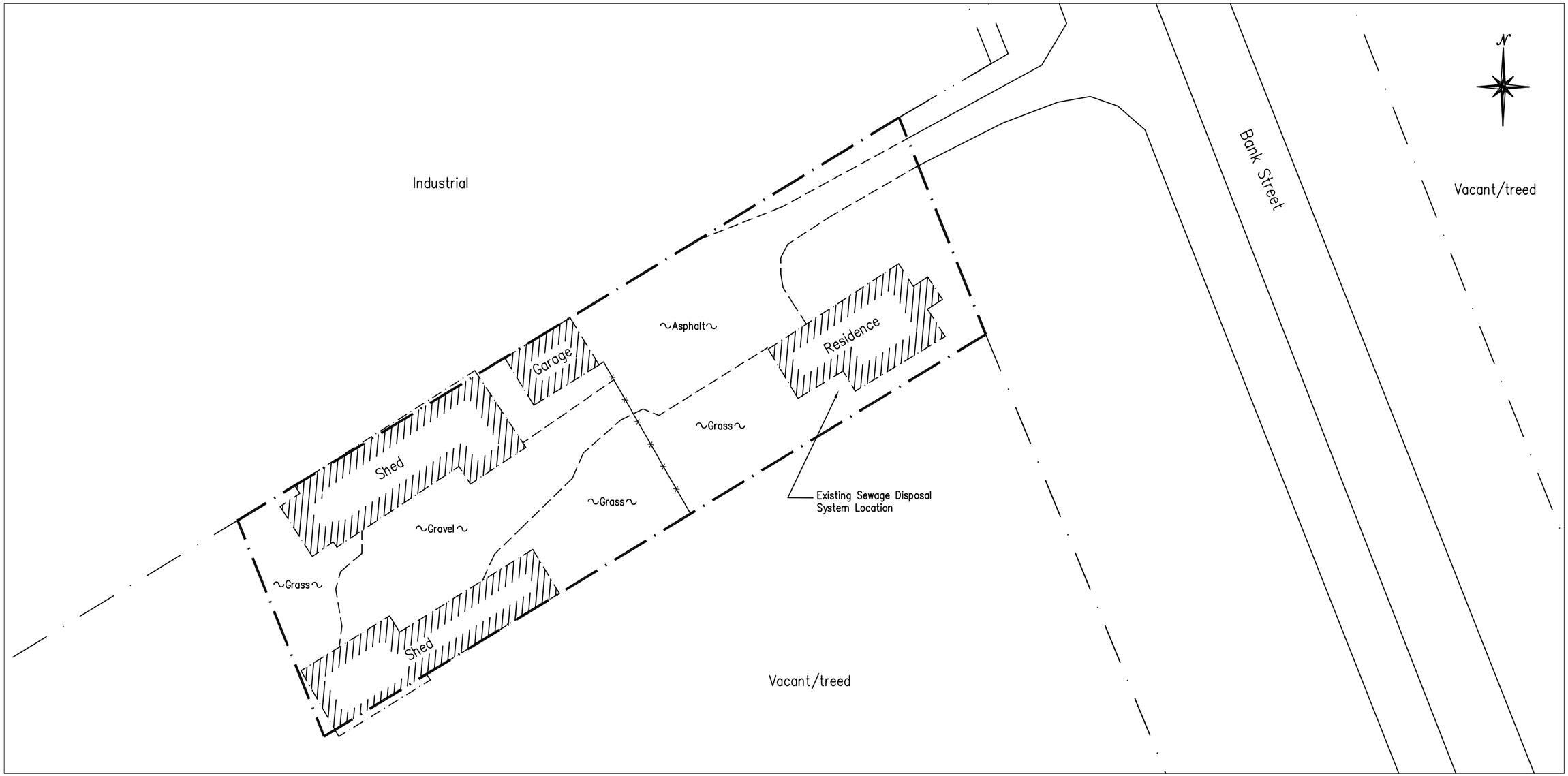
PROJECT
TERRAIN ANALYSIS AND PRIVATE SEWAGE DISPOSAL SYSTEM IMPACT ASSESSMENT
5254 BANK STREET
OTTAWA, ONTARIO

DRAWING TITLE
SITE LOCATION
(NOT TO SCALE)
SOURCE: GeoOTTAWA

CLIENT	DATE	PROJECT
JONAH BONN	MAY 2021	190271

FIGURE 1





LEGEND

- Property Line
- Division amongst surface materials
- Fenceline
- Existing Building

5m 0 10 20m

SCALE: 1:400

No.	REVISIONS	BY	DATE
02	FINAL	J.A.	26/05/21
01	ISSUED FOR REVIEW	G.M.	14/11/19

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CLIENT
JONAH BONN

DESIGNED BY:	DRAWN BY:	APPROVED BY:
	J.A.	A.W.

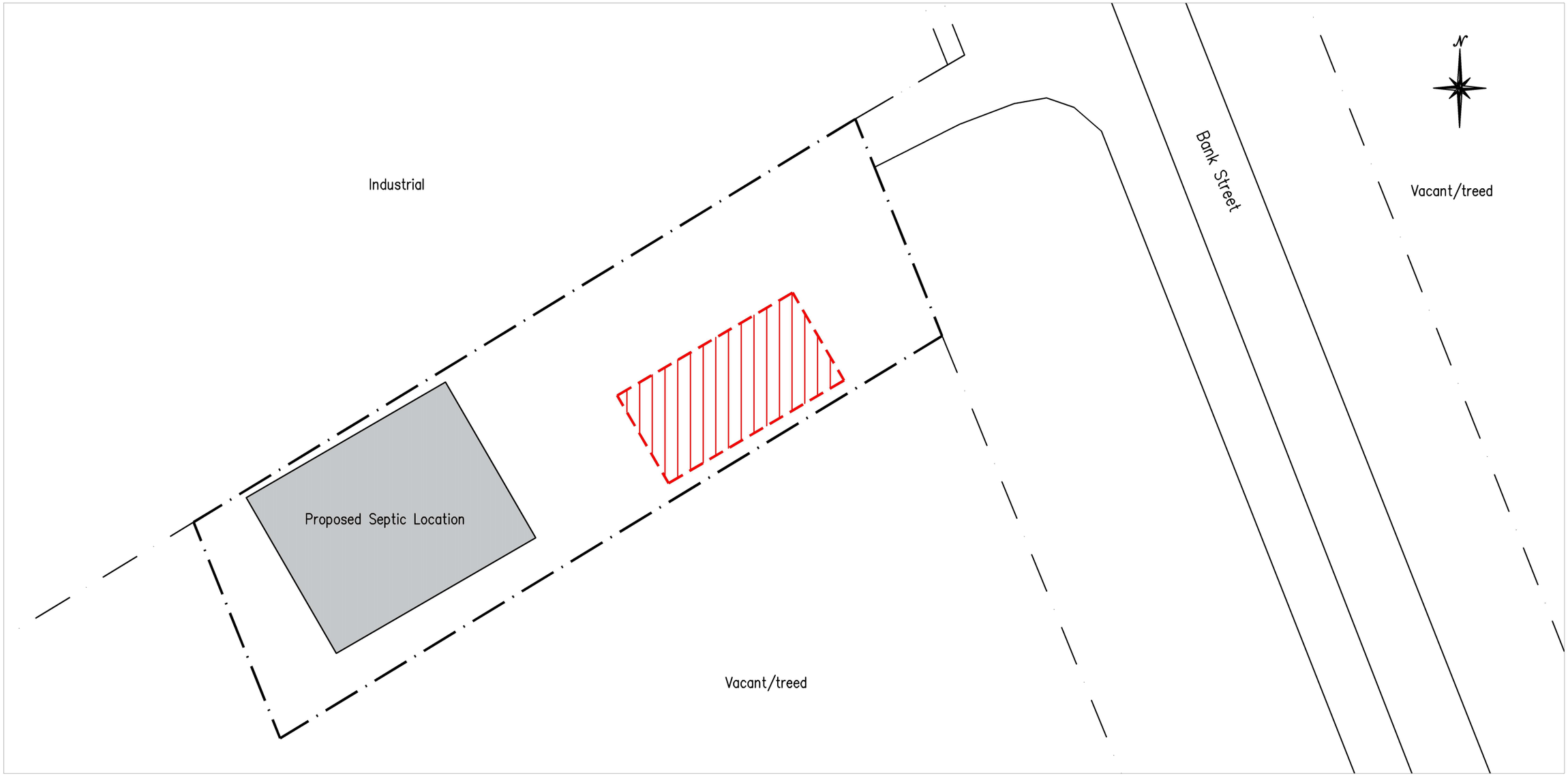
PROJECT
TERRAIN ANALYSIS AND PRIVATE SEWAGE DISPOSAL SYSTEM IMPACT ASSESSMENT
5254 BANK STREET
OTTAWA, ONTARIO

DRAWING TITLE
SITE PLAN

PROJECT NO.
190271

DATE
MAY 2021

FIGURE 2



LEGEND

Property Line

Proposed Building

5m 0 10 20m

SCALE: 1:400

No.	REVISIONS	BY	DATE
02	FINAL	J.A.	26/05/21
01	ISSUED FOR REVIEW	G.M.	14/11/19

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CLIENT
JONAH BONN

DESIGNED BY:	DRAWN BY:	APPROVED BY:
	J.A.	A.W.

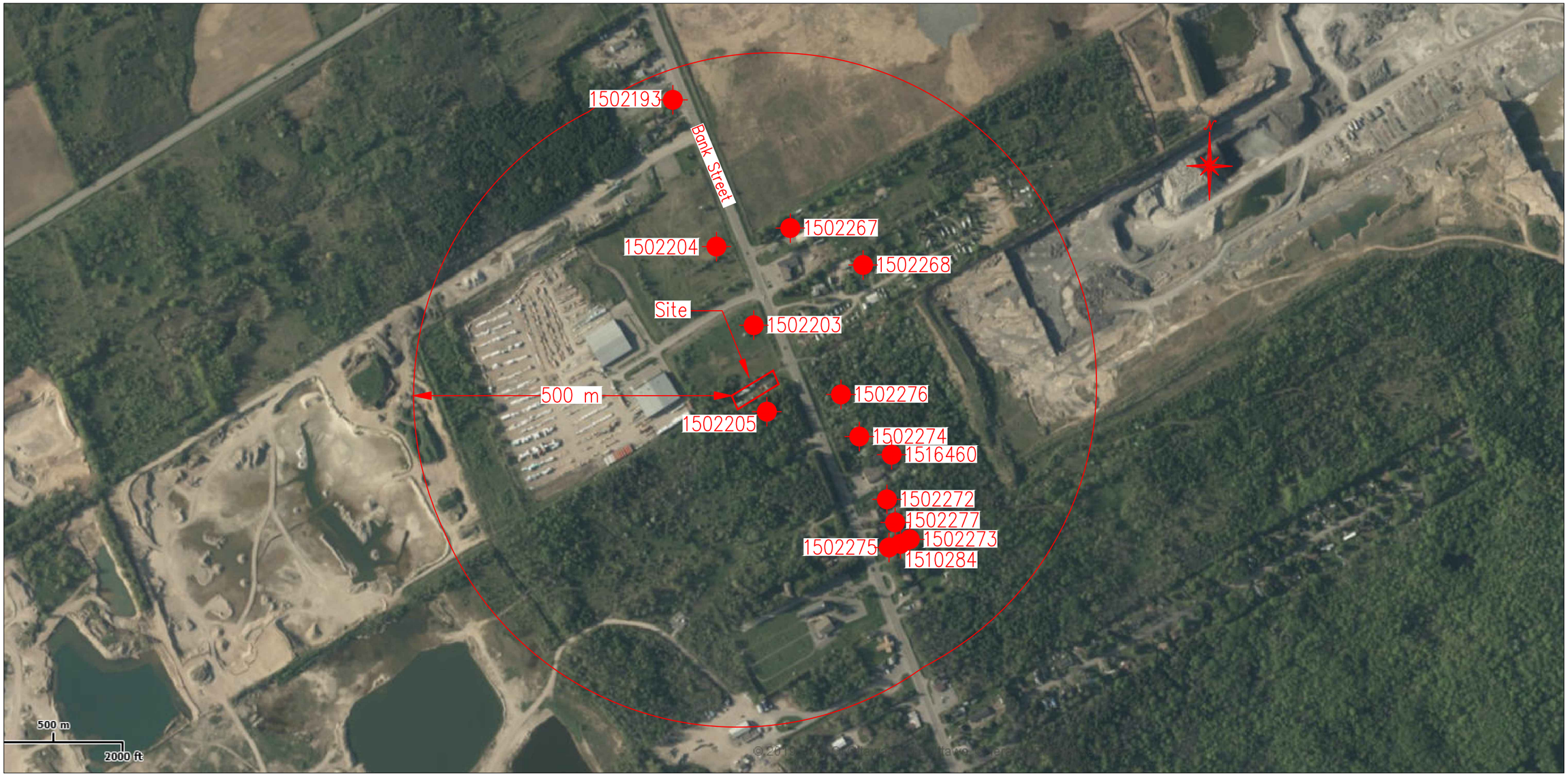
PROJECT
TERRAIN ANALYSIS AND PRIVATE SEWAGE DISPOSAL SYSTEM IMPACT ASSESSMENT
5254 BANK STREET
OTTAWA, ONTARIO

DRAWING TITLE
CONCEPTUAL SITE PLAN

PROJECT NO.
190271

DATE
MAY 2021

FIGURE 3



500 m RADIUS FROM SITE

12345 WELL RECORD APPROXIMATE LOCATION AND WELL ID

No.	REVISIONS	BY	DATE

LRJ
ENGINEERING | INGÉNIERIE
5430 Canotek Road | Ottawa, ON, K1J 9G2
www.lrl.ca | (613) 842-3434

CLIENT
JONAH BONN

DESIGNED BY:	DRAWN BY:	APPROVED BY:
	G.M.	A.W.

PROJECT
TERRAIN ANALYSIS AND PRIVATE SEWAGE DISPOSAL SYSTEM IMPACT ASSESSMENT
5254 BANK STREET
OTTAWA, ONTARIO

DRAWING TITLE
WELL LOCATIONS, ONTARIO WELL RECORDS WITHIN 500 m OF THE SITE (NOT TO SCALE)

PROJECT NO.
190271

DATE
MAY 2021

FIGURE 4

TABLES

Table 1A

Nitrate Attenuation Calculations - Hypothetical Warehouse (200 m^2) without Tertiary Treatment

Terrain Analysis and Private Sewage Disposal System Impact Study
5254 Bank Street, Ottawa, Ontario
LRL File: 190271

1. Potential Infiltration

Weather Station: Ottawa

No.	Section Area (m^2)	Infiltration Factor (IF)[1]							Moisture Surplus (MS)				Potential Infiltration (PI) (IF*MS) (mm)	
		Topography	Value	Soil	Value	Cover	Value	Total	Ground Cover	Soil Type	Moisture Retention[2] (mm)	Moisture Surplus[3] (mm)	Section	Weighted
1	1,740	Flat	0.3	Sand	0.4	Cultivated Land	0.1	0.8	Moderately Rooted Crops	2 Fine Sandy Loam	150	336	268.8	268.8
Total[6]	1,740												**Total**	268.8

2. Area Available for Infiltration

Approximate footprint of potential office building			H	200	m^2
Approximate area of paved parking and circulation			d	--	m^2
Approximate Length of Road			L	--	m
Approximate Width of Road			w	--	m
Total Area of Property				1,740	m^2
Impervious Area				200	m^2
	Roads	l x w			m^2
	Parking and Circulation	d	--		m^2
	Building	Sum of H's	200.0		m^2
Area available Infiltration			A	1,540	m^2

3. Nitrate Diluation Calculations

Nitrate Concentration of Infiltration[5]	C_i	0	mg/L
Site Infiltration	$Q_i = A*PI$	414	m^3
Daily Sewage Volume - Proposed Development[6]	Q_d	1.10	m^3
Maximum Yearly Sewage Volume - Proposed Development	$Q_e=365*Q_d$	402	m^3
Nitrate Concentration in Sewage - Proposed Development	C_e	40	mg/L
Maximum Allowable Nitrate Concentration at Boundary[4]	C_m	10.0	mg/L
Increase in Nitrate Concentration at Boundaries	C = (Qe,1Ce,1+Qe,2Ce,2+QiCi)/(Qe,1+Qe,2+Qi)	**19.7**	**mg/L**

NOTES

1 Table 2: Infiltration Factors, *Hydrogical Technical Information Requirements for Land Development Applications*, Ministry of the Energy and Environment, April 1995.

2 Thornthwaite and Mather's (1957) Instructions and Tables for Computing Potential Evapotranspiration and the Water Balance.

3 Moisture surplus for data for Ottawa ON (Environment Canada Meteorological Service of Canada, 2010).

4 As per *Technical Guideline for Individual On-Site Sewage Systems: Water Quality and Impact Risk Assessment*, Ministry of the Energy and Environment, August 1996.

5 The nitrate concentration of infiltration is assumed to be 0 mg/L.

6 Calculated using Part 8 of the Ontario Building Code, 2012: 950 L/day per water closet plus 150 L/day per loading bay. Assume one (1) water closet and one (1) loading bay.

Table 1B

Nitrate Attenuation Calculations - Hypothetical Warehouse (200 m^2) with Teritary Treatment

Terrain Analysis and Private Sewage Disposal System Impact Study
5254 Bank Street, Ottawa, Ontario
LRL File: 190271

1. Potential Infiltration

Weather Station Ottawa

		Infiltration Factor (IF)[1]							Moisture Surplus (MS)				Potential Infiltration (PI) (IF*MS) (mm)	
No.	Section Area (m^2)	Topography	Value	Soil	Value	Cover	Value	Total	Ground Cover	Soil Type	Moisture Retention[2] (mm)	Moisture Surplus[3] (mm)	Section	Weighted
1	1,740	Flat	0.3	Sand	0.4	Cultivated Land	0.1	0.8	Moderately Rooted Crops	2 Fine Sandy Loam	150	336	268.8	268.8
Total[6]	1,740												**Total**	268.8

2. Area Available for Infiltration					
Approximate footprint of potential office building			H	200	m^2
Approximate area of paved parking and circulation			d[4]	-	m^2
Approximate Length of Road			L	--	m
Approximate Width of Road			w	--	m
Total Area of Property				1,740	m^2
Impervious Area				200	m^2
	Roads	l x w			m^2
	Parking and Circulation	d	-		m^2
	Building	Sum of H's	200.0		m^2
Area available Infiltration			A	1,540	m^2

3. Nitrate Diluation Calculations				
Nitrate Concentration of Infiltration[5]		C_i	0	mg/L
Site Infiltration		$Q_i = A*PI$	414	m^3
Daily Sewage Volume - Proposed Development[6]		Q_d	1.10	m^3
Maximum Yearly Sewage Volume - Proposed Development		$Q_e=365*Q_d$	402	m^3
Nitrate Concentration in Sewage - Proposed Development		C_e	20	mg/L
Maximum Allowable Nitrate Concentration at Boundary[4]		C_m	10.0	mg/L
Increase in Nitrate Concentration at Boundaries	C = (Qe,1Ce,1+Qe,2Ce,2+QiCi)/(Qe,1+Qe,2+Qi)		**9.8**	**mg/L**

NOTES

1 Table 2: Infiltration Factors, *Hydrogical Technical Information Requirements for Land Development Applications*, Ministry of the Energy and Environment, April 1995.

2 Thornthwaite and Mather's (1957) Instructions and Tables for Computing Potential Evapotranspiration and the Water Balance.

3 Moisture surplus for data for Ottawa ON (Environment Canada Meteorological Service of Canada, 2010).

4 As per *Technical Guideline for Individual On-Site Sewage Systems: Water Quality and Impact Risk Assessment*, Ministry of the Energy and Environment, August 1996.

5 The nitrate concentration of infiltration is assumed to be 0 mg/L.

6 Calculated using Part 8 of the Ontario Building Code, 2012: 950 L/day per water closet plus 150 L/day per loading bay. Assume one (1) water closet and one (1) loading bay.

APPENDIX A

Ontario Well Record Printouts

/50

UTM 18 Z 4 5 4 6 2 0 E
9 R 5 0 1 5 4 9 0 N
Elev. 9 R 0 3 8 0
Basin 2 5 F

Con II
lot 26

15 № 2193

RECEIVED AUG 3 1955 GEOLOGICAL BRANCH DEPARTMENT of MINES

ONTARIO

The Well Drillers Act

Department of Mines, Province of Ontario

Water Well Record

[redacted] p, Village, Town or City... Gloucester

[redacted] Town or City)... South Gloucester

[redacted] s... South Gloucester

Date Completed 10 Aug. 10 1955 (day) (month) (year) Cost of Well (excluding pump)........

Pipe and Casing Record	Pumping Test
Casing diameter(s) 4"	Date Aug. 10
Length(s) of casing(s) 14'	Static level 24'
Type of screen	Pumping level 36'
Length of screen	Pumping rate 300 G.P.H.
Distance from top of screen to ground level	Duration of test 1 hr
Is well a gravel-wall type?	Distance from cylinder or bowls to ground level

Water Record

Kind (fresh or mineral)... fresh
Quality (hard, soft, contains iron, sulphur, etc.)... hard
Appearance (clear, cloudy, coloured)... clear
For what purpose(s) is the water to be used?... residential
How far is well from possible source of contamination?... 42'
What is the source of contamination?... septic tank
Enclose a copy of any mineral analysis that has been made of water...

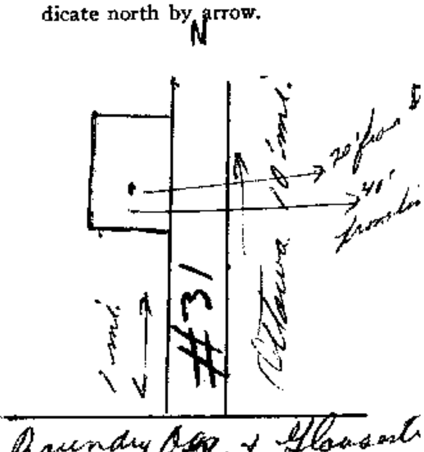
Depth(s) to Water Horizon(s)	Kind of Water	No. of Feet Water Rises
108'	fresh	84'

Well Log

Overburden and Bedrock Record	From	To
	0 ft.	....ft.
Clay	1	6'
Limestone	6	108'

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



Situation: Is well on upland, in valley, or on hillside?... hillside
Drilling Firm... M. Meagher
Address... 639 Rowanwood Ave Ottawa
Name of Driller... M. Meagher ... Address...
Date... Aug. 10 1955 ... Licence Number... 171

M. Meagher
Signature of Licensee

Form 5

31G/5a

UTM 18 Z 415151510 E
15 R 5101151610 N
Elev. 4 R 0131881
Basin 25

ONTARIO

The Water-well Drillers Act, 1954
Department of Mines

15 No 2197

GROUND WATER BRANCH
JUN 2 1959
ONTARIO WATER RESOURCES COMMISSION

Water-Well Record

County or Territorial District Carleton Township, Village, Town or City Gloucester
Village, Town or City Highway 31
Address 134 Hamilton Ottawa

[redacted]

Date completed ..... (day) ..... (month) ..... (year)

Pipe and Casing Record

Casing diameter(s) 5"
Length(s) 12'
Type of screen nil
Length of screen —

Pumping Test

Static level 7'
Pumping rate 30 GPM
Pumping level 15'
Duration of test 1 hour

Well Log

Overburden and Bedrock Record	From ft.	To ft.
Clay	0'	10'
Shale	10'	12'
Limestone	12'	71'

Water Record

Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, or sulphur)
38'	31'	fresh

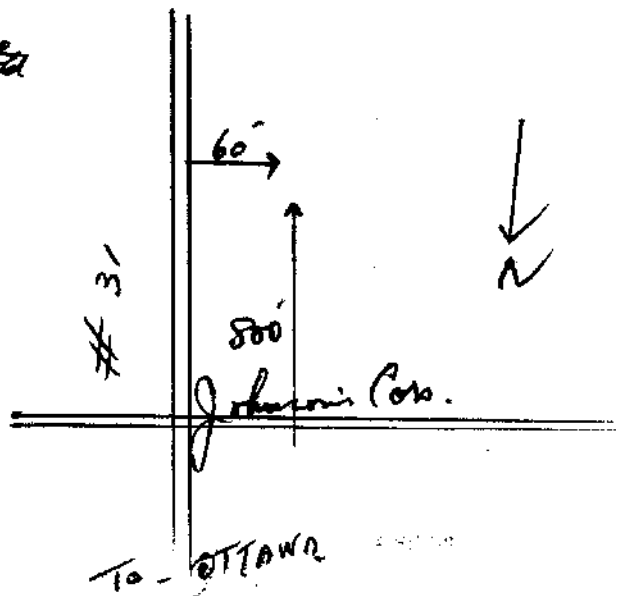
For what purpose(s) is the water to be used? Domestic
Is water clear or cloudy? clear
Is well on upland, in valley, or on hillside? Upland
Drilling firm Allan Phillips Well Co Ltd
Address Ottawa
Name of Driller Jim Phillips
Address Ottawa
Licence Number 481

I certify that the foregoing statements of fact are true.

Date 2/5/60 [signature]
Signature of Licensee

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



Form 6

310/50

UTM 18 Z 454740 E
RR 05 BAU 5 FR 96 NT

Elev. R 9380
Con I

Basin 215

Lot 27

ONTARIO

The Water-well Drillers Act, 1954
Department of Mines

RECEIVED
JAN 9 1957
GEOLOGICAL BRANCH
DEPARTMENT of MINES

2202

Water-Well Record

County or Territorial District Carleton Township, Village, Town or City Gloucester
Con. Con 4 RF Lot 27 Street and Number (if in Village, Town or City) S. Gloucester
Owner [redacted] Address S. Gloucester
Date completed Oct 9, 1956
(day) (month) (year)

Pipe and Casing Record	[redacted]	Pumping Test
Casing diameter(s) 4"		Static level 8'
Length(s) 9'		Pumping rate 200 GPH
Type of screen		Pumping level 8'
Length of screen		Duration of test 1 h.

Well Log / **Water Record**

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, or sulphur)
Clay	1'	6'			
Limestone	6	48	48'	40'	fresh

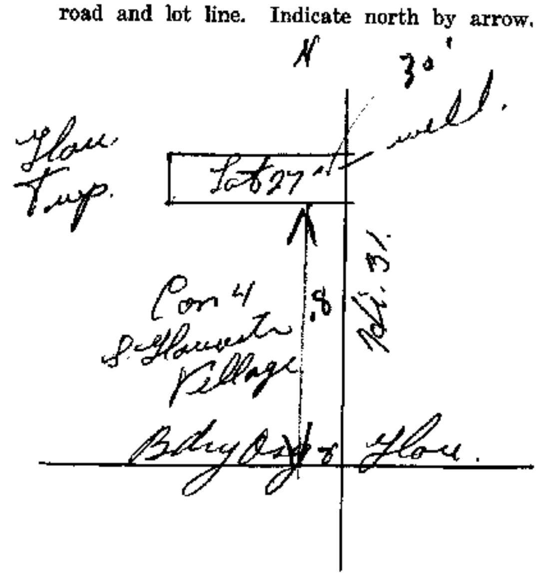
For what purpose(s) is the water to be used? home
Is water clear or cloudy? clear
Is well on upland, in valley, or on hillside? valley
Drilling firm M. McMeagher
Address 639 Rawlinwood
Name of Driller M McMeagher
Address
Licence Number 171

I certify that the foregoing statements of fact are true.

Date Oct 9. M McMeagher
Signature of Licensee

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



Form 5

316/59

UTM 18 Z 4 5 4 6 8 0 E

5 R 5 0 4 5 8 0 0 N

Rideau Front

Elev. 4 R 6 3 8 0

Con IV

Basin 2 5 27

Lot 27

220

The Ontario Water Resources Commission Act, 1957

WATER WELL RECORD

County or District CARLETON Township, Village, Town or City GLOUCESTER

Con. 4 RP Lot 27 completed 30 JULY 59 (day month year)

[redacted] ss BILLINGS BRIDGE

Casing and Screen Record

Inside diameter of casing 4"

Total length of casing 10'

Type of screen —

Length of screen —

Depth to top of screen —

Diameter of finished hole 4"

Pumping Test

Static level 8

Test-pumping rate 5 G.P.M.

Pumping level 8

Duration of test pumping 1 HR

Water clear or cloudy at end of test CLEAR

Recommended pumping rate 5 G.P.M.

with pumping level of 8

Well Log / Water Record

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, sulphur)
GRAVEL	0	8			
LIMESTONE	8	50	50	42	FRESH

For what purpose(s) is the water to be used? HOUSE

Is well on upland, in valley, or on hillside?

Drilling Firm M MEAGHER

Address OTTAWA

Licence Number 249

Name of Driller SAME

Address

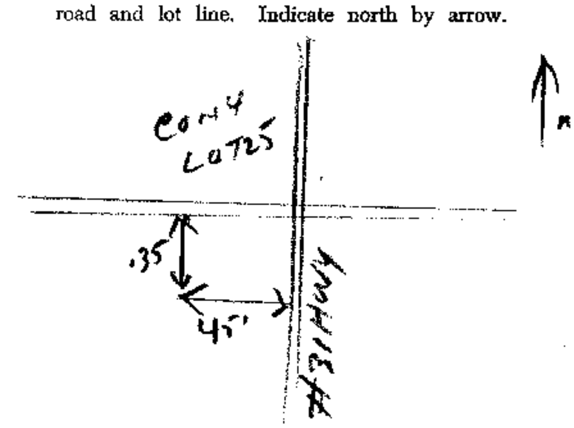
Date AUG 31/59

M. Meagher
(Signature of Licensed Drilling Contractor)

Form 5
15M-58-4149

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



CSS.S

316/58

UTM |1|8| Z |4|5|4|7|7|0| E
|9| R |5|0|1|1|5|0|5|0| N

Elev. |9| R |0|3|7|0|
Basin |2| Rideau Front

Con IV
lot 28

15 № 2205

ONTARIO

The Water-well Drillers Act, 1954

Department of Mines

Water-Well Record

County or Territorial District ....Carleton.... Township, Village, Town or City ....Gloucester....
Con. ....4RF.... Lot ....Not Known 28.... Street and Number (if in Village, Town or City) ....
Owner ....St Lawrence Rendering Co. Ltd.... Address ....South Gloucester....
Date completed ....14.... (day) ....June.... (month) ....56.... (year)

Pipe and Casing Record

Casing diameter(s) ....5in....
Length(s) ....16' ft....
Type of screen ....
Length of screen ....

Pumping Test

Static level ....8½ ft....
Pumping rate ....800 gph....
Pumping level ....42 ft....
Duration of test ....1 hr....

Well Log / Water Record

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, or sulphur)
Boulder Till	0	6			
Sandstone	6	163½	155	146½	fresh

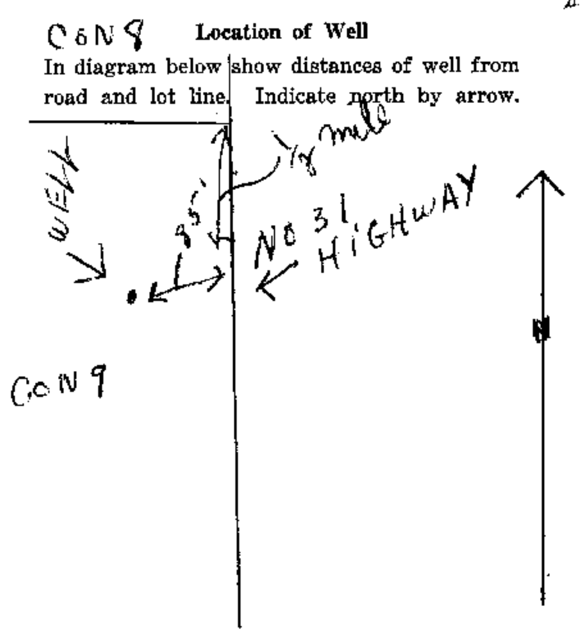
For what purpose(s) is the water to be used? ....Domestic (Company uses)....
Is water clear or cloudy? ....Clear....
Is well on upland, in valley, or on hillside? ....Hillside....
Drilling firm ....R.H.Casselman....
Address ....Williamsburg....
Name of Driller ....Philip Casselman....
Address ....Williamsburg Ontario....
Licence Number ....1025....

I certify that the foregoing statements of fact are true.

Date ....June 14/56.... Phil Casselman
Signature of Licensee

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



Form 5

316/58

UTM |1|8|z |4|5|4|7|9|0| E

RIDEAU |5|F|B|O|M|5|3|2|0| N

Elev. CON 4 R V 0|3|9|0|

Lot 27

Basin |2|5|

The Ontario Water Resources Commission Act

WATER WELL RECORD

County or District Carleton Township, Village, Town or City Gloucester

Con. V R.F. Lot SF 27 Date completed 18 (day) Mar (month) 64 (year)

[redacted]dress South Gloucester

Casing and Screen Record	
Inside diameter of casing	6"
Total length of casing	11'
Type of screen	NIL
Length of screen	
Depth to top of screen	
Diameter of finished hole	6"

Pumping Test	
Static level	70'
Test-pumping rate	15 G.P.M.
Pumping level	80'
Duration of test pumping	2 hrs
Water clear or cloudy at end of test	clear
Recommended pumping rate	10 G.P.M.
with pump setting of	90' feet below ground surface

Well Log: Overburden and Bedrock Record	From ft.	To ft.	Water Record: Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
Brown sandy loam	0	4'6"	95	fresh
Hard grey limestone	4'6"	94'	162	"
layers of soft and hard	94'	230'	188	"
Whitish grey sandstone			214	"

For what purpose(s) is the water to be used? Domestic

Is well on upland, in valley, or on hillside? hillside

Drilling or Boring Firm M E Johnston Drilling Box 4134

Address Ottawa

Licence Number 1435

Name of Driller or Borer B Klatt

Address Here

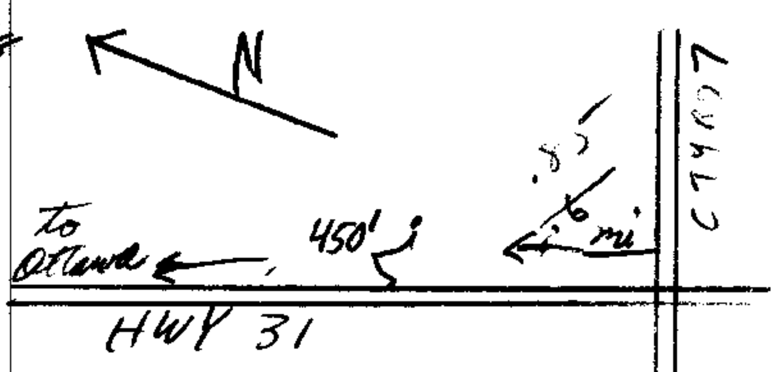
Date Nov 16/64

Ray W Renwick

(Signature of Licensed Drilling or Boring Contractor)

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



Form 7 10M-62-1152

OWRC COPY

31G/5a

UTM 1 | 18 Z | 4 5 4 9 0 0 0 E

5 R | 5 0 1 5 2 4 0 N

Elev. 4 R | 9 3 9 2

Basin 2 | 5

The Ontario Water Resources Commission Act

WATER WELL RECORD

GROUND WATER BRANCH
15 No. 2268
DEC 1 1961
ONTARIO WATER RESOURCES COMMISSION

County or District Carleton Township, Village, Town or City Gloucester

Con. V RF Lot 27 Date completed 8 (day) Nov (month) 61 (year)

[redacted] ddress RR # 4 Ottawa

Casing and Screen Record	
Inside diameter of casing	4"
Total length of casing	none
Type of screen	
Length of screen	
Depth to top of screen	
Diameter of finished hole	3 3/4"

Pumping Test	
Static level	50'
Test-pumping rate	5 G.P.M.
Pumping level	165
Duration of test pumping	1 hr
Water clear or cloudy at end of test	clear
Recommended pumping rate	4 G.P.M.
with pump setting of	160 feet below ground surface

Well Log / Water Record

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
Previously drilled to 63'	0	63		fresh
hard sandstone	63'	170'	92	
			146	

For what purpose(s) is the water to be used? Farm

Is well on upland, in valley, or on hillside? upland

Drilling or Boring Firm F.C. Johnston Drilling Co. Ltd

Address 1340 Bank Ottawa

Licence Number 240

Name of Driller or Borer R W Renwick

Address Pakenham

Date Nov 30/61

F.C. Johnston Drilling Co. Ltd

(Signature of Licensed Drilling or Boring Contractor)

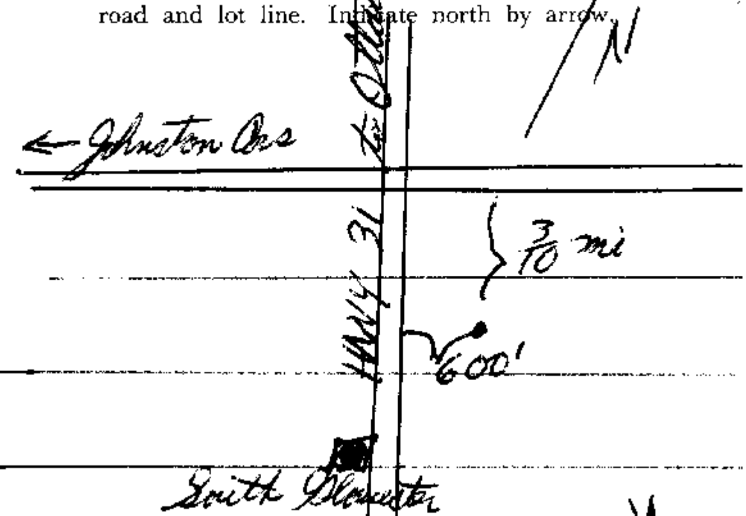
Per Ray W Renwick

Form 7 15M Sets 60-5960

OWRC COPY

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



OK

316/52.

UTM |1|8|z |4|1|5|5|9|5|4|0|2 E

|5|R |5|0|1|1|5|1|2|0| N

Elev. |4|R |Sample|

Basin |Conc. 2 R| Lot - 28.

No. 2270

ONTARIO

The Well Drillers Act

Department of Mines, Province of Ontario

Water Well Record

[redacted] Carleton ... Township, ~~Village, Town or City~~ Gloucester

[redacted] (Town or City) South Gloucester

[redacted] Billing Bridge

Date Completed Feb. 1 ... (day) (month) (year) ... Cost of Well (excluding pump) ...

Pipe and Casing Record		Pumping Test	
Casing diameter(s)	4 inch	Date	18
Length(s) of casing(s)	20 feet	Static level	30
Type of screen		Pumping level	30 feet
Length of screen		Pumping rate	191 gal
Distance from top of screen to ground level		Duration of test	1 1/2 hr long
Is well a gravel-wall type?		Distance from cylinder or bowls to ground level	

Water Record

Kind (fresh or mineral) ... fresh

Quality (hard, soft, contains iron, sulphur, etc.) ... hard

Appearance (clear, cloudy, coloured) ... Clear Crystal

For what purpose(s) is the water to be used? ... house + live stock use

How far is well from possible source of contamination? ... [illegible]

What is the source of contamination? ... None at all

Enclose a copy of any mineral analysis that has been made of water ...

Depth(s) to Water Horizon(s)	Kind of Water	No. of Feet Water Rises
115 ft	fresh	~~30~~

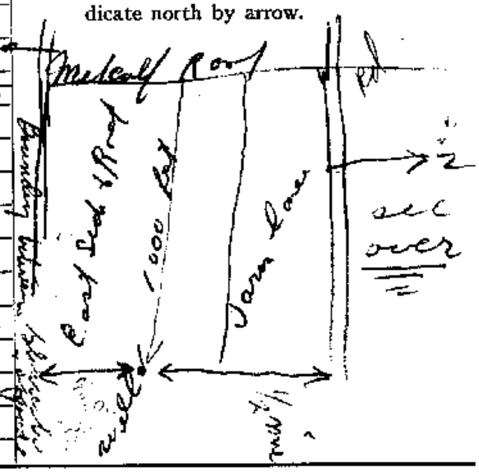
Well Log

Overburden and Bedrock Record	From	To
Old well	0 ft.	70 ft.
Oc. ~~allicate Rock~~ (Sample)	70	115
Sandstone	70	115

Location of Well

1/3 mile north of Church S. Gloucester

In diagram below show distances of well from road and lot line. Indicate north by arrow.



Situation: Is well on upland, in valley, or on hillside? ... hill

Drilling Firm ... Gordon S. Mulligan & Co.

Address ... 488 McLeod St. Ottawa

Name of Driller ... Jones Kettles ... Address ... Ramsayville

Date ... Feby 3 1952 ... Licence Number ...

Signature of Licensee

Form 5

316/50.

UTM | 1 | 8 | Z | 4 | 5 | 4 | 9 | 2 | 2 | 0 | E
| 5 | R | 5 | 0 | 1 | 4 | 8 | 9 | 0 | N

Elev. ~~240 0818 1818~~ BMIT

Basin ~~C2454~~ K1

LOT 28

15 № 2272

ONTARIO

The Water-well Drillers Act, 1954

Department of Mines

Water-Well Record

[redacted] CARLETON Township, Village, Town or City GLOUCESTER

[redacted] Village, Town or City)

[redacted] ddress

Date completed .... (day) .... (month) .... (year)

Pipe and Casing Record

Casing diameter(s) 4"

Length(s) 21'

Type of screen NO

Length of screen

Pumping Test

Static level 8'

Pumping rate 250 GPH

Pumping level 14

Duration of test 1 Hr

Well Log / **Water Record**

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, or sulphur)
CLAY + BOULDERS	0	12			
LIMESTONE	12	50	50	42	FRESH

For what purpose(s) is the water to be used? HOUSE

Is water clear or cloudy? CLEAR

Is well on upland, in valley, or on hillside? ✓

Drilling firm

Address

Name of Driller M MEAGHER

Address OTTAWA

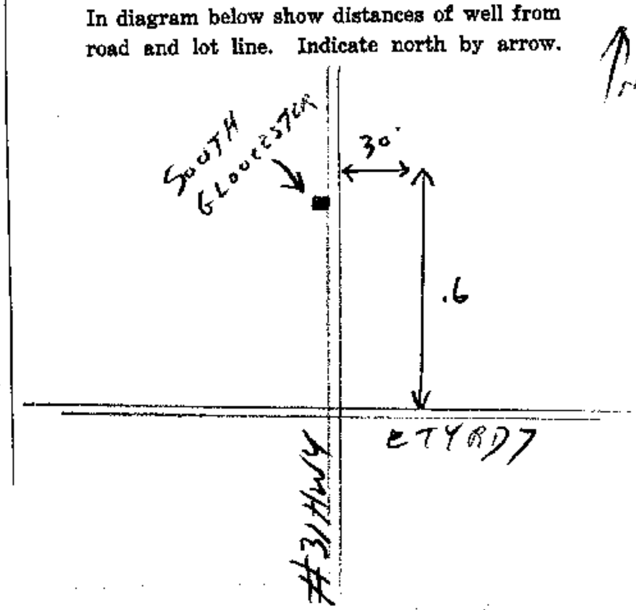
Licence Number 171

I certify that the foregoing statements of fact are true.

Date DEC 15 M Meagher
Signature of Licensee

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



Form 5

316/50

UTM 18 Z 4 5 4 9 7 0 E
5 R 5 0 1 4 8 1 0 N
Elev. R 4 0 3 FEET
Basin 2 5
Lot 28

The Ontario Water Resources Commission Act, 1957

No. 15 2273

GROUND WATER BRANCH SEP 7 1960 ONTARIO WATER RESOURCES COMMISSION

WATER WELL RECORD

County or District CARLETON Township, Village, Town or City GLOUCESTER

Con. 5 RF Lot 28 Date completed 19 (day) JULY (month) 60 (year)

[redacted] ess S. GLOUCESTER

Casing and Screen Record	
Inside diameter of casing	4"
Total length of casing	16'
Type of screen	—
Length of screen	—
Depth to top of screen	—
Diameter of finished hole	4"

Pumping Test	
Static level	9
Test-pumping rate	2 1/2 G.P.M.
Pumping level	14
Duration of test pumping	1 HR
Water clear or cloudy at end of test	CLEAR
Recommended pumping rate	2 1/2 G.P.M.
with pumping setting of	24

Well Log: Overburden and Bedrock Record	From ft.	To ft.	Water Record: Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, sulphur)
LOAM	0	14			
GRAVEL	14	16			
GREY LIMESTONE	16	58	58	49	FRESH

For what purpose(s) is the water to be used? HOUSE

Is well on upland, in valley, or on hillside? ✓ (valley)

Drilling Firm M. MEAGHER

Address OTTAWA

Licence Number

Name of Driller SAME

Address

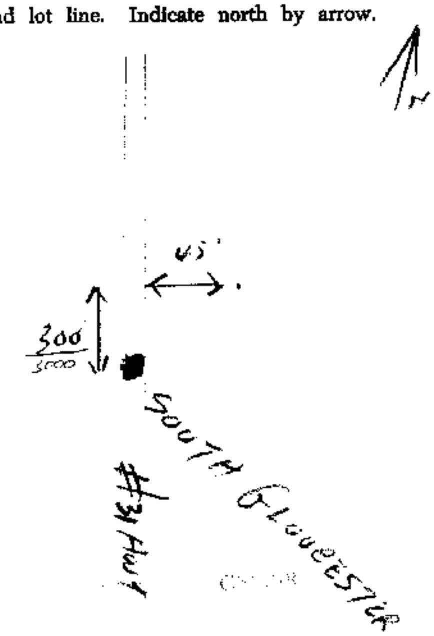
Date AUG 26/60

M. Meagher
(Signature of Licensed Drilling Contractor)

Form 5

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



316/58

UTM 18 Z 4548710 E
5 R 5014990 N
Elev. 4 R 0365
Basin 23 V
Lot 28

15 № 2274

The Ontario Water Resources Commission Act, 1957

WATER WELL RECORD

County or District Carleton Township, Village, Town or City Gloucester
Con. 5 R.F. Lot ~~28~~ 28 [redacted]ate completed 2 Sept. 1960 (day month year)
[redacted]ddress R.R. 4 Ottawa Ont.

Casing and Screen Record		Pumping Test	
Inside diameter of casing	4 inch	Static level	10
Total length of casing	4 ~~inch~~ feet	Test-pumping rate	5 G.P.M.
Type of screen		Pumping level	26
Length of screen		Duration of test pumping	1 hour
Depth to top of screen		Water clear or cloudy at end of test	clear
Diameter of finished hole	4 inch	Recommended pumping rate	4 G.P.M.
		with pumping ~~level of~~ SET	24'

Well Log / **Water Record**

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, sulphur)
hard pan	0	4	36	10	fresh
limestone rock ?	4'	36'			

For what purpose(s) is the water to be used? house

Is well on upland, in valley, or on hillside? hillside

Drilling Firm Cayen well drillers

Address St. Albert Ont.

Licence Number 404

Name of Driller Cayen & Cayen

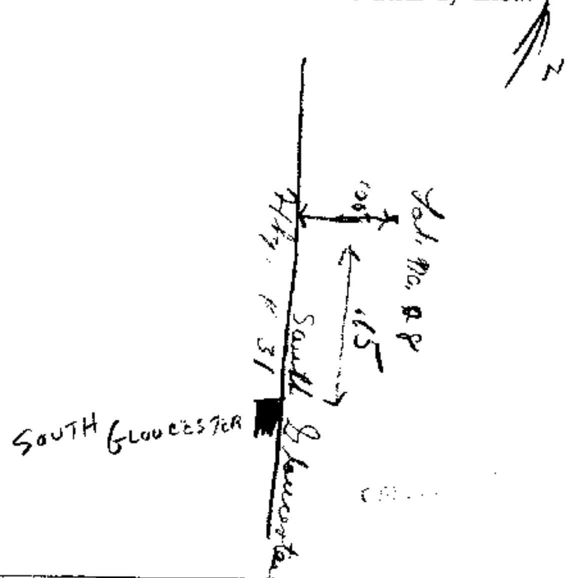
Address St. Albert Ont.

Date Sept. 2

Maurice Cayen
(Signature of Licensed Drilling Contractor)

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



Form 5
15M-58-4149

31G/52

UTM 18 Z 454930 E

Ridgeway F697 5018110 N

Elev C 04 R V 0350

Basin Lot 28 925

The Ontario Water Resources Commission Act

WATER WELL RECORD

County or District CARLETON Township, Village, Town or City GLOUCESTER

Con. 5 RF Lot 28 Date completed 2 (day) JULY (month) 61 (year)

[redacted] Address BILLINGS BRIDGE

Casing and Screen Record		Pumping Test	
Inside diameter of casing	4"	Static level	8'
Total length of casing	10'	Test-pumping rate	4 G.P.M.
Type of screen	—	Pumping level	8
Length of screen	—	Duration of test pumping	1 HR
Depth to top of screen	—	Water clear or cloudy at end of test	CLEAR
Diameter of finished hole	4"	Recommended pumping rate	4 G.P.M.
		with pump setting of 25' feet below ground surface	

Well Log: Overburden and Bedrock Record	From ft.	To ft.	Water Record: Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
GREY LIMESTONE	0	100	100	FRESH

For what purpose(s) is the water to be used? STORE - HOUSE & GARAGE

Is well on upland, in valley, or on hillside?

Drilling or Boring Firm M MEAGHER

Address OTTAWA

Licence Number 245

Name of Driller or Borer SAME

Address

Date AUG 9/61

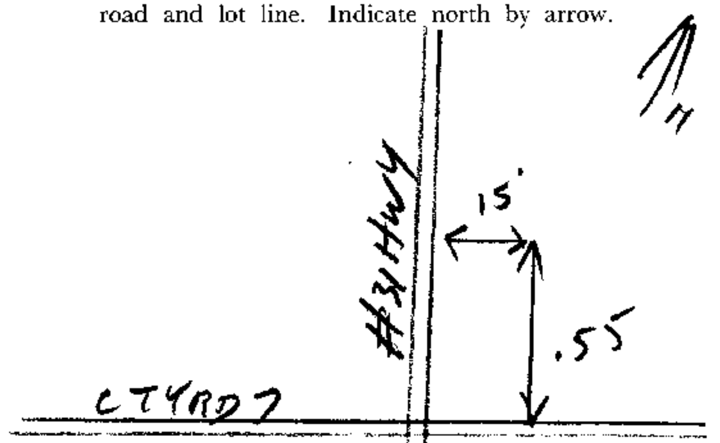
M Meagher
(Signature of Licensed Drilling or Boring Contractor)

Form 7 15M Sets 60-5990

OWRC COPY

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



316/52

UTM 18 Z 4541850 E
Upper Front
5 R 5011540 N
Con V
Elev. 4 R 0368
Lot 28
Basin 25

The Ontario Water Resources Commission Act

WATER WELL RECORD

15 No 2276

ONTARIO WATER RESOURCES COMMISSION

County or District Carl Township, Village, Town or City Gloucester

Con. 5 RF Lot 24 Date completed 24 (day) Oct (month) 1961 (year)

[redacted]ddress Richmond Ont

Casing and Screen Record

Inside diameter of casing 5 5/8

Total length of casing 20'

Type of screen

Length of screen

Depth to top of screen

Diameter of finished hole 5 1/2"

Pumping Test

Static level 50'

Test-pumping rate 10 G.P.M.

Pumping level 94'

Duration of test pumping 1 hr

Water clear or cloudy at end of test cloudy

Recommended pumping rate 10 G.P.M.

with pump setting of 120 feet below ground surface

Well Log / Water Record

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
Broken (G) lime	0	10	70'	fresh
Grey lime	10'	90'	135'	"
(G) limes ~~lime~~ with Quartz	90'	100'		
Sandstone	100'	137'		

For what purpose(s) is the water to be used? household

Is well on upland, in valley, or on hillside? upland

Drilling or Boring Firm Capital Water Supply

Address 1243 Aron Rd Ottawa

Licence Number

Name of Driller or Borer M Kavanagh

Address Stittsville Ont

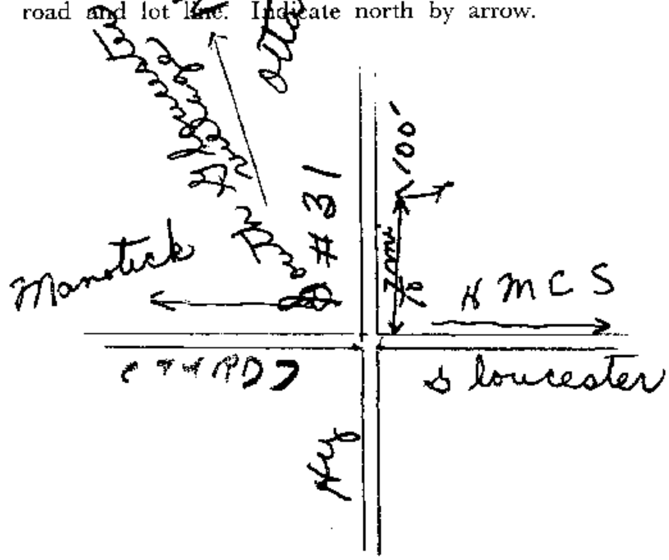
Date

Walter Kavanagh

(Signature of Licensed Drilling or Boring Contractor)

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



Form 7 15M Sets 60-5930

OWRC COPY

310/58

UTM 1|8 Z 4|5|4|9|4|0 E
KIDEAU FRONT
5 R 5|0|1|4|8|5|0 N
CON I
Elev. LOT 28 R 0|3|5|6
Basin 2|5

The Ontario Water Resources Commission Act

WATER WELL RECORD

County or District: Carleton — Township, Village, Town or City: Gloucester

Con. 5 RF — Lot ~~PT N½~~ 28 — Date completed 8 (day) Oct (month) 1964 (year)

Owner [redacted] (print in block letters) — Address RR 6 Ottawa

Casing and Screen Record [redacted]

Inside diameter of casing	2
Total length of casing	34
Type of screen	—
Length of screen	—
Depth to top of screen	—
Diameter of finished hole	2

Pumping Test

Static level	22
Test-pumping rate	2 G.P.M.
Pumping level	60
Duration of test pumping	2 hr
Water clear or cloudy at end of test	Cloudy
Recommended pumping rate	2 G.P.M.
with pump setting of	60 feet below ground surface

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
Top Soil	0	4	152	Fresh
sand	4	5		
Lime Stone	5	152		

For what purpose(s) is the water to be used? House

Is well on upland, in valley, or on hillside? Upland

Drilling or Boring Firm: F.R. Cossette

Address: 1510 Base line Rd. Ottawa

Licence Number: 1472

Name of Driller or Borer: Same

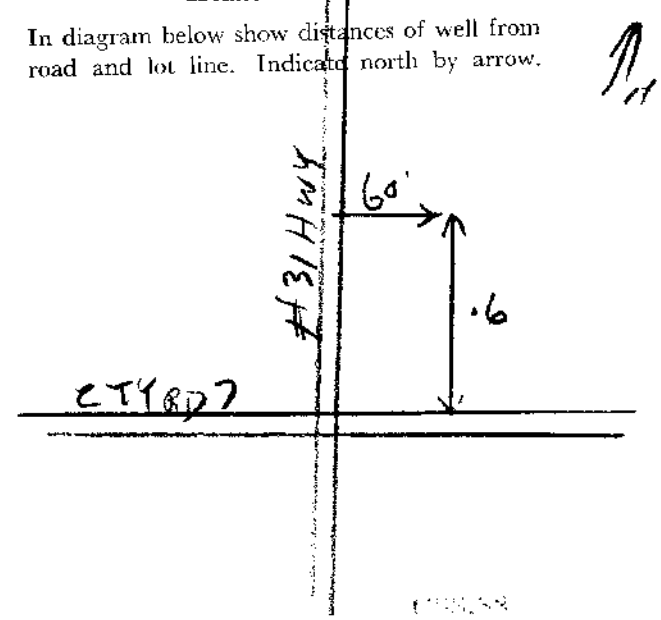
Address:

Date: Oct 9-1964

F.R. Cossette
(Signature of Licensed Drilling or Boring Contractor)

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



Form 7 15M-60-4138

OWRC COPY

SMALL FRAME

3/6/58

The Ontario Water Resources Commission Act

WATER WELL RECORD

Water management in Ontario

1. PRINT ONLY IN SPACES PROVIDED
2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

11 | 1510284 | MUNICIP. 15002 | CON. CON | 05

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT
Carl	Gloucester	4 5 RF	028

[redacted] R#6 Ottawa Ont — DATE COMPLETED DAY 22 MO 07 YR 69

01482,0 | RL 4 | ELEVATION 0350 | RC 5 | BASIN CODE 25

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH – FEET FROM	TO
brown	sand		fill	0'	5'
red	sand	clay & boulders		5'	14'
blue	limestone			14'	50'

31 | 0005009 | 00147090st13 005d315

32

41 WATER RECORD

WATER FOUND AT – FEET	KIND OF WATER
0048	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH – FEET FROM	TO
05	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ ~~OPEN HOLE~~	188	0	0018
~~6~~			18	~~50~~
05	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE			0050
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

SIZE(S) OF OPENING (SLOT NO.) | DIAMETER INCHES | LENGTH FEET
MATERIAL AND TYPE | DEPTH TO TOP OF SCREEN FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT – FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☐ PUMP 2 ☒ BAILER | PUMPING RATE 0010 GPM. | DURATION OF PUMPING 01 HOURS 00 MINS.

STATIC LEVEL	WATER LEVEL END OF PUMPING	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
010 FEET	010 FEET	010 FEET	010 FEET	010 FEET	010 FEET

WATER LEVELS DURING: 1 ☒ PUMPING 2 ☐ RECOVERY

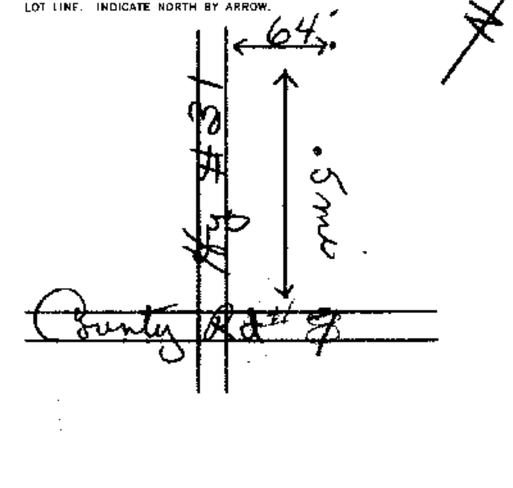
IF FLOWING, GIVE RATE ___ GPM. | PUMP INTAKE SET AT ___ FEET | WATER AT END OF TEST: 1 ☐ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE: ☒ SHALLOW ☐ DEEP | RECOMMENDED PUMP SETTING 030 FEET | RECOMMENDED PUMPING RATE 0005 GPM.

020.0 GPM./FT. SPECIFIC CAPACITY

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



DRILLERS REMARKS:

FINAL STATUS OF WELL: 1 ☒ WATER SUPPLY 2 ☐ OBSERVATION WELL 3 ☐ TEST HOLE 4 ☐ RECHARGE WELL 5 ☐ ABANDONED, INSUFFICIENT SUPPLY 6 ☐ ABANDONED, POOR QUALITY 7 ☐ UNFINISHED

WATER USE 01: 1 ☒ DOMESTIC 2 ☐ STOCK 3 ☐ IRRIGATION 4 ☐ INDUSTRIAL ☐ OTHER 5 ☐ COMMERCIAL 6 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING 9 ☐ NOT USED

METHOD OF DRILLING: 1 ☒ CABLE TOOL 2 ☐ ROTARY (CONVENTIONAL) 3 ☐ ROTARY (REVERSE) 4 ☐ ROTARY (AIR) 5 ☐ AIR PERCUSSION 6 ☐ BORING 7 ☐ DIAMOND 8 ☐ JETTING 9 ☐ DRIVING

CONTRACTOR

NAME OF WELL CONTRACTOR: Capital Water Supply | LICENCE NUMBER: 3216

ADDRESS: 14 Ashford Dr Ottawa

NAME OF DRILLER OR BORER: A. Maurice | LICENCE NUMBER:

SIGNATURE OF CONTRACTOR: Walter Cavanagh | SUBMISSION DATE DAY ___ MO ___ YR ___

OFFICE USE ONLY

DATA SOURCE 1 | CONTRACTOR 1503 | DATE RECEIVED 301069

DATE OF INSPECTION | INSPECTOR

REMARKS:

OWRC COPY

31G52

MINISTRY OF THE ENVIRONMENT
The Ontario Water Resources Act

WATER WELL RECORD

Ontario

1. PRINT ONLY IN SPACES PROVIDED
2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

(11) 1516460 | MUN 15002 | CON. RF | 05

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT
[redacted]	Gloucester	5	028

[redacted] . # 6 Ottawa, Ontario

DATE COMPLETED: DAY 28 MO 04 YR 78

NORTHING 014960 | RC 4 | ELEVATION 0360 | RC 4 | BASIN CODE 26

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
brown	sand	boulders	packed	0	5
grey	limestone		hard	5	135

(31) 0005 28/13 79 | 0/135 15 73

32

(41) WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0128	1 ☒ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL

(51) CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
06	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	188	0	0024
06	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE		24	0135
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN: SIZE OF OPENING (SLOT NO.) | DIAMETER INCHES | LENGTH FEET | MATERIAL AND TYPE | DEPTH TO TOP OF SCREEN FEET

(61) PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)

(71) PUMPING TEST

PUMPING TEST METHOD: 1 ☒ PUMP 2 ☐ BAILER | PUMPING RATE 0009 GPM | DURATION OF PUMPING 01 HOURS 00 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
010	050 FEET	050	050	050	050 FEET

WATER LEVELS DURING: 1 ☒ PUMPING 2 ☐ RECOVERY

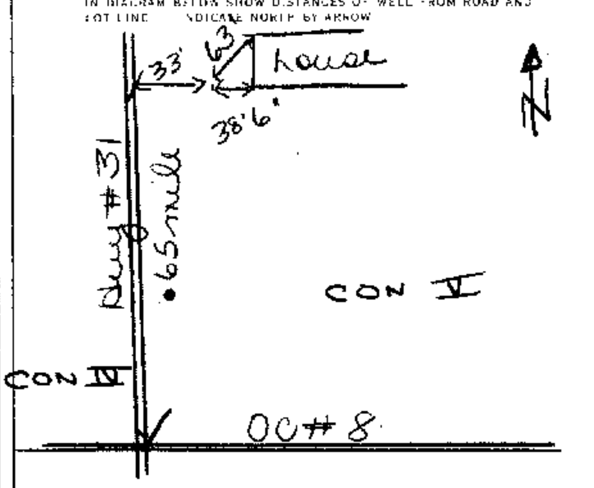
IF FLOWING GIVE RATE: GPM | PUMP INTAKE SET AT: FEET | WATER AT END OF TEST: 1 ☒ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE: ☐ SHALLOW ☒ DEEP | RECOMMENDED PUMP SETTING 060 FEET | RECOMMENDED PUMPING RATE 0005 GPM

GPM/FT. SPECIFIC CAPACITY

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



DRILLERS REMARKS

FINAL STATUS OF WELL: 1

1 ☒ WATER SUPPLY
2 ☐ OBSERVATION WELL
3 ☐ TEST HOLE
4 ☐ RECHARGE WELL
5 ☐ ABANDONED, INSUFFICIENT SUPPLY
6 ☐ ABANDONED, POOR QUALITY
7 ☐ UNFINISHED

WATER USE: 01

1 ☒ DOMESTIC
2 ☐ STOCK
3 ☐ IRRIGATION
4 ☐ INDUSTRIAL
☐ OTHER
5 ☐ COMMERCIAL
6 ☐ MUNICIPAL
7 ☐ PUBLIC SUPPLY
8 ☐ COOLING OR AIR CONDITIONING
9 ☐ NOT USED

METHOD OF DRILLING: 5

1 ☐ CABLE TOOL
2 ☐ ROTARY (CONVENTIONAL)
3 ☐ ROTARY (REVERSE)
4 ☐ ROTARY (AIR)
5 ☒ AIR PERCUSSION
6 ☐ BORING
7 ☐ DIAMOND
8 ☐ JETTING
9 ☐ DRIVING

CONTRACTOR

NAME OF WELL CONTRACTOR: Capital Water Supply Ltd. | LICENCE NUMBER: 1558

ADDRESS: Box 490 Stittsville, Ontario

NAME OF DRILLER OR BORER: S. Miller | LICENCE NUMBER:

SIGNATURE OF CONTRACTOR: Walter Kavanagh | SUBMISSION DATE: DAY 28 MO 04 YR 78

OFFICE USE ONLY

DATA SOURCE: 1 | CONTRACTOR: 1558 | DATE RECEIVED: 170578

DATE OF INSPECTION: 23/5/79 | INSPECTOR: J.P.P.

REMARKS: P WI

MINISTRY OF THE ENVIRONMENT COPY

FORM 7 MOE 07-091

APPENDIX B

Moisture Surplus Printout

Ottawa Airport, ON WATER BUDGET MEANS FOR THE PERIOD 1950-2010 DC20492

LAT.... 45.32 WATER HOLDING CAPACITY... 50 MM HEAT INDEX... 36.41
LONG... 75.67 LOWER ZONE..... 30 MM A..... 1.075

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-10.6	64	13	15	0	0	0	27	83	50	299
28- 2	-8.8	57	12	18	1	1	0	29	110	50	356
31- 3	-2.7	66	32	80	5	5	0	107	64	50	422
30- 4	5.9	72	67	69	32	32	0	104	0	50	494
31- 5	13.0	74	74	0	80	79	-1	13	0	32	568
30- 6	18.3	82	82	0	116	97	-19	4	0	14	651
31- 7	20.8	89	89	0	135	94	-41	3	0	5	740
31- 8	19.5	87	87	0	117	83	-34	1	0	9	827
30- 9	14.6	84	84	0	75	66	-9	7	0	20	912
31-10	8.1	77	76	0	36	35	-1	24	0	37	77
30-11	1.3	80	63	8	10	10	0	50	9	49	157
31-12	-7.0	78	26	15	1	1	0	38	47	50	236
AVE	5.9 TTL	911	705	205	608	503	-105	407			

Ottawa Airport, ON STANDARD DEVIATIONS FOR THE PERIOD 1950-2010 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.0	26	16	18	1	1	0	31	43	0	55
28- 2	2.6	29	15	27	1	1	0	37	59	0	59
31- 3	2.3	28	22	47	4	4	0	53	83	0	65
30- 4	1.7	31	31	84	8	8	0	84	0	2	74
31- 5	1.9	32	32	0	12	11	5	21	0	19	85
30- 6	1.2	38	38	0	9	26	26	17	0	19	93
31- 7	1.2	42	42	0	8	30	31	12	0	14	93
31- 8	1.3	39	39	0	8	30	32	5	0	16	107
30- 9	1.5	38	38	0	8	14	13	20	0	21	110
31-10	1.4	37	37	2	7	7	3	27	0	19	37
30-11	1.7	27	28	9	4	4	0	30	13	6	45
31-12	3.0	30	22	14	1	1	0	29	34	0	56

Ottawa Airport, ON WATER BUDGET MEANS FOR THE PERIOD 1950-2010 DC20492

LAT.... 45.32 WATER HOLDING CAPACITY... 75 MM HEAT INDEX... 36.41
LONG... 75.67 LOWER ZONE..... 45 MM A..... 1.075

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-10.6	64	13	15	0	0	0	27	83	75	299
28- 2	-8.8	57	12	18	1	1	0	29	110	75	356
31- 3	-2.7	66	32	80	5	5	0	107	64	75	422
30- 4	5.9	72	67	69	32	32	0	104	0	75	494
31- 5	13.0	74	74	0	80	80	0	13	0	56	568
30- 6	18.3	82	82	0	116	107	-10	4	0	28	651
31- 7	20.8	89	89	0	135	104	-32	2	0	10	740
31- 8	19.5	87	87	0	117	85	-32	1	0	12	827
30- 9	14.6	84	84	0	75	66	-9	4	0	26	912
31-10	8.1	77	76	0	36	35	-1	15	0	52	77
30-11	1.3	80	63	8	10	10	0	42	9	71	157
31-12	-7.0	78	26	15	1	1	0	36	47	75	236
AVE	5.9 TTL	911	705	205	608	526	-84	384			

Ottawa Airport, ON STANDARD DEVIATIONS FOR THE PERIOD 1950-2010 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.0	26	16	18	1	1	0	30	43	0	55
28- 2	2.6	29	15	27	1	1	0	37	59	0	59
31- 3	2.3	28	22	47	4	4	0	53	83	0	65
30- 4	1.7	31	31	84	8	8	0	84	0	2	74
31- 5	1.9	32	32	0	12	12	0	21	0	22	85
30- 6	1.2	38	38	0	9	19	19	17	0	28	93
31- 7	1.2	42	42	0	8	28	30	11	0	22	93
31- 8	1.3	39	39	0	8	29	31	5	0	23	107
30- 9	1.5	38	38	0	8	14	14	17	0	29	110
31-10	1.4	37	37	2	7	7	2	23	0	28	37
30-11	1.7	27	28	9	4	4	0	33	13	11	45
31-12	3.0	30	22	14	1	1	0	30	34	3	56

Ottawa Airport, ON WATER BUDGET MEANS FOR THE PERIOD 1950-2010 DC20492

LAT.... 45.32 WATER HOLDING CAPACITY...100 MM HEAT INDEX... 36.41
LONG... 75.67 LOWER ZONE..... 60 MM A..... 1.075

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-10.6	64	13	15	0	0	0	25	83	99	299
28- 2	-8.8	57	12	18	1	1	0	28	110	99	356
31- 3	-2.7	66	32	80	5	5	0	106	64	100	422
30- 4	5.9	72	67	69	32	32	0	104	0	100	494
31- 5	13.0	74	74	0	80	80	0	13	0	81	568
30- 6	18.3	82	82	0	116	112	-4	4	0	47	651
31- 7	20.8	89	89	0	135	115	-21	2	0	19	740
31- 8	19.5	87	87	0	117	88	-29	1	0	18	827
30- 9	14.6	84	84	0	75	66	-8	3	0	32	912
31-10	8.1	77	76	0	36	35	-1	10	0	63	77
30-11	1.3	80	63	8	10	10	0	34	9	91	157
31-12	-7.0	78	26	15	1	1	0	33	47	97	236
AVE	5.9 TTL	911	705	205	608	545	-63	363			

Ottawa Airport, ON STANDARD DEVIATIONS FOR THE PERIOD 1950-2010 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.0	26	16	18	1	1	0	30	43	5	55
28- 2	2.6	29	15	27	1	1	0	37	59	3	59
31- 3	2.3	28	22	47	4	4	0	53	83	0	65
30- 4	1.7	31	31	84	8	8	0	84	0	2	74
31- 5	1.9	32	32	0	12	12	0	21	0	22	85
30- 6	1.2	38	38	0	9	12	11	17	0	34	93
31- 7	1.2	42	42	0	8	25	26	11	0	30	93
31- 8	1.3	39	39	0	8	29	30	5	0	30	107
30- 9	1.5	38	38	0	8	14	13	15	0	35	110
31-10	1.4	37	37	2	7	6	2	21	0	36	37
30-11	1.7	27	28	9	4	4	0	34	13	19	45
31-12	3.0	30	22	14	1	1	0	30	34	8	56

Ottawa Airport, ON WATER BUDGET MEANS FOR THE PERIOD 1950-2010 DC20492

LAT.... 45.32 WATER HOLDING CAPACITY...125 MM HEAT INDEX... 36.41
LONG... 75.67 LOWER ZONE..... 75 MM A..... 1.075

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-10.6	64	13	15	0	0	0	24	83	122	299
28- 2	-8.8	57	12	18	1	1	0	28	110	123	356
31- 3	-2.7	66	32	80	5	5	0	105	64	125	422
30- 4	5.9	72	67	69	32	32	0	104	0	125	494
31- 5	13.0	74	74	0	80	80	0	13	0	106	568
30- 6	18.3	82	82	0	116	115	-1	4	0	69	651
31- 7	20.8	89	89	0	135	122	-13	2	0	33	740
31- 8	19.5	87	87	0	117	92	-25	1	0	28	827
30- 9	14.6	84	84	0	75	67	-7	3	0	41	912
31-10	8.1	77	76	0	36	35	-1	9	0	74	77
30-11	1.3	80	63	8	10	10	0	27	9	108	157
31-12	-7.0	78	26	15	1	1	0	29	47	119	236
AVE	5.9 TTL	911	705	205	608	560	-47	349			

Ottawa Airport, ON STANDARD DEVIATIONS FOR THE PERIOD 1950-2010 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.0	26	16	18	1	1	0	31	43	10	55
28- 2	2.6	29	15	27	1	1	0	37	59	8	59
31- 3	2.3	28	22	47	4	4	0	54	83	0	65
30- 4	1.7	31	31	84	8	8	0	84	0	2	74
31- 5	1.9	32	32	0	12	12	0	21	0	22	85
30- 6	1.2	38	38	0	9	9	4	17	0	39	93
31- 7	1.2	42	42	0	8	21	23	11	0	37	93
31- 8	1.3	39	39	0	8	26	28	5	0	38	107
30- 9	1.5	38	38	0	8	13	11	14	0	42	110
31-10	1.4	37	37	2	7	6	2	20	0	42	37
30-11	1.7	27	28	9	4	4	0	32	13	25	45
31-12	3.0	30	22	14	1	1	0	30	34	14	56

Ottawa Airport, ON WATER BUDGET MEANS FOR THE PERIOD 1950-2010 DC20492

LAT.... 45.32 WATER HOLDING CAPACITY...150 MM HEAT INDEX... 36.41
LONG... 75.67 LOWER ZONE..... 90 MM A..... 1.075

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-10.6	64	13	15	0	0	0	23	83	144	299
28- 2	-8.8	57	12	18	1	1	0	26	110	146	356
31- 3	-2.7	66	32	80	5	5	0	103	64	150	422
30- 4	5.9	72	67	69	32	32	0	104	0	150	494
31- 5	13.0	74	74	0	80	80	0	13	0	131	568
30- 6	18.3	82	82	0	116	116	0	4	0	93	651
31- 7	20.8	89	89	0	135	127	-8	2	0	52	740
31- 8	19.5	87	87	0	117	97	-19	1	0	41	827
30- 9	14.6	84	84	0	75	68	-6	3	0	54	912
31-10	8.1	77	76	0	36	36	-1	8	0	88	77
30-11	1.3	80	63	8	10	10	0	23	9	126	157
31-12	-7.0	78	26	15	1	1	0	26	47	140	236
AVE	5.9 TTL	911	705	205	608	573	-34	336			

Ottawa Airport, ON STANDARD DEVIATIONS FOR THE PERIOD 1950-2010 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.0	26	16	18	1	1	0	31	43	15	55
28- 2	2.6	29	15	27	1	1	0	37	59	12	59
31- 3	2.3	28	22	47	4	4	0	54	83	0	65
30- 4	1.7	31	31	84	8	8	0	84	0	2	74
31- 5	1.9	32	32	0	12	12	0	21	0	22	85
30- 6	1.2	38	38	0	9	8	1	17	0	41	93
31- 7	1.2	42	42	0	8	18	18	11	0	42	93
31- 8	1.3	39	39	0	8	22	23	5	0	44	107
30- 9	1.5	38	38	0	8	12	10	14	0	49	110
31-10	1.4	37	37	2	7	6	2	19	0	47	37
30-11	1.7	27	28	9	4	4	0	30	13	31	45
31-12	3.0	30	22	14	1	1	0	29	34	20	56

Ottawa Airport, ON WATER BUDGET MEANS FOR THE PERIOD 1950-2010 DC20492

LAT.... 45.32 WATER HOLDING CAPACITY...200 MM HEAT INDEX... 36.41
LONG... 75.67 LOWER ZONE.....120 MM A..... 1.075

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-10.6	64	13	15	0	0	0	21	83	187	299
28- 2	-8.8	57	12	18	1	1	0	24	110	191	356
31- 3	-2.7	66	32	80	5	5	0	99	64	199	422
30- 4	5.9	72	67	69	32	32	0	103	0	200	494
31- 5	13.0	74	74	0	80	80	0	13	0	181	568
30- 6	18.3	82	82	0	116	116	0	4	0	143	651
31- 7	20.8	89	89	0	135	132	-3	2	0	97	740
31- 8	19.5	87	87	0	117	106	-11	1	0	78	827
30- 9	14.6	84	84	0	75	70	-4	3	0	89	912
31-10	8.1	77	76	0	36	36	0	7	0	123	77
30-11	1.3	80	63	8	10	10	0	19	9	164	157
31-12	-7.0	78	26	15	1	1	0	22	47	182	236
AVE	5.9 TTL	911	705	205	608	589	-18	318			

Ottawa Airport, ON STANDARD DEVIATIONS FOR THE PERIOD 1950-2010 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.0	26	16	18	1	1	0	30	43	24	55
28- 2	2.6	29	15	27	1	1	0	36	59	20	59
31- 3	2.3	28	22	47	4	4	0	55	83	4	65
30- 4	1.7	31	31	84	8	8	0	83	0	2	74
31- 5	1.9	32	32	0	12	12	0	21	0	22	85
30- 6	1.2	38	38	0	9	9	0	17	0	41	93
31- 7	1.2	42	42	0	8	11	10	11	0	48	93
31- 8	1.3	39	39	0	8	16	16	5	0	54	107
30- 9	1.5	38	38	0	8	10	8	14	0	59	110
31-10	1.4	37	37	2	7	6	1	19	0	55	37
30-11	1.7	27	28	9	4	4	0	29	13	41	45
31-12	3.0	30	22	14	1	1	0	28	34	29	56

Ottawa Airport, ON WATER BUDGET MEANS FOR THE PERIOD 1950-2010 DC20492

LAT.... 45.32 WATER HOLDING CAPACITY...225 MM HEAT INDEX... 36.41
LONG... 75.67 LOWER ZONE.....135 MM A..... 1.075

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-10.6	64	13	15	0	0	0	21	83	209	299
28- 2	-8.8	57	12	18	1	1	0	24	110	214	356
31- 3	-2.7	66	32	80	5	5	0	97	64	224	422
30- 4	5.9	72	67	69	32	32	0	103	0	225	494
31- 5	13.0	74	74	0	80	80	0	13	0	206	568
30- 6	18.3	82	82	0	116	116	0	4	0	168	651
31- 7	20.8	89	89	0	135	133	-2	2	0	121	740
31- 8	19.5	87	87	0	117	109	-8	1	0	99	827
30- 9	14.6	84	84	0	75	71	-4	3	0	109	912
31-10	8.1	77	76	0	36	36	0	7	0	143	77
30-11	1.3	80	63	8	10	10	0	18	9	185	157
31-12	-7.0	78	26	15	1	1	0	21	47	204	236
AVE	5.9 TTL	911	705	205	608	594	-14	314			

Ottawa Airport, ON STANDARD DEVIATIONS FOR THE PERIOD 1950-2010 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.0	26	16	18	1	1	0	30	43	28	55
28- 2	2.6	29	15	27	1	1	0	36	59	24	59
31- 3	2.3	28	22	47	4	4	0	56	83	7	65
30- 4	1.7	31	31	84	8	8	0	82	0	2	74
31- 5	1.9	32	32	0	12	12	0	21	0	22	85
30- 6	1.2	38	38	0	9	9	0	17	0	41	93
31- 7	1.2	42	42	0	8	10	7	11	0	49	93
31- 8	1.3	39	39	0	8	14	13	5	0	58	107
30- 9	1.5	38	38	0	8	10	7	14	0	63	110
31-10	1.4	37	37	2	7	6	1	19	0	58	37
30-11	1.7	27	28	9	4	4	0	29	13	44	45
31-12	3.0	30	22	14	1	1	0	28	34	33	56

Ottawa Airport, ON WATER BUDGET MEANS FOR THE PERIOD 1950-2010 DC20492

LAT.... 45.32 WATER HOLDING CAPACITY...250 MM HEAT INDEX... 36.41
LONG... 75.67 LOWER ZONE.....150 MM A..... 1.075

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-10.6	64	13	15	0	0	0	20	83	232	299
28- 2	-8.8	57	12	18	1	1	0	23	110	238	356
31- 3	-2.7	66	32	80	5	5	0	96	64	248	422
30- 4	5.9	72	67	69	32	32	0	102	0	250	494
31- 5	13.0	74	74	0	80	80	0	13	0	231	568
30- 6	18.3	82	82	0	116	116	0	4	0	193	651
31- 7	20.8	89	89	0	135	134	-1	2	0	145	740
31- 8	19.5	87	87	0	117	111	-6	1	0	121	827
30- 9	14.6	84	84	0	75	72	-3	3	0	130	912
31-10	8.1	77	76	0	36	36	0	7	0	164	77
30-11	1.3	80	63	8	10	10	0	18	9	207	157
31-12	-7.0	78	26	15	1	1	0	20	47	226	236
AVE	5.9 TTL	911	705	205	608	598	-10	309			

Ottawa Airport, ON STANDARD DEVIATIONS FOR THE PERIOD 1950-2010 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.0	26	16	18	1	1	0	29	43	32	55
28- 2	2.6	29	15	27	1	1	0	36	59	27	59
31- 3	2.3	28	22	47	4	4	0	56	83	9	65
30- 4	1.7	31	31	84	8	8	0	82	0	2	74
31- 5	1.9	32	32	0	12	12	0	21	0	22	85
30- 6	1.2	38	38	0	9	9	0	17	0	41	93
31- 7	1.2	42	42	0	8	9	5	11	0	50	93
31- 8	1.3	39	39	0	8	12	11	5	0	61	107
30- 9	1.5	38	38	0	8	9	6	14	0	66	110
31-10	1.4	37	37	2	7	7	1	19	0	61	37
30-11	1.7	27	28	9	4	4	0	29	13	47	45
31-12	3.0	30	22	14	1	1	0	28	34	36	56

Ottawa Airport, ON WATER BUDGET MEANS FOR THE PERIOD 1950-2010 DC20492

LAT.... 45.32 WATER HOLDING CAPACITY...265 MM HEAT INDEX... 36.41
LONG... 75.67 LOWER ZONE.....159 MM A..... 1.075

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-10.6	64	13	15	0	0	0	20	83	246	299
28- 2	-8.8	57	12	18	1	1	0	23	110	252	356
31- 3	-2.7	66	32	80	5	5	0	96	64	263	422
30- 4	5.9	72	67	69	32	32	0	102	0	265	494
31- 5	13.0	74	74	0	80	80	0	13	0	246	568
30- 6	18.3	82	82	0	116	116	0	4	0	208	651
31- 7	20.8	89	89	0	135	134	-1	2	0	160	740
31- 8	19.5	87	87	0	117	112	-5	1	0	135	827
30- 9	14.6	84	84	0	75	72	-3	3	0	144	912
31-10	8.1	77	76	0	36	36	0	7	0	177	77
30-11	1.3	80	63	8	10	10	0	18	9	221	157
31-12	-7.0	78	26	15	1	1	0	20	47	240	236
AVE	5.9 TTL	911	705	205	608	599	-9	309			

Ottawa Airport, ON STANDARD DEVIATIONS FOR THE PERIOD 1950-2010 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.0	26	16	18	1	1	0	29	43	34	55
28- 2	2.6	29	15	27	1	1	0	36	59	29	59
31- 3	2.3	28	22	47	4	4	0	56	83	10	65
30- 4	1.7	31	31	84	8	8	0	82	0	2	74
31- 5	1.9	32	32	0	12	12	0	21	0	22	85
30- 6	1.2	38	38	0	9	9	0	17	0	41	93
31- 7	1.2	42	42	0	8	8	4	11	0	51	93
31- 8	1.3	39	39	0	8	11	10	5	0	62	107
30- 9	1.5	38	38	0	8	9	5	14	0	68	110
31-10	1.4	37	37	2	7	7	1	19	0	62	37
30-11	1.7	27	28	9	4	4	0	29	13	49	45
31-12	3.0	30	22	14	1	1	0	28	34	38	56

Ottawa Airport, ON WATER BUDGET MEANS FOR THE PERIOD 1950-2010 DC20492

LAT.... 45.32 WATER HOLDING CAPACITY...275 MM HEAT INDEX... 36.41
LONG... 75.67 LOWER ZONE.....165 MM A..... 1.075

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-10.6	64	13	15	0	0	0	19	83	255	299
28- 2	-8.8	57	12	18	1	1	0	23	110	261	356
31- 3	-2.7	66	32	80	5	5	0	96	64	272	422
30- 4	5.9	72	67	69	32	32	0	101	0	275	494
31- 5	13.0	74	74	0	80	80	0	13	0	256	568
30- 6	18.3	82	82	0	116	116	0	4	0	218	651
31- 7	20.8	89	89	0	135	135	-1	2	0	170	740
31- 8	19.5	87	87	0	117	113	-4	1	0	144	827
30- 9	14.6	84	84	0	75	72	-2	3	0	153	912
31-10	8.1	77	76	0	36	36	0	7	0	186	77
30-11	1.3	80	63	8	10	10	0	18	9	230	157
31-12	-7.0	78	26	15	1	1	0	20	47	249	236
AVE	5.9 TTL	911	705	205	608	601	-7	307			

Ottawa Airport, ON STANDARD DEVIATIONS FOR THE PERIOD 1950-2010 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.0	26	16	18	1	1	0	29	43	35	55
28- 2	2.6	29	15	27	1	1	0	36	59	30	59
31- 3	2.3	28	22	47	4	4	0	56	83	11	65
30- 4	1.7	31	31	84	8	8	0	81	0	2	74
31- 5	1.9	32	32	0	12	12	0	21	0	22	85
30- 6	1.2	38	38	0	9	9	0	17	0	41	93
31- 7	1.2	42	42	0	8	8	3	11	0	51	93
31- 8	1.3	39	39	0	8	11	9	5	0	63	107
30- 9	1.5	38	38	0	8	9	5	14	0	69	110
31-10	1.4	37	37	2	7	7	1	19	0	63	37
30-11	1.7	27	28	9	4	4	0	29	13	50	45
31-12	3.0	30	22	14	1	1	0	28	34	39	56

Ottawa Airport, ON WATER BUDGET MEANS FOR THE PERIOD 1950-2010 DC20492

LAT.... 45.32 WATER HOLDING CAPACITY...280 MM HEAT INDEX... 36.41
LONG... 75.67 LOWER ZONE.....168 MM A..... 1.075

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-10.6	64	13	15	0	0	0	19	83	260	299
28- 2	-8.8	57	12	18	1	1	0	23	110	266	356
31- 3	-2.7	66	32	80	5	5	0	95	64	277	422
30- 4	5.9	72	67	69	32	32	0	101	0	280	494
31- 5	13.0	74	74	0	80	80	0	13	0	261	568
30- 6	18.3	82	82	0	116	116	0	4	0	223	651
31- 7	20.8	89	89	0	135	135	-1	2	0	175	740
31- 8	19.5	87	87	0	117	113	-4	1	0	148	827
30- 9	14.6	84	84	0	75	72	-2	3	0	157	912
31-10	8.1	77	76	0	36	36	0	7	0	191	77
30-11	1.3	80	63	8	10	10	0	18	9	234	157
31-12	-7.0	78	26	15	1	1	0	20	47	254	236
AVE	5.9 TTL	911	705	205	608	601	-7	306			

Ottawa Airport, ON STANDARD DEVIATIONS FOR THE PERIOD 1950-2010 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.0	26	16	18	1	1	0	29	43	35	55
28- 2	2.6	29	15	27	1	1	0	36	59	31	59
31- 3	2.3	28	22	47	4	4	0	56	83	12	65
30- 4	1.7	31	31	84	8	8	0	81	0	2	74
31- 5	1.9	32	32	0	12	12	0	21	0	22	85
30- 6	1.2	38	38	0	9	9	0	17	0	41	93
31- 7	1.2	42	42	0	8	8	3	11	0	52	93
31- 8	1.3	39	39	0	8	10	9	5	0	64	107
30- 9	1.5	38	38	0	8	9	5	14	0	69	110
31-10	1.4	37	37	2	7	7	1	19	0	64	37
30-11	1.7	27	28	9	4	4	0	29	13	50	45
31-12	3.0	30	22	14	1	1	0	28	34	39	56

Ottawa Airport, ON WATER BUDGET MEANS FOR THE PERIOD 1950-2010 DC20492

LAT.... 45.32 WATER HOLDING CAPACITY...300 MM HEAT INDEX... 36.41
LONG... 75.67 LOWER ZONE.....180 MM A..... 1.075

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-10.6	64	13	15	0	0	0	19	83	279	299
28- 2	-8.8	57	12	18	1	1	0	23	110	285	356
31- 3	-2.7	66	32	80	5	5	0	95	64	297	422
30- 4	5.9	72	67	69	32	32	0	101	0	300	494
31- 5	13.0	74	74	0	80	80	0	13	0	281	568
30- 6	18.3	82	82	0	116	116	0	4	0	243	651
31- 7	20.8	89	89	0	135	135	0	2	0	194	740
31- 8	19.5	87	87	0	117	114	-3	1	0	167	827
30- 9	14.6	84	84	0	75	73	-2	3	0	176	912
31-10	8.1	77	76	0	36	36	0	7	0	209	77
30-11	1.3	80	63	8	10	10	0	18	9	252	157
31-12	-7.0	78	26	15	1	1	0	20	47	272	236
AVE	5.9 TTL	911	705	205	608	603	-5	306			

Ottawa Airport, ON STANDARD DEVIATIONS FOR THE PERIOD 1950-2010 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.0	26	16	18	1	1	0	29	43	37	55
28- 2	2.6	29	15	27	1	1	0	36	59	33	59
31- 3	2.3	28	22	47	4	4	0	57	83	13	65
30- 4	1.7	31	31	84	8	8	0	81	0	2	74
31- 5	1.9	32	32	0	12	12	0	21	0	22	85
30- 6	1.2	38	38	0	9	9	0	17	0	41	93
31- 7	1.2	42	42	0	8	8	2	11	0	52	93
31- 8	1.3	39	39	0	8	10	8	5	0	65	107
30- 9	1.5	38	38	0	8	9	5	14	0	71	110
31-10	1.4	37	37	2	7	7	1	19	0	65	37
30-11	1.7	27	28	9	4	4	0	29	13	52	45
31-12	3.0	30	22	14	1	1	0	28	34	41	56

Ottawa Airport, ON WATER BUDGET MEANS FOR THE PERIOD 1950-2010 DC20492

LAT.... 45.32 WATER HOLDING CAPACITY...400 MM HEAT INDEX... 36.41
LONG... 75.67 LOWER ZONE.....240 MM A..... 1.075

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-10.6	64	13	15	0	0	0	19	83	375	299
28- 2	-8.8	57	12	18	1	1	0	22	110	382	356
31- 3	-2.7	66	32	80	5	5	0	94	64	395	422
30- 4	5.9	72	67	69	32	32	0	99	0	400	494
31- 5	13.0	74	74	0	80	80	0	13	0	381	568
30- 6	18.3	82	82	0	116	116	0	4	0	343	651
31- 7	20.8	89	89	0	135	135	0	2	0	294	740
31- 8	19.5	87	87	0	117	116	-1	1	0	265	827
30- 9	14.6	84	84	0	75	74	-1	3	0	272	912
31-10	8.1	77	76	0	36	36	0	7	0	305	77
30-11	1.3	80	63	8	10	10	0	18	9	349	157
31-12	-7.0	78	26	15	1	1	0	19	47	369	236
AVE	5.9 TTL	911	705	205	608	606	-2	301			

Ottawa Airport, ON STANDARD DEVIATIONS FOR THE PERIOD 1950-2010 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.0	26	16	18	1	1	0	29	43	44	55
28- 2	2.6	29	15	27	1	1	0	36	59	39	59
31- 3	2.3	28	22	47	4	4	0	57	83	20	65
30- 4	1.7	31	31	84	8	8	0	80	0	2	74
31- 5	1.9	32	32	0	12	12	0	21	0	22	85
30- 6	1.2	38	38	0	9	9	0	17	0	41	93
31- 7	1.2	42	42	0	8	8	0	11	0	53	93
31- 8	1.3	39	39	0	8	8	4	5	0	69	107
30- 9	1.5	38	38	0	8	8	2	14	0	76	110
31-10	1.4	37	37	2	7	7	0	19	0	69	37
30-11	1.7	27	28	9	4	4	0	29	13	57	45
31-12	3.0	30	22	14	1	1	0	28	34	46	56

APPENDIX C

Premier Tech Aqua Report

WASTEWATER TECHNOLOGY

NSF/ANSI Standard 245 - *Wastewater Treatment Systems – Nitrogen Reduction*

Final Report:

Premier Tech Aqua
Ecoflo Coco Filter ECDn Model Series
15/03/055/0030

NSF International
789 N. Dixboro Road
PO Box 130140
Ann Arbor, Michigan 48113-0140 USA

Evaluation Report:
Ecoflo Coco Filter ECDn Model Series
Wastewater Treatment System

Under the provisions of NSF/ANSI Standard 245
Wastewater Treatment Systems – Nitrogen Reduction

January 2016

EXECUTIVE SUMMARY

Testing of the Ecoflo Coco Filter ECDn Model Series was conducted under the provisions of NSF/ANSI Standard 245 for Residential Wastewater Treatment Systems (April 2013 revision). NSF/ANSI Standard 245 was developed by the NSF Joint Committee on Wastewater Technology.

The performance evaluation was conducted at the NSF Wastewater Technology Testing Facility located in Waco, Texas, using wastewater diverted from the Waco municipal wastewater collection system, which serves predominantly residential development. The evaluation consisted of sixteen weeks of dosing at design flow, seven and one half weeks of stress testing and an additional two and one half weeks of dosing at design flow. The stress weeks were repeated due to sampling error and the test was extended for 35 weeks. Sampling started in the spring and continued through summer and fall, covering a range of operating temperatures.

Over the course of the evaluation, the average influent Total Nitrogen was 40.4 mg/L, ranging between 20.9 and 77.4 mg/L. The Ecoflo Coco Filter ECDn Model Series produced an average effluent Total Nitrogen of 18.6 mg/L, which resulted in a 53.89% reduction in the influent Total Nitrogen. The Ecoflo Coco Filter ECDn Model Series produced an effluent that successfully met the performance requirements established by NSF/ANSI Standard 245.

The Ecoflo Coco Filter ECDn Model Series produced an effluent that successfully met the performance requirements established by NSF/ANSI Standard 40 for Class I effluent:

> The maximum 7-day arithmetic mean was 13 mg/L for $CBOD_5$ and 9 mg/L for total suspended solids, both below the allowed maximums of 40 and 45 mg/L, respectively. The maximum 30-day arithmetic mean was 5 mg/L for $CBOD_5$ and 5 mg/L for total suspended solids, both below the allowed maximums of 25 mg/L and 30 mg/L, respectively.

The effluent pH during the entire evaluation ranged between 6.6 and 7.3, within the required range of 6.0 to 9.0. The Ecoflo Coco Filter ECDn Model Series met the requirements for noise levels (less than 60 dbA at a distance of 20 feet), color, threshold odor, oily film and foam.

PREFACE

Performance evaluation of nitrogen reduction for residential wastewater treatment systems is achieved within the provisions of NSF/ANSI Standard 245: Wastewater Treatment Systems – Nitrogen Reduction (April 2013), prepared by the NSF Joint Committee on Wastewater Technology and adopted by the NSF Board of Trustees.

Conformance with the Standard is recognized by issuance of the NSF Mark. This is not to be construed as an approval of the equipment, but a certification of the data provided by the test and an indication of compliance with the requirements expressed in the Standard.

Systems conforming to Standard 245 are classified as having met the requirements of the Standard. Permission to use the NSF Mark is granted only after the equipment has been tested and found to perform satisfactorily, and all other requirements of the Standard have been satisfied. Continued use of the Mark is dependent upon evidence of compliance with the Standard and NSF General and Program Specific Policies, as determined by periodic reinspection of the equipment at the factory, distributors and reports from the field.

NSF Standard 245 requires the testing laboratory to provide the manufacturer of a residential wastewater treatment system a report including significant data and appropriate commentary relative to the performance evaluation of the plant. NSF policy specifies provision of performance evaluation reports to appropriate state regulatory agencies at publication. Subsequent direct distribution of the report by NSF is made only at the specific request of or by permission of the manufacturer.

The following report contains results of the entire testing program, a description of the plant, its operation and key process control equipment, and a narrative summary of the test program, including test location, procedures and significant occurrences. The plant represented herein reflects the equipment authorized to bear the NSF Mark.

CERTIFICATION

NSF International has determined by performance evaluation under the provisions of NSF/ANSI Standard 245 (revised April 2013) that the Model Number Ecoflo Coco Filter ECDn Model Series manufactured by Premier Tech Aqua has fulfilled the requirements of NSF/ANSI Standard 245. The Ecoflo Coco Filter ECDn Model Series has therefore been authorized to bear the NSF Mark so long as Manufacture continues to meet the requirements of Standard 245 and NSF General and Program Specific Policies.

General performance evaluation and stress tests were performed at the Wastewater Technology Site located at the NSF Wastewater Technology Testing Facility located in Waco, Texas. The raw wastewater used in the test was residential wastewater. The characteristics of the wastewater during the test are included in the tabulated data of this report.

The observations and analyses included in this report are certified to be correct and true copies of the data secured during the performance tests conducted by NSF on the wastewater treatment system described herein. The manufacturer has agreed to present the data in this certification in its entirety whenever it is used in advertising, prospectuses, bids or similar uses.

Jenny Oorbeck
General Manager
Sustainability

Sharon Stiener
Business Unit Manager
Wastewater

TABLE OF CONTENTS

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1.0 PROCESS DESCRIPTION

To be treated, the wastewater first flows into a Primary tank where a primary treatment, gross solids sedimentation, takes place. The Ecoflo® Coco ECDn Model Series is based on a pre-denitrification approach: The ammonia is first converted into nitrates inside the Ecoflo® Coco filtering media (nitrification); then, nitrates are recirculated in a Primary tank and transformed in gaseous nitrogen (denitrification).

The wastewater entering the Ecoflo® Coco Filter is directed to the tipping bucket and evenly distributed onto distribution plates. These plates include channels and orifices that uniformly distribute the primary tank effluent over the surface of the filtering media. Distributed wastewater trickles downward into the filtering media where microorganisms, naturally attached onto the filtering media, degrade the contaminants through their metabolic reactions. A fraction of the treated wastewater is returned to the Primary/anoxic tank via the pumping station provided for that matter and the remaining fraction is directed toward the final disposal. The recirculation ratio is approximately two (2) times the daily flow (2Q).

2.0 PERFORMANCE EVALUATION

2.1 Description of Plant Evaluated

The Ecoflo® Coco Filter ECDn tested in this evaluation has a rated capacity of 14.1 gpd/ft² for and applied flow rate of 460 gallons per day (gpd). Specifications and drawings are included in Appendix A. The system is composed of a 920 gallon primary/septic tank equipped with an effluent filter, followed by the Ecoflo® Coco Filter operated in recirculation mode. The Ecoflo® Coco Filter was housed in a concrete shell. The filtering media consisted in a natural coco composed of fragments of coconut husks especially shaped and sized to treat residential wastewater. A securely fastened polyethylene lid limited the access to the filter.

The wastewater entered the primary/septic tank for primary treatment (separation of settleable solids). From the Primary tank, the pretreated wastewater flows to the Ecoflo® Coco Filter. Effluent from the primary/septic tank is gravity fed to a tipping bucket to alternately apply wastewater to the distribution plates. These plates included channels and orifices that uniformly distributed the settled wastewater to the top of the filtering media. The wastewater trickled down into the filtering media where microorganisms, naturally attached onto the coco fragments, degraded the contaminants through their metabolic reactions.

The treated effluent was collected at the bottom of the filter and directed to a pumping station with a minimum working capacity of 150 gallons. The pump, controlled by a time dosing control panel, allowed the recirculation, via a specially designed Premier Tech Aqua pressure flow divider (PFS-200DN), of 2/3 of the dose at the beginning of the treatment train (Primary tank) and 1/3 of the dose to the outlet pipe located on the side of the shell.

Normally, an Ecoflo® Coco Filter model with integrated pump would be used to ensure the recirculation. However, for the purpose of the certification, a pumping station was installed downstream of the Ecoflo® Coco Filter in order to recirculate part of the treated water to the Primary tank. To regulate the recirculation rate a minimum working capacity of 0.3Q (Q being the design daily flow rate) is required. As mentioned above, this volume of treated effluent can be provided either at the bottom of the Ecoflo® Coco Filter tank with an integrated pump or in an independent pumping station installed downstream of the filter.

Flow regulation can be achieved either by using a time dosing unit controlling the recirculation pump or, by a gravity flow regulator mounted on the outlet of the septic tank. Both Approaches provide equivalent flow regulation performance.

2.2 Test Protocol

Section 8 of NSF/ANSI Standard 40 protocol, "Performance Testing and Evaluation", is included in Appendix B. Start up of the plant was accomplished by filling the primary tank with 2/3 water and 1/3 raw sewage. The plant was then dosed at the design loading rate of 460 gpd as follows:

6 a.m. to 9 a.m. - 35 percent of daily rated capacity (160 gallons)
11 a.m. to 2 p.m. - 25 percent of daily rated capacity (120 gallons)
5 p.m. to 8 p.m. - 40 percent of daily rated capacity (180 gallons)

Dosing was accomplished by opening an electrically actuated valve to feed wastewater to the test plant. Ten gallon doses were spread uniformly over each dosing period to comprise the total dose volume for the period.

After a start up period (up to three weeks at the manufacturer's discretion), the plant is subjected to the following loading sequence:

Design loading - 16 weeks
Stress loading - 7.5 weeks
Design loading - 2.5 weeks
Note this test was extended to 35 weeks, stress was repeated due to sampling error.

During the design loading periods, flow proportioned 24-hour composite influent and effluent samples are collected three times per week. The influent samples are analyzed for five-day biochemical oxygen demand (BOD_5), total suspended solids (TSS), alkalinity, total Kjeldahl nitrogen (TKN), and ammonia-N. The effluent samples are analyzed for carbonaceous five-day biochemical oxygen demand ($CBOD_5$), TSS, alkalinity, TKN, ammonia-N and nitrite/nitrate-N concentrations. Onsite determinations of the influent and effluent pH, temperature and dissolved oxygen are made five days per week on grab samples.

Stress testing is designed to evaluate how the plant performs under non-ideal conditions, including varied hydraulic loadings and electrical or system failure. The test sequence includes (1) Wash Day stress, (2) Working Parent stress, (3) Power/Equipment Failure stress, and (4) Vacation stress. Detailed descriptions of the stress sequences are shown in Appendix B.

During the stress test sequences, 24-hour composite samples are collected before and after each stress dosing pattern. The analyses and on-site determinations completed on the samples are the same as described for the design load testing. Each stress is followed by seven consecutive days of dosing at design rated capacity before beginning the next stress test. Sample collection is initiated twenty-four hours after completion of Wash Day, Working Parent, and Vacation stresses, and beginning 48 hours after completion of the Power/Equipment Failure stress.

In order for the system to successfully pass the Standard 245 evaluation:

(1) $CBOD_5$: The average of all effluent samples shall not exceed 25 mg/L.

(2) TSS: The average of all effluent samples shall not exceed 30 mg/L.

(3) Total Nitrogen: The average total nitrogen concentration of all effluent samples shall be less than 50% of the average total nitrogen concentration of all influent samples.

(4) pH: Individual effluent values shall remain between 6.0 and 9.0 SU.

2.3 Test Chronology

The system was installed under the direction of the manufacturer from March 3, 2015 through March 11, 2015. The infiltration/exfiltration test, during which the entire system was tested for leaks, was completed on March 2, 2015. The unit was completely pumped out then filled with fresh water to allow set up and adjustment prior to the start of dosing. The fresh water was then pumped down by approximately one-third volume in the treatment unit. Dosing was initiated at the rate of 460 gallons per day beginning March 16, 2015. After a three-week start up period, the test was officially started on April 6, 2015. The stress test sequence was started on July 27, 2015 to September 8, 2015, and repeated September 21, 2015 to November 6, 2015. The stress weeks were repeated due to test site error and the test was extended to 35 weeks. During the second wash day stress, the system was mistakenly dosed at 520 gpd on each of the three wash days. Testing was completed on December 4, 2015.

3.0 ANALYTICAL RESULTS

3.1 Summary

Chemical analyses of samples collected during the evaluation were completed using the procedures in *Standard Methods for the Examination of Water and Wastewater* 21st edition. Copies of the data generated during the evaluation are included in Appendix C. Results of the chemical analyses and on-site observations and measurements made during the evaluation are summarized in Table I.

TABLE I. SUMMARY OF ANALYTICAL RESULTS

	Average	Std. Dev.	Minimum	Maximum	Median	Interquartile Range
Biochemical Oxygen Demand (mg/L)						
Influent (BOD_5)	200	88	39	590	200	200-290
Effluent ($CBOD_5$)	4	3	1	34	3	3-6
Total Suspended Solids (mg/L)						
Influent	190	83	26	600	180	180-250
Effluent	2	2	1	10	2	2-4
pH						
Influent	-	-	6.8	7.9	7.4	7.3-7.5
Effluent	-	-	6.6	7.3	7.1	7.0-7.2
Temperature (°C)						
Influent	28	3	22	32	28	28-31
Effluent	28	3	20	33	28	28-30
Dissolved Oxygen (mg/L)						
Primary Tank	1.0	1.0	0.2	2.4	0.5	0.4-1.3
Effluent	4.0	2.0	0.5	8.0	4.0	3.9-5.4
Alkalinity (mg/L)						
Influent	320	42	230	420	320	300-350
Effluent	280	42	190	360	270	250-310
Total Kjeldahl Nitrogen						
Influent	40.1	12.6	20.7	76.9	37.8	39.9-47.0
Effluent	14.9	9.3	2.3	33.3	11.5	8.6-21.1
Ammonia-N						
Influent	25.1	8.3	7.1	44.3	24.7	18.4-30.5
Effluent	12.5	8.4	1.0	28.9	10.2	6.8-18.4
Nitrite/nitrate-N (mg/L)						
Influent	0.35	0.46	0.05	2.20	0.10	0.06-0.53
Effluent	3.77	2.01	0.30	8.54	4.20	2.34-5.01
Total Nitrogen						
Influent	40.4	12.6	20.9	77.4	37.9	30.3-47.7
Effluent	18.6	8.1	6.7	34.4	15.9	12.6-24.8

Notes: The median is the point where half of the values are greater and half are less.
The interquartile range is the range of values about the median between the upper and lower 25 percent of all values.

Criteria for evaluating the analytical results from the testing are described in Section 8.5 of NSF/ANSI Standard 40. In completing the pass/fail determination for the data, an allowance is made for effluent TSS and $CBOD_5$ during the first month of testing. The 30- and 7-day averages during this time may not equal or exceed 1.4 times the effluent limits required for the rest of the test. This provision recognizes that an immature culture of microorganisms within the system may require additional time to achieve adequate treatment efficiency. Effluent $CBOD_5$ and TSS concentrations from the Ecoflo Coco Filter ECDn Model Series during the first calendar month of testing were within the normal limits and did not need to use this provision.

Section 8.5.1.1 of the Standard provides guidance addressing the impact of unusual testing conditions, including sampling, dosing, or influent characteristics, on operation of a system under test. Specific data points may be excluded from 7- and 30-day average calculations where determined to have an adverse impact on performance of the system, with rationale for the exclusion to be documented in the final report. During the second wash day stress, the system was mistakenly dosed at 520 gpd on each of the three wash days. No impact was observed on the system under test and no data was excluded because of this testing error.

Sections 3.6 and 8.2.1 of the Standard define influent wastewater characteristics as they apply to testing under the Standard. Typical domestic wastewater is defined as having a 30-day average BOD_5 concentration between 100 and 300 mg/L and a 30-day average TSS concentration between 100 and 350 mg/L. The 30-day average influent remained inside this specified range for the duration of the test.

3.2 Biochemical Oxygen Demand

The five-day biochemical oxygen demand (BOD_5) and five-day carbonaceous biochemical oxygen demand ($CBOD_5$) analyses were completed using *Standard Methods for the Examination of Water and Wastewater* 21st edition. The results of both analyses are shown in Figure 1.

Influent BOD_5:

Individual influent BOD_5 concentrations ranged from 39 to 590 mg/L during the evaluation, with average concentration of 200 mg/L and a median concentration of 200 mg/L. Thirty day average concentrations ranged from 160 to 280 mg/L. The average influent BOD_5 delivered to the treatment unit was within the influent characteristics defined under Section 8.2.1 of NSF/ANSI Standard 245.

Effluent $CBOD_5$:

Effluent $CBOD_5$ concentrations ranged from 1 to 34 mg/L over the course of the evaluation, with an average and median effluent $CBOD_5$ concentrations of 4 and 3 mg/L.

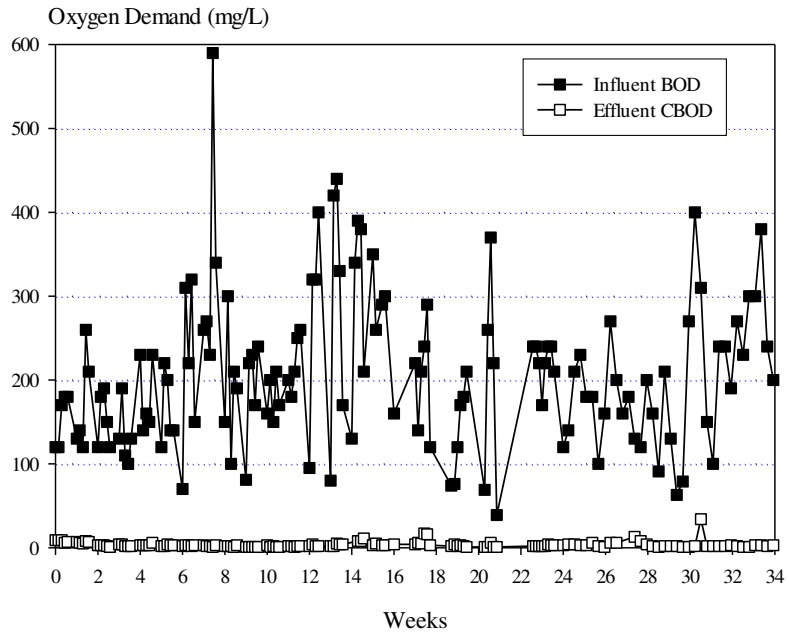

Figure 1. Biochemical Oxygen Demand

3.3 Total Suspended Solids

TSS analyses were completed using *Standard Methods for the Examination of Water and Wastewater* 21st edition. The TSS results over the entire evaluation are shown in Figure 2. Data from the TSS analyses are summarized in Table I.

Influent TSS:

The influent TSS ranged from 26 to 600 mg/L during the evaluation, with an average and median concentrations of 190 and 180 mg/L. The 30-day average concentrations during the test ranged from 130-260 mg/L. The average influent TSS delivered to the treatment unit was within the influent characteristics defined under Section 8.2.1 of NSF/ANSI Standard 245.

Effluent TSS:

The effluent TSS concentration ranged from 1 to 10 mg/L during the evaluation, with an average and median concentrations of 2 mg/L.

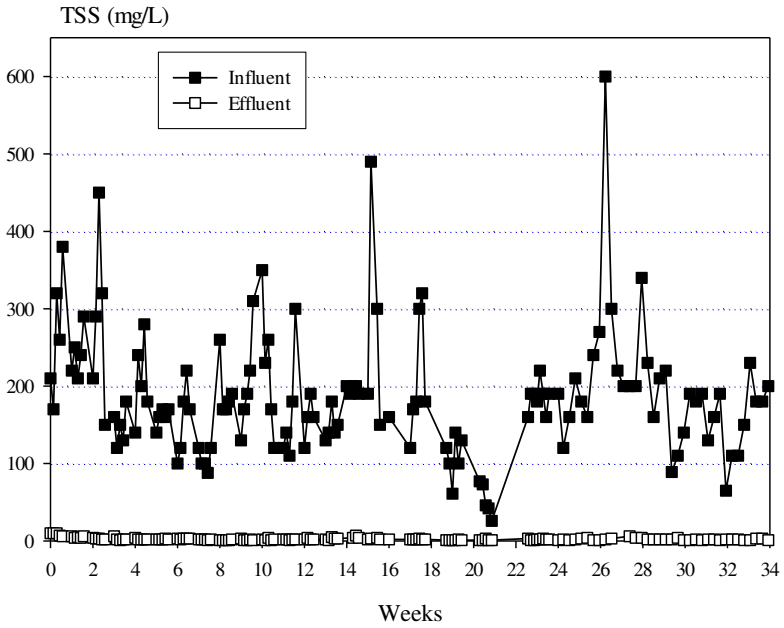

Figure 2. Total Suspended Solids

3.4 pH

Over the entire evaluation period, the influent pH ranged from 6.8 to 7.9 (median of 7.4). The effluent pH ranged 6.6 to 7.3 during the evaluation (median of 7.1); within the 6 to 9 range required by NSF/ANSI Standard 245. The pH data for the evaluation are shown in Appendix C.

3.5 Temperature

Influent temperatures over the evaluation period ranged from 22 to 32°C (median of 29°C). The temperature data are shown in Appendix C. The average influent temperature was within the characteristics defined under Section 8.2.1 of NSF/ANSI Standard 245.

3.6 Dissolved Oxygen

Dissolved Oxygen (DO) was measured in the primary tank effluent and effluent during the evaluation. The primary tank effluent DO ranged between 0.2 and 2.4 mg/L (median of 0.5 mg/L), while the effluent DO ranged between 0.5 and 8.0 mg/L (median of 4.0 mg/L). All dissolved oxygen data are shown in Appendix C.

3.7 Alkalinity

Alkalinity analyses were completed using *Standard Methods for the Examination of Water and Wastewater* 21st edition. The alkalinity results over the entire evaluation are shown in Figure 3. The influent and effluent alkalinities were all well within the range required by the Standard, and review of the nitrogen data indicates that alkalinity was not a limiting factor for nitrification in the system.

Influent Alkalinity

The influent alkalinity averaged 320 mg/L, ranging from 230 to 420 mg/L, with a median concentration of 320 mg/L. The influent alkalinity delivered to the treatment unit was within the influent characteristics defined under Section 8.2.1 of NSF/ANSI Standard 245.

Effluent Alkalinity

The effluent Alkalinity concentration ranged from 190 to 360 mg/L during the period when alkalinity samples were collected, with an average concentration of 280 mg/L and a median concentration of 270 mg/L.

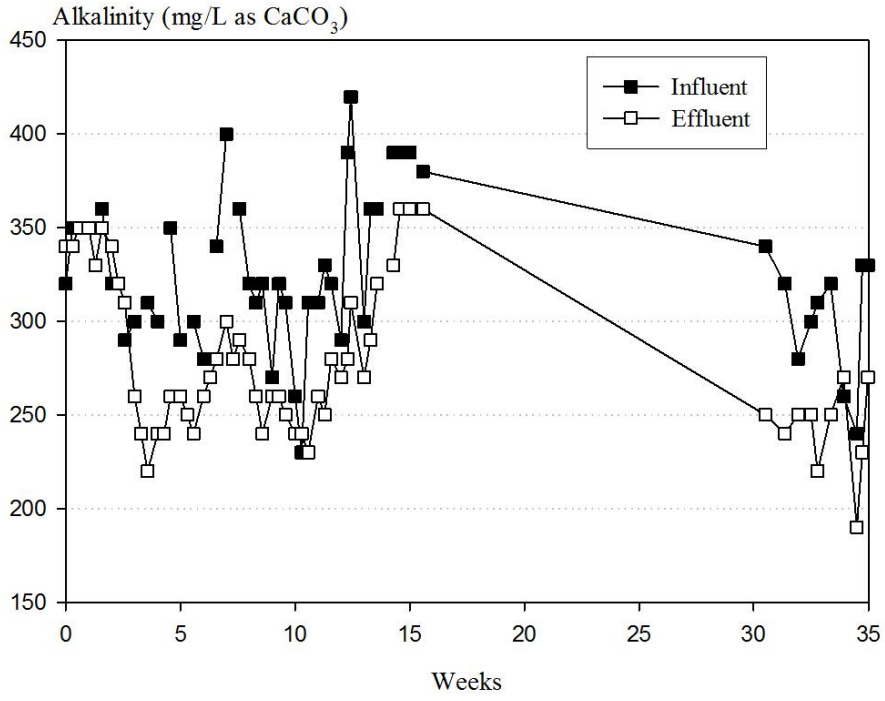

Figure 3: Alkalinity

3.8 Total Kjeldahl Nitrogen (TKN)

TKN analyses were completed using *Standard Methods for the Examination of Water and Wastewater* 21st edition. The TKN results over the entire evaluation are shown in Figure 4.

Influent TKN:

The influent TKN ranged from 20.7 to 76.9 mg/L during the evaluation, with average of 40.1 mg/L and a median concentration of 37.8 mg/L. The influent TKN delivered to the treatment unit was within the influent characteristics defined under Section 8.2.1 of NSF/ANSI Standard 245.

Effluent TKN:

The effluent TKN concentration ranged from 2.3 to 33.3 mg/L during the evaluation, with an average concentration of 14.9 mg/L and a median concentration of 11.5 mg/L.

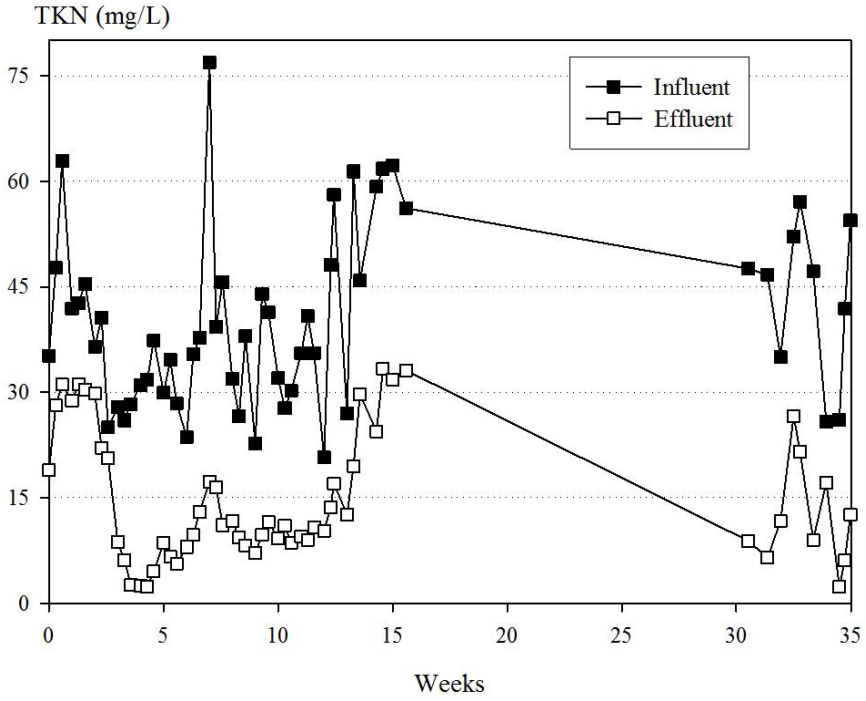

Figure 4: Total Kjeldahl Nitrogen

3.9 Ammonia-N

Ammonia-N analyses were completed using *Standard Methods for the Examination of Water and Wastewater* 21st edition. The Ammonia-N results over the entire evaluation are shown in Figure 5.

Influent Ammonia-N:

The influent Ammonia-N ranged from 7.1 to 44.3 mg/L during the evaluation, with an average and median concentrations of 25.1 and 24.7 mg/L.

Effluent Ammonia-N:

The effluent Ammonia-N concentration ranged from 1.0 to 28.9 mg/L during the evaluation, with an average of 12.5 mg/L and a median concentration of 10.2 mg/L.

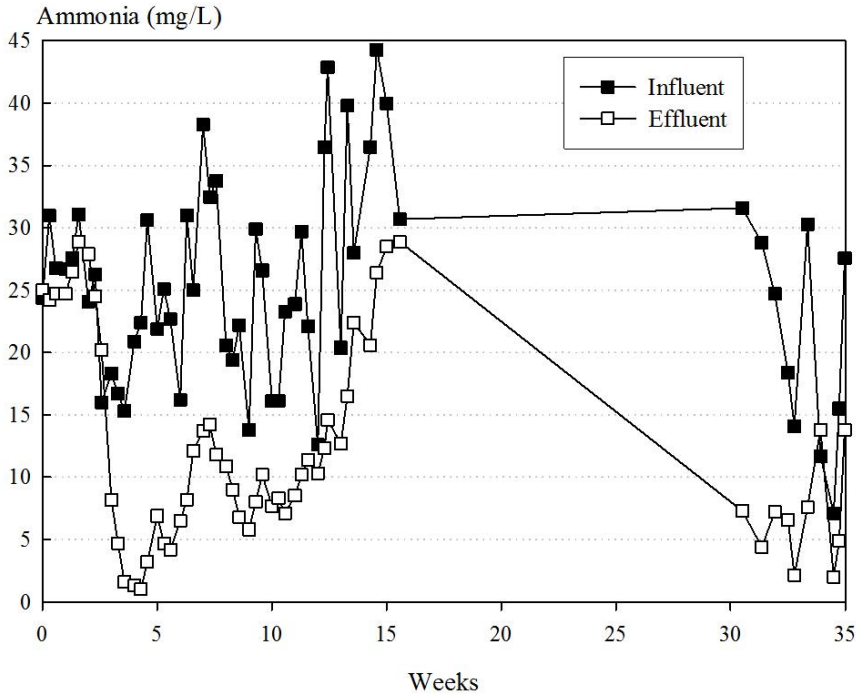

Figure 5: Ammonia

3.10 Nitrite/nitrate-N

Nitrite/nitrate-N analyses were completed using *Standard Methods for the Examination of Water and Wastewater* 21st edition. The Nitrite/nitrate-N results over the entire evaluation are shown in Figure 6.

Influent Nitrite/nitrate-N:

The influent Nitrite/nitrate-N ranged from 0.05 to 2.2 mg/L during the evaluation, with average and median concentrations of 0.35 and 0.1 mg/L.

Effluent Nitrite/nitrate-N:

The effluent Nitrite/nitrate-N concentration ranged from 0.3 to 8.5 mg/L during the evaluation, with an average of 3.8 mg/L and a median concentration of 4.2 mg/L.

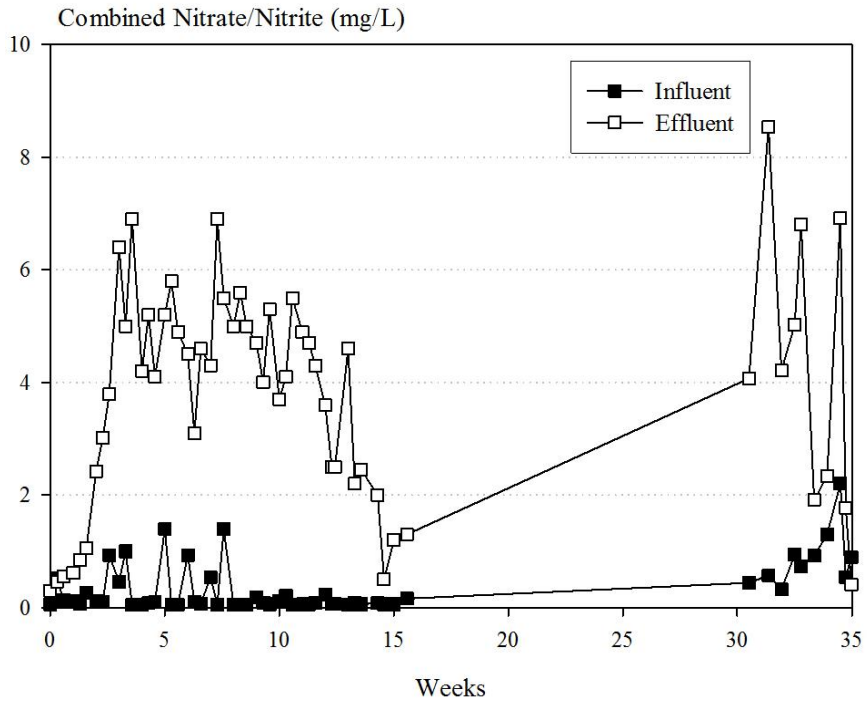

Figure 6: Effluent Nitrate/Nitrite

3.11 Total Nitrogen

Total Nitrogen (TN) is the sum of the total Kjeldahl nitrogen (TKN), nitrite (NO_2) and nitrate (NO_3) in a sample, and is expressed as mg/L as N. The TN results over the entire evaluation are shown in Figure 7.

Influent Total Nitrogen

The influent TN ranged from 20.9 to 77.4 mg/L during the evaluation, with average and median concentrations of 40.4 and 37.9 mg/L.

Effluent Total Nitrogen:

The effluent TN concentration ranged from 6.7 to 34.4 mg/L during the evaluation, with an average concentration of 18.6 mg/L and a median concentration of 15.9 mg/L. The Premier Tech Aqua Ecoflo Coco

Filter ECDn Model Series successfully met the requirements of Standard 245 by reducing the influent TN by 53.89%, which exceeds the pass/fail criteria of 50%.

Nitrogen Loading:

Over the course of the evaluation the influent Total Nitrogen loading averaged 0.15 lb/day. The Premier Tech Aqua Ecoflo Coco Filter ECDn Model Series achieved an average reduction of 0.08 lbs/day.

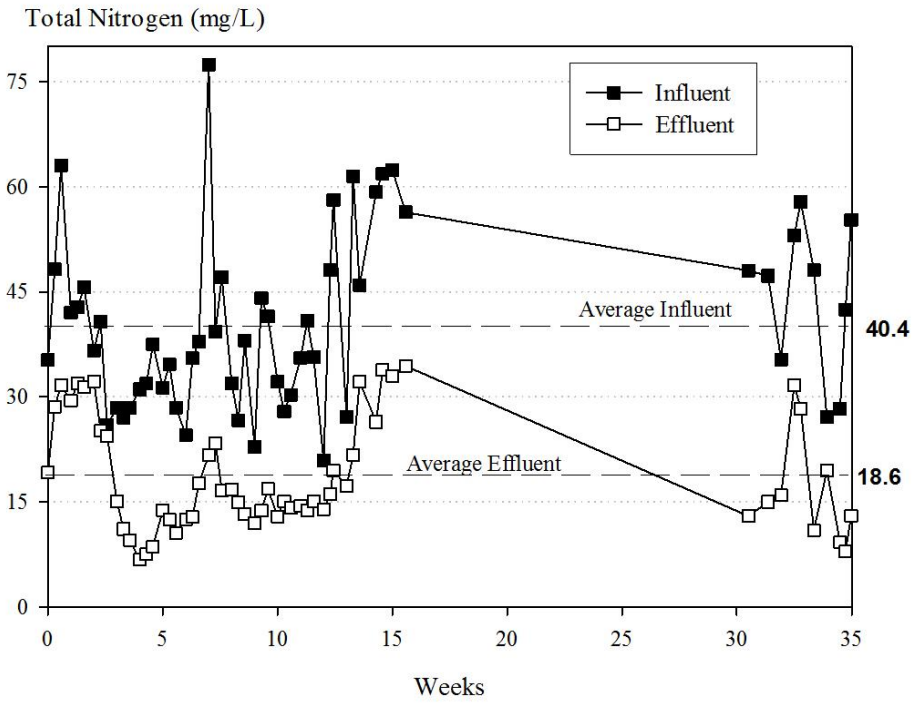

Figure 7: Total Nitrogen

4.0 REFERENCES

1. American Public Health Association (APHA), American Water Works Association (AWWA) & Water Environment Federation (WEF): *Standard Methods for the Examination of Water and Wastewater,* 21st Edition, 2005 (hereinafter referred to as *Standard Methods*)

2. ANSI/AWS D.1.1/D1.1M:2010, *Structural Welding Code – Steel and* ANSI/AWS D1.3/D1.3M:2008, *Structural Welding Code – Sheet Steel,* 5th Edition, with Errata

3. NFPA 70®: *National Electrical Code*® (NEC®), 2011

4. NSF/ANSI 40, *Residential Wastewater Treatment Systems*

5. US EPA, *Code of Federal Regulations (CFR), Title 40: Protection of Environment, July 1, 2010*

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APPENDIX A

PLANT SPECIFICATIONS

PLANT SPECIFICATIONS

Premier Tech Aqua Ecoflo Coco Filter ECDn Model Series

460 gpd

Plant Capacity

Design Flow	460 gpd

System Hydraulic Capacity

Total Hydraulic Capacity	920 gallons

Hydraulic Retention Time (at design flow))

Primary/septic tank	48 hours

Ecoflo Coco Filter Media

Coco Shell Dimensions	Height: 62 ‘’ Width: 43-1/8 ‘’ Length: 115-1/4’’

Material: Fragments of natural coconut husk based media
Volume: 62.4 ft^3
Hydraulic loading rate: 14.1 gpd/ft^2

Effluent Filter

Manufacture	Polylok
Model #	PL-122

Pump

Manufacture ABS	120V 60Hz 0.3 HP

Recirculation

Recirculation rate: 2Q
Hydraulic loading rate including recirculation: 42.3 gdp/sq.ft
Minimum working volume required for recirculation[1]: 0.3Q (150 gallons)

Alarm & Time dosing Panel[2]

Manufacturer	Premier Tech Aqua
Model	TPA-350 I/E

[1] The minimum working volume can either be built in at the bottom of the Ecoflo® Coco Filter unit or in an independent pumping station located downstream.

[2] or equivalent time dosing panel

APPENDIX B

NSF STANDARD 245 PERFORMANCE EVALUATION METHOD AND REQUIREMENTS

8 Performance testing and evaluation

This section describes the methods used to evaluate the performance of residential wastewater treatment systems designed to remove nitrogen from residential wastewater. Performance testing and evaluation shall not be restricted to specific seasons.

8.1 Preparations for testing and evaluation

The system shall be assembled, installed, and filled in accordance with the manufacturer's instructions.

The manufacturer shall inspect the system for proper installation. If no defects are detected and the system is judged to be structurally sound, it shall be placed into operation in accordance with the manufacturer's start-up procedures. If the manufacturer does not provide a start-up procedure, ⅔ of the system's capacity shall be filled with water and the remaining ⅓ shall be filled with residential wastewater.

The system shall undergo design loading (see 8.2.2.1) until testing and evaluations are initiated. Sample collection and analysis shall be initiated within three weeks of filling the system and shall continue without interruption until the end of the evaluation period, except as specified in 8.4.2.

If conditions at the test site preclude installation of the system at its normally prescribed depth, the manufacturer shall be permitted to cover the system with soil to achieve normal installation depth.

When possible, electrical or mechanical defects shall be repaired to prevent delays. All repairs made during the performance testing and evaluation shall be documented in the final report.

The system shall be operated in accordance with the manufacturer's instructions. However, routine service and maintenance of the system shall not be allowed during the testing and evaluation period.

> NOTE – The manufacturer may recommend or offer more frequent service and maintenance of the system, but for purpose of performance testing and evaluation, the service and maintenance shall not be performed beyond what is specified in this Standard.

8.2 Testing conditions, hydraulic loading and schedules

8.2.1 Influent wastewater characteristics

Except as required by NSF/ANSI 40 for systems seeking concurrent NSF/ANSI 40 and Nitrogen Reduction certification, the average wastewater characteristics delivered to the system over the course of the testing shall fall within:

- BOD5: 100 to 300 mg/L
- TSS: 100 to 350 mg/L
- TKN: 35 to 70 mg/L as N
- alkalinity: > 175 mg/L as $CaCO_3$ (alkalinity may be adjusted if inadequate)
- temperature: 10 to 30 ºC (50 to 86 ºF)
- pH: 6.5 to 9 SU

Unless requested by the manufacturer, the raw influent shall be supplemented with sodium bicarbonate if the wastewater is found to be deficient in alkalinity. In addition, the influent shall be supplemented with urea to meet the required influent TKN concentration. The influent may also be supplemented with methanol to maintain a carbon:nitrogen ratio of no less than 5:1.

NOTE – For this testing, minimum alkalinity may be calculated as described in Annex A.
If the influent temperature drops below 10 ºC (50 ºF), impacting the nitrification process, sample collection may be suspended until the influent temperature returns to 10 ºC (50 ºF).

8.2.2 Hydraulic loading

The performance of the system shall be evaluated for a minimum of 26 wks. During the testing and evaluation period, the system shall be subjected to 16 wks of design loading, followed by 7.5 wks (52 d) of stress loading, and an additional period of design loading to obtain a minimum of 55 influent and effluent data sets collected during non-stress dosing period.

8.2.2.1 Design loading

The system shall be dosed 7 d/wk with a wastewater volume equivalent to the daily hydraulic capacity of the system. The following schedule shall be adhered to for dosing:

Time Frame	Approximate % rated daily hydraulic capacity
6 a. m. – 9 a. m.	35
11 a. m. – 2 p. m.	25
5 p. m. – 8 p. m.	40

NOTE – An individual dose shall be no more than 10 gal (37.9 L), unless the dosage system is based on a continuous flow, and the doses shall be uniformly applied over the dosing period.

8.2.2.2 Stress loading

Stress loading sequences shall begin in week 17 of the testing and will be completed in the order listed in the following sections. Each stress sequence shall be separated by 7 d of design loading, as described in 8.2.2.1.

8.2.2.2.1 Wash-day stress

The wash-day stress shall consist of 3 wash-days in a 5-d period. Each wash-day shall be separated by a 24-h period. During a wash-day, the system shall be loaded at times and capacities similar to those delivered during design loading (see 8.2.2.1). However, during the first two dosing periods per day, the design loading shall include 3 wash loads (3 wash cycles and 6 rinse cycles).

8.2.2.2.2 Working-parent stress

For five consecutive days, the system shall be subjected to a working-parent stress. During this stress, the system shall be dosed with 40% of its daily hydraulic capacity between 6:00 a. m. and 9:00 a. m. Between 5:00 p. m. and 8:00 p. m., the system shall be dosed with the remaining 60% of its daily hydraulic capacity,

which shall include 1 wash load (1 wash cycle and 2 rinse cycles).

8.2.2.2.3 Power/equipment failure stress

Power/equipment failure stress simulation shall consist of a flow pattern where approximately 40% of the total daily flow is received between 5 p. m. and 8 p. m. on the day when the power/equipment failure stress is initiated. Power to the system shall then be turned off at 9 p. m. and the flow pattern shall be discontinued for 48 h. After the 48-h period, power shall be restored and the system shall receive approximately 60% of the total daily flow over a 3-h period which shall include 1 wash load (1 wash cycle and 2 rinse cycles).

8.2.2.2.4 Vacation stress

Vacation stress simulation shall consist of a flow pattern where approximately 35% of the total daily flow is received between 6 a. m. and 9 a. m. and approximately 25% of the total daily flow is received between 11 a. m. and 2 p. m. on the day that the vacation stress is initiated. The flow pattern shall be discontinued for 8 consecutive days with power continuing to be supplied to the system. Between 5 p. m. and 8 p. m. of the ninth day, the system shall receive 60% of the total daily flow, which shall include 3 wash loads (3 wash cycles and 6 rinse cycles).

8.2.3 Dosing volumes

The 30-d average volume of the wastewater delivered to the system shall be within 100% ± 10% of the system's rated hydraulic capacity.

NOTE – All dosing days, except those with dosing requirements less than the daily hydraulic capacity, shall be included in the 30-d average calculation.

8.3 Sample collection

8.3.1 Sampling frequency

Influent and effluent samples shall be collected three times per week during design loading periods and twice during each stress recovery period (the week following completion of each of the stress simulations described in 8.2.2.2). This schedule shall be continued in the event that testing is extended beyond the 26-wk minimum.

8.3.2 Collection methods

All sample collection shall be in accordance with *Standard Methods*, unless otherwise specified. Influent wastewater samples shall be flow-proportional, 24-h composites obtained during periods of system dosing. Effluent samples shall be flow-proportional, 24-h composites obtained during periods of system discharge. Effluent samples shall be representative of all treated effluent discharged from the system, as sampled from a central point of collection of all treated effluent. Grab samples shall be collected for pH, temperature, and dissolved oxygen (DO). The location of the grab sample shall be appropriate to provide a sample that is representative of the influent or effluent, and shall be determined in conjunction with the manufacturer. Grab samples shall be collected during the morning dosing period for gravity flow systems and during a time of discharge for systems that are pump discharged.

8.3.3 Analyses

The samples collected as described in 8.3.1 and 8.3.2 shall be analyzed as follows:

		Sample location		
Parameter	Sample type	Raw influent	Treated effluent	Testing location
BOD_5	24 h composite	X		Laboratory
$CBOD_5$	24 h composite		X	Laboratory
Total suspended solids	24 h composite	X	X	Laboratory
PH	Grab	X	X	Test site
Temperature (°C)	Grab	X	X	Test site
Dissolved oxygen	Grab		X	Test site
Alkalinity (as $CaCO_3$)	24 h composite	X	X	Laboratory
TKN (as N)	24 h composite	X	X	Laboratory
Ammonia-N (as N)	24 h composite	X	X	Laboratory
Nitrite/nitrate-N (as N)	24 h composite	X	X	Laboratory

8.3.4 Analytical methods

The appropriate methods in *Standard Methods* shall be used to complete the analyses indicated in 8.3.3.

8.4 Criteria

8.4.1 Testing conditions

If conditions during the testing and evaluation period result in system upset, improper sampling, improper dosing, or influent characteristics outside the ranges specified in 8.2.1, an assessment shall be conducted to determine the extent to which these conditions adversely affected the performance of the system. Based on this assessment, specific data points may be excluded from the averages. Rationale for all data exclusions shall be documented in the final report.

8.4.2 Catastrophic site problems

In the event that a catastrophic site problem not described in the Standard including, but not limited to, influent characteristics, malfunctions of test site apparatus and acts of God, jeopardizes the validity of the performance testing, manufacturers shall be given the choice to:

– perform maintenance on the system, reinitiate system start-up procedures, and restart the performance testing; or
– with no routine maintenance performed, have the system brought back to pre-existing conditions and resume testing within 3 wks after the site problem has been identified and corrected. Data collected during the system recovery period shall be excluded from the effluent averages.

NOTE – “Pre-existing conditions” shall be defined as the point when the results of 1 wk’s worth of sampling are within 15% of the averages of the samples from the previous 3 wks of sampling.

8.4.3 Effluent quality

For purposes of determining system performance, only samples collected during design loading periods, described in 8.2.2, shall be used in the calculations. The data collected during the stress sequences shall not be included in the calculations, but shall be included in the final report.

8.4.3.1 CBOD5

The average CBOD5 of all effluent samples shall not exceed 25 mg/L.

8.4.3.2 TSS

The average TSS of all effluent samples shall not exceed 30 mg/L.

8.4.3.3 Total nitrogen

The average total nitrogen concentration of all effluent samples shall be less than 50% of the average total nitrogen concentration of all influent samples.

8.4.3.4 pH

The pH of individual effluent samples shall be between 6.0 and 9.0 SU.

8.5 Final report

A final report shall be prepared that presents the following:

– all data collected in accordance with the testing and evaluations within this Standard;

– a table indicating the actual percent reduction over the course of the test (included in the Executive Summary, as well as in the body, of the report);

– observations made during the testing;

– an estimation of the pounds of nitrogen loaded during the test and the pounds removed;

– any adjustments made to the alkalinity of the influent wastewater;

– a copy of the current edition of the Owner’s Manual; and

– process description and detailed dimensioned drawings of the system evaluated.

A supplemental report shall be prepared for any system(s) approved under the performance classification section (1.4) of this Standard, including process description(s) and dimensioned drawings.

APPENDIX C

ANALYTICAL RESULTS

NSF International

Standard 40 - Residential Wastewater Treatment Systems

Plant Effluent

Week Beginning: 5-Apr-15 Plant Code: Premier Tech Coco DN

Weeks Into Test: 1

Weekend Dosing: Sunday 460 gallons Saturday 460 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		460	460	460	460	460
Dissolved Oxygen (mg/L)	aeration chamber	0.59	0.63	0.62	0.57	0.64
	effluent	6.61	6.97	8.02	6.15	7.43
Temperature (C)	influent	23	23	24	24	24
	aeration chamber	21	22	22	23	22
	effluent	21	22	22	22	22
pH	influent	7.1	7.0	7.2	7.0	7.3
	aeration chamber	7.2	7.2	7.1	7.1	7.3
	effluent	7.2	7.2	7.1	7.1	7.2
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	120	120	170	180	180
	effluent ($CBOD_5$)	9	9	9	6	7
Suspended Solids (mg/L)	influent	210	170	320	260	380
	effluent	10	10	10	7	6

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes:

NSF International

Standard 40 - Residential Wastewater Treatment Systems

Plant Effluent

Week Beginning: 12-Apr-15 Plant Code: Premier Tech Coco DN

Weeks Into Test: 2

Weekend Dosing: Sunday 460 gallons Saturday 460 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		460	460	460	460	460
Dissolved Oxygen (mg/L)	aeration chamber	0.46	0.75	0.59	0.55	0.46
	effluent	5.41	5.88	4.71	4.63	4.61
Temperature (C)	influent	25	24	24	25	24
	aeration chamber	23	23	22	23	23
	effluent	22	22	22	23	23
pH	influent	7.2	7.1	6.9	7.3	7.0
	aeration chamber	7.1	7.2	7.2	7.2	7.1
	effluent	7.1	7.2	7.2	7.1	7.0
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	130	140	120	260	210
	effluent ($CBOD_5$)	7	6	5	8	7
Suspended Solids (mg/L)	influent	220	250	210	240	290
	effluent	6	4	5	4	6

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes:

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: 19-Apr-15 Plant Code: Premier Tech Coco DN

Weeks Into Test: 3

Weekend Dosing: Sunday 460 gallons Saturday 460 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		460	460	460	460	460
Dissolved Oxygen (mg/L)	aeration chamber	0.49	0.57	0.36	0.48	0.40
	effluent	4.81	6.29	4.87	4.57	5.07
Temperature (C)	influent	22	25	25	24	25
	aeration chamber	23	23	23	23	23
	effluent	22	22	23	23	23
pH	influent	6.8	7.2	7.0	6.9	7.2
	aeration chamber	7.2	7.2	7.1	7.2	7.1
	effluent	7.1	7.2	7.1	7.2	7.2
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	120	180	190	150	120
	effluent ($CBOD_5$)	3	3	3	2	1
Suspended Solids (mg/L)	influent	210	290	450	320	150
	effluent	4	3	3	2	2

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes:

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: 26-Apr-15 Plant Code: Premier Tech Coco DN

Weeks Into Test: 4

Weekend Dosing: Sunday 460 gallons Saturday 460 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		460	460	460	460	460
Dissolved Oxygen (mg/L)	aeration chamber	0.45	0.55	0.59	0.69	0.57
	effluent	5.31	5.17	6.89	6.32	6.60
Temperature (C)	influent	25	24	23	24	22
	aeration chamber	24	23	23	23	23
	effluent	24	23	23	23	22
pH	influent	7.1	6.8	7.1	7.2	7.0
	aeration chamber	7.0	7.0	7.2	7.1	7.1
	effluent	7.0	7.0	7.2	7.0	7.1
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	130	190	110	99	130
	effluent ($CBOD_5$)	4	4	2	2	2
Suspended Solids (mg/L)	influent	160	120	150	130	180
	effluent	6	2	1	2	2

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes:

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: 3-May-15 Plant Code: Premier Tech Coco DN

Weeks Into Test: 5

Weekend Dosing: Sunday 460 gallons Saturday 460 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		460	460	460	460	460
Dissolved Oxygen (mg/L)	aeration chamber	0.57	0.49	0.58	0.65	0.57
	effluent	5.49	6.27	6.71	6.86	6.33
Temperature (C)	influent	25	25	26	26	25
	aeration chamber	24	24	25	25	24
	effluent	24	24	25	25	24
pH	influent	6.9	6.8	7.0	7.1	6.9
	aeration chamber	7.1	7.0	7.0	7.0	7.1
	effluent	7.1	7.0	7.0	7.0	7.0
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	230	140	160	150	230
	effluent ($CBOD_5$)	3	3	3	3	6
Suspended Solids (mg/L)	influent	140	240	200	280	180
	effluent	4	2	2	2	2

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes:

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: 10-May-15 Plant Code: Premier Tech Coco DN

Weeks Into Test: 6

Weekend Dosing: Sunday 460 gallons Saturday 460 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		460	460	460	460	460
Dissolved Oxygen (mg/L)	aeration chamber	0.50	0.46	0.64	0.59	0.55
	effluent	5.27	5.52	6.40	7.27	6.12
Temperature (C)	influent	26	26	26	25	26
	aeration chamber	25	25	24	24	25
	effluent	25	24	24	24	24
pH	influent	7.0	6.9	7.1	6.8	7.0
	aeration chamber	7.1	7.0	7.1	7.0	7.0
	effluent	7.0	7.0	7.1	7.0	7.0
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	120	220	200	140	140
	effluent ($CBOD_5$)	2	2	4	3	3
Suspended Solids (mg/L)	influent	140	160	170	160	170
	effluent	2	2	2	3	2

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes:

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: 17-May-15 Plant Code: Premier Tech Coco DN

Weeks Into Test: 7

Weekend Dosing: Sunday 460 gallons Saturday 460 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		460	460	460	460	460
Dissolved Oxygen (mg/L)	aeration chamber	0.39	0.45	0.49	0.40	0.55
	effluent	5.07	4.89	4.74	4.65	4.95
Temperature (C)	influent	26	26	26	27	26
	aeration chamber	25	25	25	26	25
	effluent	25	25	25	25	25
pH	influent	6.9	7.0	7.0	6.9	7.1
	aeration chamber	7.2	7.2	7.2	7.2	7.1
	effluent	7.0	7.1	7.1	7.1	7.1
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	70	310	220	320	150
	effluent ($CBOD_5$)	2	3	3	2	3
Suspended Solids (mg/L)	influent	100	120	180	220	170
	effluent	3	2	3	3	3

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes:

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: 24-May-15 Plant Code: Premier Tech Coco DN

Weeks Into Test: 8

Weekend Dosing: Sunday 460 gallons Saturday 460 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		460	460	460	460	460
Dissolved Oxygen (mg/L)	aeration chamber	d	0.49	0.45	0.69	0.54
	effluent	d	3.89	4.89	4.31	4.36
Temperature (C)	influent	d	25	26	26	26
	aeration chamber	d	25	25	25	25
	effluent	d	25	25	25	25
pH	influent	d	7.0	7.0	7.5	7.2
	aeration chamber	d	6.8	7.2	6.7	6.9
	effluent	d	6.7	7.1	6.6	6.8
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	260	270	230	590	340
	effluent ($CBOD_5$)	3	2	2	2	<3
Suspended Solids (mg/L)	influent	120	100	100	88	120
	effluent	2	2	2	1	2

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes: No field readings on 5/25 due to the holiday.

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: 31-May-15 Plant Code: Premier Tech Coco DN

Weeks Into Test: 9

Weekend Dosing: Sunday 460 gallons Saturday 460 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		460	460	460	460	460
Dissolved Oxygen (mg/L)	aeration chamber	0.39	a	0.55	0.47	0.47
	effluent	5.07	a	4.33	4.30	4.57
Temperature (C)	influent	26	a	27	26	26
	aeration chamber	26	a	27	27	26
	effluent	26	a	26	26	26
pH	influent	6.9	a	a	a	a
	aeration chamber	7.2	a	a	a	a
	effluent	7.0	a	a	a	a
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	150	300	97	210	190
	effluent ($CBOD_5$)	2	2	2	1	<3
Suspended Solids (mg/L)	influent	260	170	170	180	190
	effluent	<1	1	1	<1	<2

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes: The pH meter failed on 6/2, resulting in loss of pH, temperature, and D.O. data on that day. pH measurements were not completed until the problem was resolved on 6/12.

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: 7-Jun-15 Plant Code: Premier Tech Coco DN

Weeks Into Test: 10

Weekend Dosing: Sunday 460 gallons Saturday 460 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		460	460	460	460	460
Dissolved Oxygen (mg/L)	aeration chamber	0.57	0.46	0.41	0.48	0.75
	effluent	4.38	4.30	3.88	4.19	4.13
Temperature (C)	influent	27	27	27	27	27
	aeration chamber	28	28	28	28	28
	effluent	27	25	28	27	28
pH	influent	a	a	a	a	7.4
	aeration chamber	a	a	a	a	7.0
	effluent	a	a	a	a	6.9
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	81	220	230	170	240
	effluent ($CBOD_5$)	1	1	1	1	1
Suspended Solids (mg/L)	influent	130	170	190	220	310
	effluent	3	1	1	2	<1

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes:

NSF International
Standard 40 - Residential Wastewater Treatment Systems

Plant Effluent

Week Beginning: 14-Jun-15 Plant Code: Premier Tech Coco DN

Weeks Into Test: 11

Weekend Dosing: Sunday 460 gallons Saturday 460 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		460	460	460	460	460
Dissolved Oxygen (mg/L)	aeration chamber	0.83	1.28	1.09	1.01	1.05
	effluent	4.11	4.27	4.35	4.53	4.32
Temperature (C)	influent	27	27	27	27	27
	aeration chamber	28	28	28	27	28
	effluent	28	28	28	28	28
pH	influent	7.5	7.4	7.5	7.6	7.5
	aeration chamber	7.0	7.0	7.0	7.0	7.0
	effluent	7.0	6.9	7.0	6.9	6.9
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	160	200	150	210	170
	effluent ($CBOD_5$)	3	1	2	1	1
Suspended Solids (mg/L)	influent	350	230	260	170	120
	effluent	2	1	<4	<1	2

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes:

NSF International
Standard 40 - Residential Wastewater Treatment Systems

Plant Effluent

Week Beginning: 21-Jun-15 Plant Code: Premier Tech Coco DN

Weeks Into Test: 12

Weekend Dosing: Sunday 460 gallons Saturday 460 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		460	460	460	460	460
Dissolved Oxygen (mg/L)	aeration chamber	1.60	1.58	1.74	1.63	1.64
	effluent	5.36	5.45	5.27	5.18	5.32
Temperature (C)	influent	27	27	27	28	28
	aeration chamber	27	27	28	28	28
	effluent	28	28	28	28	28
pH	influent	7.6	7.3	7.5	7.4	7.5
	aeration chamber	7.1	7.0	7.0	7.0	7.0
	effluent	6.9	6.9	7.0	6.9	6.9
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	200	180	210	250	260
	effluent ($CBOD_5$)	2	2	1	2	2
Suspended Solids (mg/L)	influent	120	140	110	180	300
	effluent	2	2	1	2	2

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes:

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: 28-Jun-15 Plant Code: Premier Tech Coco DN

Weeks Into Test: 13

Weekend Dosing: Sunday 460 gallons Saturday 460 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		460	460	460	460	460
Dissolved Oxygen (mg/L)	aeration chamber	1.71	1.69	1.87	1.76	d
	effluent	4.96	4.72	5.11	4.93	d
Temperature (C)	influent	28	28	28	28	d
	aeration chamber	28	28	29	28	d
	effluent	28	28	28	28	d
pH	influent	7.6	7.5	7.6	7.5	d
	aeration chamber	7.0	7.0	7.0	7.0	d
	effluent	7.0	6.9	7.0	7.0	d
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	95	320	320	400	d
	effluent ($CBOD_5$)	2	4	2	2	d
Suspended Solids (mg/L)	influent	120	160	190	160	d
	effluent	2	4	2	2	d

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes: No samples on 7/3 due to the holiday.

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Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: 5-Jul-15 Plant Code: Premier Tech Coco DN

Weeks Into Test: 14

Weekend Dosing: Sunday 460 gallons Saturday 460 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		460	460	460	460	460
Dissolved Oxygen (mg/L)	aeration chamber	2.24	2.04	2.36	2.42	2.27
	effluent	4.69	5.53	4.82	4.17	4.80
Temperature (C)	influent	28	28	28	28	28
	aeration chamber	29	29	29	29	29
	effluent	29	29	29	29	29
pH	influent	7.7	7.7	7.8	7.8	7.9
	aeration chamber	7.1	7.1	7.1	7.1	7.1
	effluent	7.1	7.1	7.1	7.1	7.1
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	80	420	440	330	170
	effluent ($CBOD_5$)	2	2	5	4	4
Suspended Solids (mg/L)	influent	130	140	180	140	150
	effluent	2	<1	5	3	3

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes:

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Plant Effluent

Week Beginning: 12-Jul-15 Plant Code: Premier Tech Coco DN

Weeks Into Test: 15

Weekend Dosing: Sunday 460 gallons Saturday 460 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		460	460	460	460	460
Dissolved Oxygen (mg/L)	aeration chamber	d	1.29	1.43	1.39	1.37
	effluent	d	4.68	2.91	2.73	3.44
Temperature (C)	influent	d	29	29	29	29
	aeration chamber	d	30	30	30	30
	effluent	d	30	30	30	30
pH	influent	d	7.5	7.5	7.3	7.4
	aeration chamber	d	7.1	7.2	7.0	7.1
	effluent	d	7.1	7.2	7.1	7.1
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	130	340	390	380	210
	effluent ($CBOD_5$)	a	a	8	8	11
Suspended Solids (mg/L)	influent	200	190	200	200	190
	effluent	a	a	4	7	4

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes: On site measurements not completed on 7/13 due to lab error. Effluent TSS and CBOD samples not collected on 7/13 and 7/14 due to a problem with the sampling system.

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Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: 19-Jul-15 Plant Code: Premier Tech Coco DN

Weeks Into Test: 16

Weekend Dosing: Sunday gallons Saturday 460 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		460	276	299	460	460
Dissolved Oxygen (mg/L)	aeration chamber	1.27	1.57	1.87	2.15	2.03
	effluent	3.32	3.41	3.29	3.38	3.35
Temperature (C)	influent	29	31	30	31	32
	aeration chamber	30	30	30	31	31
	effluent	30	30	30	31	30
pH	influent	7.2	7.4	7.2	7.3	7.3
	aeration chamber	7.0	7.1	7.2	7.1	7.1
	effluent	7.1	7.1	7.2	7.1	7.0
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	350	260	a	290	300
	effluent ($CBOD_5$)	3	5	a	3	3
Suspended Solids (mg/L)	influent	190	490	a	300	150
	effluent	2	3	a	4	2

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes: Evening dosing was missed on 7/21 and morning dosing was missed on 7/22 due to problems with the Waco test site dosing system.
TSS, BOD, and CBOD samples were not collected on 7/22 due to the problems with the dosing system.

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Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: 26-Jul-15 Plant Code: Premier Tech Coco DN

Weeks Into Test: 17

		Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Dosed Volume (gallons)		460	460	460	460	460	460	460
Dissolved Oxygen (mg/L)	aeration chamber	-	1.69	1.56	1.59	1.65	1.57	1.61
	effluent	-	2.98	2.81	1.89	1.72	1.96	2.27
Temperature (C)	influent	-	30	30	30	30	30	30
	aeration chamber	-	31	31	31	31	31	31
	effluent	-	31	30	30	30	30	30
pH	influent	-	7.4	7.7	7.6	7.4	7.4	7.5
	aeration chamber	-	7.1	7.2	7.2	7.2	7.1	7.1
	effluent	-	7.1	7.2	7.2	7.2	7.1	7.2
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)		160	170	180	230	160	
	effluent ($CBOD_5$)		4	6	5	5	7	
Suspended Solids (mg/L)	influent		160	130	140	150	140	
	effluent		2	3	2	2	3	

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes: Wash Day Stress 7/27 through 7/31.
Additiional samples were collected on 7/28, 29, and 30 at the request of the manufacturer.

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Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: 2-Aug-15 Plant Code: Premier Tech Coco DN

Weeks Into Test: 18

		Sunday	Monday	Tuesday	Wednesday	Thursday
Dosed Volume (gallons)		460	460	460	460	460
Dissolved Oxygen (mg/L)	aeration chamber	1.18	1.26	1.38	1.40	1.21
	effluent	1.57	1.42	1.74	1.68	1.71
Temperature (C)	influent	31	30	30	30	31
	aeration chamber	31	31	31	31	31
	effluent	30	30	31	31	30
pH	influent	7.2	7.6	7.5	7.3	7.3
	aeration chamber	7.2	7.2	7.2	7.2	7.1
	effluent	7.2	7.2	7.2	7.2	7.2
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)		220	140	210	240
	effluent ($CBOD_5$)		4	6	5	17
Suspended Solids (mg/L)	influent		120	170	180	300
	effluent		2	2	2	3

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes: Working Parent Stress started on 8/8.

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Plant Effluent

Week Beginning: 9-Aug-15 Plant Code: Premier Tech Coco DN

Weeks Into Test: 19

		Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Dosed Volume (gallons)		460	460	460	460	460	460	460
Dissolved Oxygen (mg/L)	aeration chamber	1.29	1.01	0.47	0.52	0.38	0.37	0.40
	effluent	2.48	1.97	2.13	2.59	2.82	1.72	1.83
Temperature (C)	influent	31	32	32	32	32	31	32
	aeration chamber	32	32	32	32	32	32	32
	effluent	32	31	32	33	33	33	32
pH	influent	7.3	7.5	7.4	7.4	7.5	7.4	7.4
	aeration chamber	7.1	7.2	7.2	7.2	7.2	7.2	7.2
	effluent	7.2	7.2	7.2	7.3	7.3	7.2	7.2
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)		76	160	200	180		74
	effluent ($CBOD_5$)		3	3	4	5		2
Suspended Solids (mg/L)	influent		110	150	120	160		120
	effluent		1	<1	1	1		<1

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes: Working Parent Stress completed on 8/12.
Additiional samples were collected on 8/11 and 8/13 at the request of the manufacturer.

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Plant Effluent

Week Beginning: 16-Aug-15 Plant Code: Premier Tech Coco DN

Weeks Into Test: 20

		Sunday	Monday	Tuesday	Wednesday	Thursday
Dosed Volume (gallons)		460	460	460	460	180
Dissolved Oxygen (mg/L)	aeration chamber	0.42	0.33	0.33	0.36	0.39
	effluent	1.67	1.58	2.31	3.13	2.43
Temperature (C)	influent	31	32	31	31	31
	aeration chamber	32	32	32	32	32
	effluent	32	32	32	32	32
pH	influent	7.3	7.4	7.6	7.5	7.5
	aeration chamber	7.2	7.2	7.2	7.1	7.1
	effluent	7.3	7.2	7.3	7.3	7.2
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	76	120	170	180	210
	effluent ($CBOD_5$)	4	2	3	2	1
Suspended Solids (mg/L)	influent	95	61	140	99	130
	effluent	1	<1	1	2	1

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes: Power/Equipment Failure Stress 8/20th through 8/22.

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Plant Effluent

Week Beginning: 23-Aug-15 Plant Code: Premier Tech Coco DN

Weeks Into Test: 21

		Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Dosed Volume (gallons)		460	460	460	460	460	460	460
Dissolved Oxygen (mg/L)	aeration chamber	0.51	0.48	0.40	0.55	0.55	0.42	0.49
	effluent	3.68	3.82	3.73	4.22	3.75	3.04	3.21
Temperature (C)	influent	31	31	31	31	31	32	31
	aeration chamber	30	31	31	30	30	30	30
	effluent	31	31	31	31	30	30	31
pH	influent	7.4	7.6	7.5	7.5	7.5	7.5	7.5
	aeration chamber	7.1	7.1	7.2	7.1	7.1	7.1	7.1
	effluent	7.1	7.1	7.1	7.1	7.1	7.1	7.1
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)				69	260	370	220
	effluent ($CBOD_5$)				1	1	6	1
Suspended Solids (mg/L)	influent				77	73	46	42
	effluent				<1	<1	3	<1

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes: Odor:2 T.O.N were measured on Wed 8/26

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Plant Effluent

Week Beginning: 30-Aug-15 Plant Code: Premier Tech Coco DN

Weeks Into Test: 22

		Sunday	Monday	Tuesday	Wednesday	Thursday
Dosed Volume (gallons)		280	0	0	0	0
Dissolved Oxygen (mg/L)	aeration chamber	0.49	0.47	0.38	0.26	0.42
	effluent	3.21	-	-	-	-
Temperature (C)	influent	31	-	-	-	-
	aeration chamber	31	30	30	30	30
	effluent	31	-	-	-	-
pH	influent	7.3	-	-	-	-
	aeration chamber	7.1	7.1	7.2	7.2	7.3
	effluent	7.1	-	-	-	-
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	<39				
	effluent ($CBOD_5$)	1				
Suspended Solids (mg/L)	influent	26				
	effluent	<1				

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes: Vacation Stress started on 8/30.

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Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: 6-Sep-15 Plant Code: Premier Tech Coco DN

Weeks Into Test: 23

		Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Dosed Volume (gallons)		0	0	276	460	460	460	460
Dissolved Oxygen (mg/L)	aeration chamber	0.27	0.33	0.25	0.35	0.31	0.30	0.28
	effluent	-	-	-	4.09	4.15	4.02	3.89
Temperature (C)	influent	-	-	-	31	31	30	31
	aeration chamber	31	31	31	30	30	30	30
	effluent	-	-	-	31	30	30	30
pH	influent	-	-	-	7.4	7.1	7.3	7.3
	aeration chamber	7.4	7.2	7.5	7.0	7.0	7.1	7.2
	effluent	-	-	-	7.0	7.0	7.0	7.1
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)						240	240
	effluent ($CBOD_5$)						2	2
Suspended Solids (mg/L)	influent						160	190
	effluent						3	1

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes: Vacation Stress completed on 9/8.

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Plant Effluent

Week Beginning: 13-Sep-15 Plant Code: Premier Tech Coco DN

Weeks Into Test: 24

		Sunday	Monday	Tuesday	Wednesday	Thursday
Dosed Volume (gallons)		460	460	460	460	460
Dissolved Oxygen (mg/L)	aeration chamber	0.29	0.29	0.33	0.31	0.25
	effluent	3.37	3.34	3.38	2.64	2.42
Temperature (C)	influent	30	30	30	30	30
	aeration chamber	30	29	29	30	30
	effluent	30	30	29	30	30
pH	influent	7.5	7.5	7.4	7.4	7.4
	aeration chamber	7.2	7.2	7.2	7.2	7.2
	effluent	7.1	7.1	7.1	7.1	7.2
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	220	170	220	240	240
	effluent ($CBOD_5$)	2	2	2	4	3
Suspended Solids (mg/L)	influent	190	180	220	190	160
	effluent	1	2	2	3	2

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes: Odor:5 T.O.N were measured on Wed 9/16

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Plant Effluent

Week Beginning: 20-Sep-15 Plant Code: Premier Tech Coco DN

Weeks Into Test: 25

		Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Dosed Volume (gallons)		460	560	460	560	460	560	460
Dissolved Oxygen (mg/L)	aeration chamber	0.32	0.29	0.31	0.27	0.30	0.33	0.30
	effluent	1.92	1.89	1.97	1.91	1.48	1.94	1.85
Temperature (C)	influent	30	30	30	30	29	29	29
	aeration chamber	30	30	30	30	30	30	30
	effluent	30	30	30	30	30	30	30
pH	influent	7.4	7.4	7.4	7.4	7.3	7.3	7.3
	aeration chamber	7.2	7.2	7.2	7.2	7.2	7.2	7.2
	effluent	7.2	7.2	7.2	7.2	7.2	7.2	7.2
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)		120		260		140	
	effluent ($CBOD_5$)		3		7		8	
Suspended Solids (mg/L)	influent		190		220		160	
	effluent		1		2		3	

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes: The stress sequences were repeated, starting in week 25 because some of the required sampling was missed during the first set of stress sequences.
Wash Day Stress 9/21 through 9/25.
Wash loads were added on the wash days, without adjusting the normal dosing, due to lab error. This resulted in 100 extra gallons of dosing on 9/21, 23, and 25.

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Plant Effluent

Week Beginning: 27-Sep-15 Plant Code: Premier Tech Coco DN

Weeks Into Test: 26

		Sunday	Monday	Tuesday	Wednesday	Thursday
Dosed Volume (gallons)		460	460	460	460	460
Dissolved Oxygen (mg/L)	aeration chamber	0.41	0.35	0.36	0.41	0.34
	effluent	2.05	2.05	3.14	2.11	2.03
Temperature (C)	influent	29	29	29	30	30
	aeration chamber	29	29	29	29	29
	effluent	30	29	29	29	29
pH	influent	7.1	7.3	7.6	7.4	7.3
	aeration chamber	7.1	7.1	7.2	7.2	7.2
	effluent	7.2	7.2	7.2	7.2	7.2
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)		140	210	230	180
	effluent ($CBOD_5$)		4	4	3	3
Suspended Solids (mg/L)	influent		120	160	210	180
	effluent		2	1	2	3

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes: Working Parent Stress didn't start on 10/3 as scheduled, due technical issue with the influent.
Odor:4 T.O.N were measured on Wed 9/30

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Plant Effluent

Week Beginning: 4-Oct-15 Plant Cod Premier Tech Coco DN

Weeks Into Test: 27

		Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Dosed Volume (gallons)		460	460	460	460	460	460	460
Dissolved Oxygen (mg/L)	aeration chamber	0.47	0.51	0.44	0.39	0.41	0.40	0.44
	effluent	3.78	3.84	4.02	3.16	1.28	1.41	1.87
Temperature (C)	influent	29	29	30	30	30	30	30
	aeration chamber	28	28	28	28	28	28	28
	effluent	28	28	28	27	28	28	28
pH	influent	7.2	7.3	7.6	7.3	7.3	7.4	7.4
	aeration chamber	7.1	7.1	7.2	7.2	7.1	7.2	7.2
	effluent	7.2	7.1	7.1	7.2	7.2	7.2	7.2
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	a	<39	160	220	250	180	210
	effluent ($CBOD_5$)	a	1	1	1	7	7	4
Suspended Solids (mg/L)	influent	a	31	270	470	190	230	280
	effluent	a	<1	1	<1	6	4	2

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes: No sampling on 10/4 because there was site technical issue with the influent on 10/3 and 4, which was resolved on 10/5.
Working Parent Stress 10/6 through 10/10.
Additional sampling during the stress was at the request of the manufactur

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Plant Effluent

Week Beginning: 11-Oct-15 Plant Co Premier Tech Coco DN

Weeks Into Test: 28

		Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Dosed Volume (gallons)		460	460	460	276	184	460	460
Dissolved Oxygen (mg/L)	aeration chamber	0.41	0.38	0.73	0.33	0.38	0.42	0.39
	effluent	1.94	2.02	2.45	2.21	1.16	1.78	1.95
Temperature (C)	influent	30	30	30	30	30	30	30
	aeration chamber	29	29	29	28	28	28	28
	effluent	28	28	28	28	25	27	27
pH	influent	7.3	7.3	7.3	7.3	7.4	7.3	7.3
	aeration chamber	7.1	7.2	7.2	7.0	7.1	7.1	7.1
	effluent	7.2	7.2	7.2	7.2	7.2	7.2	7.2
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)			270	200	160	180	130
	effluent ($CBOD_5$)			6	6	b	b	13
Suspended Solids (mg/L)	influent			600	300	220	200	200
	effluent			2	3	b	b	6

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes: The septic tank effluent filter, which is part of the system under test, was found clogged on 10/13, resulting in the treatment system backing up. Dosing was suspended following the mid-day dosing on 10/14. The effluent filter was serviced according to the manufacturer's instructions on 10/15 after allowing the water level in the septic tank to return to normal. Dosing resumed just prior to evening dosing on 10/15. This meant full 24-hour effluent samples could not be collected on 10/15 and 10/16.
10/14 measurements: Color: 40 Pt-Co units
Odor: 10 T.O.N
Oily film and foam: Not detected

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Plant Effluent

Week Beginning: 18-Oct-15 Plant Code: Premier Tech Coco DN

Weeks Into Test: 29

		Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Dosed Volume (gallons)		460	0	280	460	460	460	460
Dissolved Oxygen (mg/L)	aeration chamber	0.42	0.50	0.41	0.41	0.36	0.38	0.33
	effluent	2.13	-	-	0.54	3.35	3.42	3.67
Temperature (C)	influent	29	-	-	29	29	29	28
	aeration chamber	28	28	27	28	28	28	27
	effluent	27	-	-	24	27	28	28
pH	influent	7.4	-	-	7.3	7.3	7.3	7.3
	aeration chamber	7.2	7.2	7.3	7.2	7.2	7.2	7.3
	effluent	7.1	-	-	7.1	7.1	7.0	7.1
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	120						200
	effluent ($CBOD_5$)	8						4
Suspended Solids (mg/L)	influent	200						340
	effluent	4						4

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes: Power/Equipment Failure Stress 10/18 through 10/20.

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Plant Effluent

Week Beginning: 25-Oct-15 Plant Code: Premier Tech Coco DN

Weeks Into Test: 30

		Sunday	Monday	Tuesday	Wednesday	Thursday
Dosed Volume (gallons)		460	460	460	280	0
Dissolved Oxygen (mg/L)	aeration chamber	0.38	0.46	1.50	0.53	0.60
	effluent	3.84	4.17	1.06	4.22	-
Temperature (C)	influent	27	27	27	27	-
	aeration chamber	25	25	25	25	25
	effluent	25	25	25	25	-
pH	influent	7.3	7.3	7.5	7.4	-
	aeration chamber	7.2	6.9	7.4	7.1	7.2
	effluent	7.0	7.0	7.3	7.1	-
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	160	91	210	130	
	effluent ($CBOD_5$)	2	1	2	2	
Suspended Solids (mg/L)	influent	230	160	210	220	
	effluent	2	2	2	2	

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes: Vacation Stress started on 10/28.

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: 1-Nov-15 Plant Code: Premier Tech Coco DN

Weeks Into Test: 31

		Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Dosed Volume (gallons)		0	0	0	0	0	275	460
Dissolved Oxygen (mg/L)	aeration chamber	0.64	0.62	0.58	0.45	0.61	0.47	0.63
	effluent	-	-	-	-	-	-	2.17
Temperature (C)	influent	-	-	-	-	-	-	27
	aeration chamber	23	23	23	23	23	23	23
	effluent	-	-	-	-	-	-	20
pH	influent	-	-	-	-	-	-	7.4
	aeration chamber	7.1	7.2	7.2	7.2	7.2	7.2	7.2
	effluent	-	-	-	-	-	-	7.2
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)							
	effluent ($CBOD_5$)							
Suspended Solids (mg/L)	influent							
	effluent							

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes: Vacation Stress completed on 11/6.

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: 8-Nov-15 Plant Code: Premier Tech Coco DN

Weeks Into Test: 32

		Sunday	Monday	Tuesday	Wednesday	Thursday
Dosed Volume (gallons)		460	460	460	460	460
Dissolved Oxygen (mg/L)	aeration chamber	0.58	0.54	0.61	0.46	0.39
	effluent	3.89	5.62	5.72	5.47	5.12
Temperature (C)	influent	26	26	26	26	26
	aeration chamber	23	23	23	23	23
	effluent	21	22	23	22	23
pH	influent	7.3	7.3	7.4	7.3	7.4
	aeration chamber	7.2	7.2	7.1	7.2	7.2
	effluent	7.2	7.1	7.1	7.1	7.1
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)		63	79	270	400
	effluent ($CBOD_5$)		2	1	1	2
Suspended Solids (mg/L)	influent		89	110	140	190
	effluent		2	4	1	1

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes: 11/11 measurements:
Color: 20 Pt-Co units
Odor 10 T.O.N
Oily film and foam: Not detected

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: 15-Nov-15 Plant Code: Premier Tech Coco DN

Weeks Into Test: 33

		Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Dosed Volume (gallons)		460	460	460	460	460	460	460
Dissolved Oxygen (mg/L)	aeration chamber	0.39	0.44	0.58	0.52	0.57	0.66	
	effluent	4.19	4.01	3.91	3.80	5.55	5.78	
Temperature (C)	influent	26	26	27	31	28	28	
	aeration chamber	23	23	22	22	22	22	
	effluent	22	23	22	22	22	22	
pH	influent	7.4	7.6	7.4	7.1	7.2	7.3	
	aeration chamber	7.2	7.2	7.2	7.2	7.2	7.1	
	effluent	7.1	7.1	7.1	7.1	7.2	7.1	
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	100	240	240	190	270	230	
	effluent ($CBOD_5$)	2	2	2	3	2	1	
Suspended Solids (mg/L)	influent	130	160	190	65	110	110	
	effluent	2	2	1	2	2	2	

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes: D.O., temperature, and pH data collected from 11/14 through 11/20 was measured with an instrument that was past it's calibration due date. However, the instrument was calibrated in house for both pH and DO each day before collecting data.

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: 22-Nov-15 Plant Code: Premier Tech Coco DN

Weeks Into Test: 34

		Sunday	Monday	Tuesday	Wednesday	Thursday
Dosed Volume (gallons)		460	460	460	460	460
Dissolved Oxygen (mg/L)	aeration chamber		1.41	1.83	2.21	2.17
	effluent		4.99	5.23	5.44	5.37
Temperature (C)	influent		23	23	24	25
	aeration chamber		20	21	21	21
	effluent		20	20	21	21
pH	influent		7.5	7.6	7.7	7.5
	aeration chamber		7.2	7.2	7.1	7.1
	effluent		7.1	7.1	7.2	7.1
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)		300	300	380	240
	effluent ($CBOD_5$)		1	3	3	2
Suspended Solids (mg/L)	influent		150	230	180	180
	effluent		1	1	3	3

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes:

APPENDIX D

ANALYTICAL RESULTS – Nitrogen Analyses

	Date	Ammonia Nitrogen (mg/L)		Total Kjeldahl Nitrogen (mg/L)		Nitrate/Nitrite (mg/L)		Total Nitrogen (mg/L)		Total Alkalinity (mg/L CaCO3)		Days	Daily TN Reduction	Avg TN Reduction
		Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent			
Week 1	04/06/15	24.4	25	35.2	18.9	0.06	0.3	35.3	19.2	320	340	1	45.55	
	04/08/15	31.0	24.2	47.7	28.1	0.52	0.46	48.2	28.6	350	340	2	40.77	
	04/10/15	26.8	24.7	62.9	31.1	0.14	0.55	63.0	31.7	350	350	3	49.79	
Week 2	04/13/15	26.7	24.7	41.9	28.8	0.12	0.61	42.0	29.4	350	350	4	30.01	
	04/15/15	27.6	26.5	42.7	31.1	0.07	0.84	42.8	31.9		330	5	25.32	
	04/17/15	31.1	28.9	45.4	30.4	0.26	1.05	45.7	31.5	360	350	6	31.12	
Week 3	04/20/15	24.1	27.9	36.5	29.8	0.12	2.42	36.6	32.2	320	340	7	12.02	
	04/22/15	26.3	24.5	40.6	22.1	0.1	3.02	40.7	25.1		320	8	38.28	
	04/24/15	16.0	20.2	25.0	20.6	0.93	3.79	25.9	24.4	290	310	9	5.94	
Week 4	04/27/15	18.3	8.2	27.9	8.7	0.46	6.4	28.4	15.1	300	260	10	46.76	
	04/29/15	16.7	4.7	26.0	6.1	1.0	5.0	27.0	11.1		240	11	58.89	
	05/01/15	15.3	1.6	28.3	2.6	0.05	6.9	28.4	9.5	310	220	12	66.49	
Week 5	05/04/15	20.9	1.3	31.0	2.5	0.05	4.2	31.1	6.7	300	240	13	78.42	
	05/06/15	22.4	1.0	31.8	2.3	0.08	5.2	31.9	7.5		240	14	76.47	
	05/08/15	30.6	3.2	37.4	4.5	0.1	4.1	37.5	8.6	350	260	15	77.07	
Week 6	05/11/15	21.9	6.9	29.9	8.6	1.4	5.2	31.3	13.8	290	260	16	55.91	
	05/13/15	25.1	4.7	34.6	6.6	0.05	5.8	34.7	12.4		250	17	64.21	
	05/15/15	22.7	4.2	28.4	5.6	0.05	4.9	28.5	10.5	300	240	18	63.09	
Week 7	05/18/15	16.2	6.5	23.6	8.0	0.93	4.5	24.5	12.5	280	260	19	49.04	
	05/20/15	31.0	8.2	35.4	9.7	0.1	3.1	35.5	12.8		270	20	63.94	
	05/22/15	25.0	12.1	37.8	13.0	0.07	4.6	37.9	17.6	340	280	21	53.53	
Week 8	05/25/15	38.3	13.7	76.9	17.3	0.54	4.3	77.4	21.6	400	300	22	72.11	
	05/27/15	32.5	14.2	39.3	16.5	0.05	6.9	39.4	23.4		280	23	40.53	
	05/29/15	33.8	11.8	45.7	11.1	1.4	5.5	47.1	16.6	360	290	24	64.76	
Week 9	06/01/15	20.6	10.9	31.9	11.7	0.05	5	32.0	16.7	320	280	24	47.73	
	06/03/15	19.4	9.0	26.6	9.3	0.05	5.6	26.7	14.9	310	260	26	44.09	
	06/05/15	22.2	6.8	38.0	8.2	0.05	5.0	38.1	13.2	320	240	27	65.31	
Week 10	06/08/15	13.8	5.8	22.7	7.2	0.18	4.7	22.9	11.9	270	260	28	47.99	**50.93**
	06/10/15	29.9	8.0	44.0	9.7	0.09	4	44.1	13.7	320	260	29	68.93	
	06/12/15	26.6	10.2	41.4	11.5	0.06	5.3	41.5	16.8	310	250	30	59.48	
Week 11	06/15/15	16.1	7.7	32.0	9.2	0.12	3.7	32.1	12.9	260	240	31	59.84	
	06/17/15	16.1	8.3	27.7	11	0.22	4.1	27.9	15.1	230	240	32	45.92	
	06/19/15	23.3	7.1	30.2	8.6	0.05	5.5	30.3	14.1	310	230	33	53.39	
Week 12	06/22/15	23.9	8.5	35.5	9.5	0.06	4.9	35.6	14.4	310	260	34	59.51	**52.27**
	06/24/15	29.7	10.2	40.8	9.0	0.06	4.7	40.9	13.7	330	250	35	66.47	
	06/26/15	22.1	11.4	35.6	10.8	0.08	4.3	35.7	15.1	320	280	36	57.68	
Week 13	06/29/15	12.6	10.3	20.7	10.3	0.23	3.6	20.9	13.9	290	270	37	33.59	
	07/01/15	36.5	12.3	48.1	13.6	0.07	2.5	48.2	16.1	390	280	38	66.58	
	07/02/15	42.9	14.6	58.1	17.0	0.07	2.5	58.2	19.5	420	310	39	66.48	
Week 14	07/06/15	20.4	12.7	27	12.6	0.05	4.6	27.1	17.2	300	270	40	36.41	**53.26**
	07/08/15	39.8	16.5	61.4	19.5	0.09	2.2	61.5	21.7	360	290	41	64.71	
	07/10/15	28.0	22.4	45.9	29.7	0.06	2.45	46.0	32.2	360	320	42	30.05	

Week 15	07/13/15													
	07/15/15	36.5	20.6	59.2	24.4	0.08	2	59.3	26.4	390	330	43	55.47	
	07/17/15	44.3	26.4	61.8	33.3	0.06	0.5	61.9	33.8	390	360	44	45.36	
Week 16	07/20/15	40.0	28.5	62.3	31.8	0.06	1.2	62.4	33.0	390	360	45	47.08	
	07/22/15													
	07/24/15	30.7	28.9	56.2	33.1	0.16	1.3	56.4	34.4	380	360	46	38.96	**52.22**
week 17- 23	08/03/15											**Stress data, do not use for 245**		Extra samples per Premier Tech
	08/05/15													
	08/07/15													
	08/10/15		24.5		26.7		0.19	0	26.9					
	08/11/15	19.8	22.8	30.6	26.5	2.07	0.83	25.5	29.4					
	08/12/15	18.7	20.7	33.6	26.9	1.6	0.44	24.1	26.7					
	08/13/15	16.6	20.2	26.1	21.7	0.62	0.48	21.4	26.0					
	08/15/15													
	08/17/15													
	08/19/15													
	08/26/15													
	08/28/15													
	08/29/15													
	09/11/15													
week 24	09/14/15	35.1	15.9	47.3	16.4	0.13	5.98	47.4	22.4	350	280			
	09/16/15	39.5	20	55.6	20.8	0.25	4.79	55.9	25.6	310	290			
	09/18/15	31.5	25.5	47.4	24.4	0.09	3.58	47.5	28.0	340	300			
Week 25	09/21/15	32.7	25.8	45.6	24.2	0.12	3.27	45.7	27.5	320	310		39.92	wash day stress
	09/23/15	44.6	26.7	63.9	29.7	0.11	1.87	64.0	31.6	370	330		50.68	
	09/25/15	25.8	29.6	43.4	35.3	0.09	0.87	43.5	36.2	330	370		16.83	
Week 26	09/28/15	23.2	33.5	38.9	34.3	1.69	1.32	40.6	35.6	290	340		12.24	
	09/30/15	31.3	25.6	50.6	26.9	0.2	2.01	50.8	28.9	310	320		43.09	
	10/02/15	30.3	27.4	46.0	31.5	0.23	2.21	46.2	33.7	350	320		27.08	
Week 27	10/06/15	28.1	11.1	44.3	13.1	0.27	4.73	44.6	17.8	280	230		60.00	working parent stress
	10/07/15	29.0	13.0	52.0	16.5	0.11	3.46	52.1	20.0	300	240		61.70	
	10/09/15	29.9	20.5	47.9	25.5	0.16	1.38	48.1	26.9	310	300		44.07	
Week 28	10/13/15	36.9	25.6	76.2	25.7	0.13	0.68	76.3	26.4	350	320		65.44	
	10/14/15	23.3	27.7	46.7	33.3	0.14	0.64	46.8	33.9	300	320		27.54	
	10/17/15	31.4	29.2	49.5	34.3	0.11	2.61	49.6	36.9	340	330		25.60	
Week 29	10/18/15	32.9	29.2	40.6	30	0.5	3.03	41.1	33.0	330	320		19.64	power failure stress
	10/21/15													
	10/24/15	20.0	16.6	33.6	18.0	0.14	5.31	33.7	23.3	260	260		30.91	
Week30	10/26/15	7.4	6.0	18.5	7.3	2.03	9.56	20.5	16.9	200	190		17.88	
	10/27/15	19.6	5.3	30.7	10.7	2.31	5.88	33.0	16.6	280	200		49.77	
	10/28/15	17.6	4.95	34.8	8.3	0.8	4.93	35.6	13.2	260	200		62.84	
Week 3	11/02/15													vacation stress
	11/04/15													
	11/06/15													

Week 32	11/09/15	10.7	0.52	24.3	0.94	1.79	12.7	26.1	13.6	260	190		47.72	
	11/11/15	21.8	0.08	46.3	0.93	0.05	10.4	46.4	11.3	320	190		75.56	
	11/13/15	31.6	7.3	47.6	8.88	0.44	4.07	48.0	13.0	340	250		73.04	
Week33	11/16/15	28.8	4.4	46.7	6.45	0.57	8.54	47.3	15.0	320	240	47	68.29	
	11/18/15	24.7	7.2	35	11.7	0.32	4.21	35.3	15.9	280	250	48	54.95	
	11/20/15	18.4	6.6	52.1	26.6	0.94	5.02	53.0	31.6	300	250	49	40.38	
Week34	11/23/15	14.1	2.15	57.1	21.5	0.73	6.81	57.8	28.3	310	220	50	51.05	
	11/25/15	30.3	7.6	47.2	9.0	0.92	1.91	48.1	10.9	320	250	51	77.33	
	11/27/15	11.7	13.8	25.8	17.1	1.3	2.34	27.1	19.4	260	270	52	28.27	
Week35	11/30/15	7.1	2.0	26.1	2.3	2.2	6.92	28.3	9.2	240	190	53	67.42	
	12/02/15	15.5	4.9	41.9	6.1	0.54	1.77	42.4	7.9	330	230	54	81.46	
	12/04/15	27.6	13.8	54.4	12.6	0.9	0.41	55.3	13.0	330	270	55	76.47	**53.89**

Median	24.7	10.2	37.8	11.5	0.1	4.2	37.9	15.91	320	270
Min	7.1	1.0	20.7	2.3	0.1	0.3	20.9	6.7	230	190
Max	44.3	28.9	76.9	33.3	2.2	8.5	77.4	34.4	420	360
Avg	25.1	12.5	40.1	14.9	0.3	3.8	40.4	18.6	324	278
Std Dev	8.3	8.4	12.6	9.3	0.5	2.0	12.6	8.1	42	42

APPENDIX E

OWNERS MANUAL

Residential Owner's Manual – USA

*Congratulations on your purchase of an **Ecoflo® Coco Filter- ECDn unit** from **Premier Tech Aqua (PTA)**. The **Ecoflo® Coco Filter-ECDn unit*** has been tested and listed under NSF standard 40 & 245 and meets requirements for Class I systems.
*With the **Ecoflo® Coco Filter –ECDn unit**, you have wisely chosen to protect your health as well as the environment. This manual contains information on the operation, operating guidelines, maintenance and warranties of the **Ecoflo® Coco Filter- ECDn unit**. For additional information, contact our customer service at **1 800 632-6356** or visit our website at **PREMIERTECHAQUA.COM.***

Operating Principle

Onsite wastewater treatment systems must respect applicable local rules and regulations. These systems are specifically designed to treat residential wastewater to such a level that treated effluent can be safely returned to the environment. Typically, an onsite wastewater treatment system is composed of 2 to 3 main treatment steps depending on site constraints prior to final dispersal of treated effluent: primary treatment, treatment system and if required polishing unit.

Primary treatment

The Primary tank is the first element of this nitrification-denitrification system. The primary tank's main functions are to accomplish a primary treatment which is to retain solids and let only a clarified effluent enter further treatment (Ecoflo® Coco Filter-ECDn unit) as well as to offer an anoxic zone in order to promote total nitrogen removal (denitrification).

Treatment system

The wastewater first goes into the Primary tank through an inlet device (tee or baffle) that directs it into the tank. The Primary tank promotes total nitrogen removal (denitrification) under anoxic conditions by creating a rapid mix of the recirculated treated effluent (from the Ecoflo® Coco Filter- ECDn unit) with the organic content of the raw wastewater. The recirculation line between the Ecoflo® Coco Filter- ECDn unit and the Primary tank is simply connected to the inlet pipe of the Primary tank. From the Primary tank, the pretreated wastewater flows by gravity to the Ecoflo® Coco Filter- ECDn unit by first passing into an effluent filter that promotes scum and solids retention in the tank.

Once the wastewater reaches the Ecoflo® Coco Filter- ECDn unit, a tipping bucket equally disperses the wastewater on specially designed plates which evenly distribute the wastewater on top of the filtering media. The wastewater then trickles through the natural fibrous filtering media.

The dosing control unit used in this system controls the pump located in the bottom of the biofilter that feeds a flow divider (PFS-200DN). This control unit consists of a "simplex" control panel allowing management of the dosing pump's cycles (start and pause). The controller totalizes and keeps records of the different pump's operating times either in normal cycle or in critical high level situations. It also totalizes and records the number of critical high level events occurred on the system since its installation. This last count allows validation of the dosing cycle used (operation time and pause time).

The flow divider (PFS-200DN) allow a fraction of the treated wastewater to return to the Primary/anoxic tank via the pump located in the bottom of the biofilter and the remaining fraction is directed toward the dispersal/disposal mean in accordance to local regulations. The recirculation ratio is approximately two (2) times the daily flow (2Q).

The Ecoflo® Coco Filter-ECDn unit's operating principle allows the system to be used continuously or intermittently without requiring any special precaution or having any impact on the quality of the treatment. No specific action from the owner is required to start the system.

The model and the number of Ecoflo® Coco Filter-ECDn unit are determined by the domestic wastewater flow per

day. Other factors such as the available space, the topography of the lot, as well as the type, permeability and depth of the natural occurring soils could influence model selection.

Ecoflo® Coco Filter ECDn unit Models

There are many different models of Ecoflo® Coco Filter-ECDn unit and each model has different characteristics. The letters and numbers associated with the Ecoflo® Coco Filter-ECDn unit specify the model's characteristics, as presented in the following table with model **ECDn-500-P (PACK)** as reference:

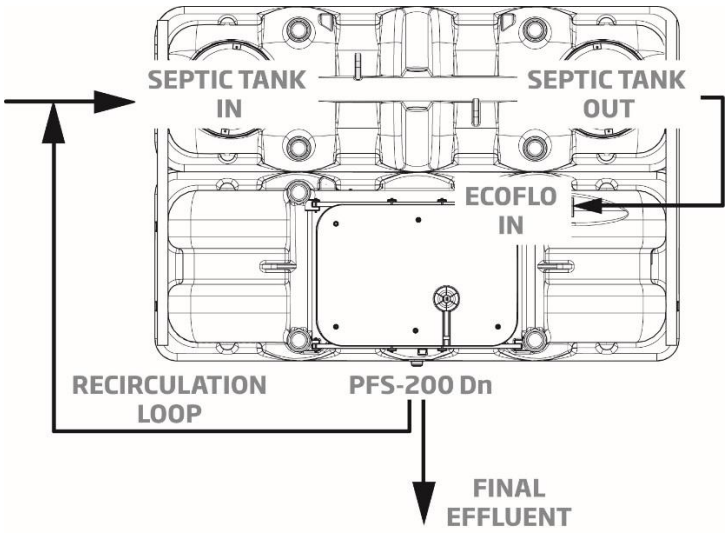
EC refers to the Ecoflo® model	**EC** = Ecoflo® Coco Filter
Dn	**Nitrogen removal product with a maximum applicable HLR 575 L/m²-d, i.e. of 14.1 gal /ft²**
500 refers to the daily flow capacity	**500** = Capacity of 500 US gallons per day 600 = Capacity of 600 US gallons per day 865 = Capacity of 850 US gallons per day 1000 = Capacity of 1000 US gallons per day 1100 = Capacity of 1100 US gallons per day
P refers to the material of the shell	C = Concrete **P** = Plastic (Polyethylene)
PACK refers to configuration of the primary tank and biofilter	PACK = monobloc configuration, both tight together No mention = In line

Therefore, according to this nomenclature, the **ECDn-500-P (PACK)** model refers to an Ecoflo Coco Filter, Nitrogen removal version, with a daily flow capacity of 500 US gallons, in a polyethylene shell. Both primary tank and biofilter come in a monobloc configuration (pack).

For models that doesn't come into PACK configuration, the recommended Hydraulic Retention Time of the primary/septic tank is a minimum of two days at the design daily flow.

Installation Diagrams

NOTE: The installation diagrams below show the Ecoflo® Coco Filter-ECDn unit with polyethylene shell-PACK configuration.



Operating Guidelines

Type of wastewater that can be treated by an Ecoflo® Coco Filter-ECDn unit:

Domestic wastewater (for example: wastewater from isolated dwellings).

It is NOT RECOMMENDED to discharge any of the following substances into the septic system:

- Oil and grease (motor oil, cooking oil, etc.);
- Wax and resins;
- Paints and solvents;
- Any kind of petroleum product;
- Any kind of pesticide;
- Any kind of primary tank additive;
- Any kind of toxic substance;
- Anything not easily biodegradable (for example, coffee beans, cigarette butts, sanitary napkins, tampons, condoms, cotton swab, etc.).

AND

- **NEVER open or go inside the primary tank or the Ecoflo® Coco Filter-ECDn unit.**
- **Keep all lids of the septic system accessible at all times. NEVER cover them with mulch, dirt or any permanent structure (patio, swing, shed, etc.).**
- **Make sure all lids of the septic system are at least 50 mm (2") above the surface of the landscaped lot.**
- **NEVER install a riser on polyethylene Ecoflo® Coco Filter ECDn-865, 1000 and 1100-P models.**
- **NEVER install more than one (1) 6 inch riser on a polyethylene Ecoflo® Coco Filter-ECDn-500 and 600 models.**
- **NEVER install more than ONE (1) 8 inch RISER on a concrete Ecoflo® Coco Filter-ECDn unit main access. Use only PTA products.**
- **NEVER plant trees within 6 m (20') of the Ecoflo® Coco Filter-ECDn unit lid and within 2 m (6' 6") of the absorption bed.**
- **NEVER connect a drain pipe, roof gutter, sump pump or air conditioner drain to the septic system.**
- **NEVER discharge content or water from a water softener backwash, a spa or pool in your septic system.**
- **NEVER discharge wastewater from a recreation vehicle (camping trailer, caravan, etc.) into any of the components of your septic system.**
- **NEVER use automatic toilet bowl cleaners.**
- **DO NOT let anything accumulate on top of the septic system (for example, blown snow, backfill, landscaping, rocks, etc.) less than 5 m (16' 5") of your septic system's lid.**
- **Maintain a minimal distance of 6 m (20') between the bottom of a slope, an embankment or a retaining wall and the lids of your septic installation.**

By respecting these guidelines, you contribute to the proper operation of your septic system and help prolong the life of your Ecoflo® Coco Filter-ECDn unit filtering media. Failure to abide by these guidelines may, at Premier Tech Aqua's discretion, render the warranty invalid.

Owner's responsibility

The owner must respect all existing laws and regulations regarding the system's effluent quality and its discharge into the environment. The owner of the wastewater treatment system is responsible for its installation, operation and maintenance.

The system's warranty begins upon purchase. Should the start-up be delayed, it is the customer's responsibility to inform Premier Tech Aqua about it so the first maintenance, which is included in the purchase price, is postponed. If the first maintenance has been performed prior to the client's call, Premier Tech Aqua reserves the right to decide whether another maintenance, free of charge or not, will be carried out the following year. No request for delayed

start-up will be accepted any later than one (1) year after the purchase date without it affecting the product's warranties.

Keep heavy objects off your septic system

Never drive a vehicle or place objects weighing more than 225 kg (500 lb) within 5 m (16' 5") of the lid of your Ecoflo® Coco Filter-ECDn unit. If you are planning any kind of landscaping or any other type of work on the property (i.e.: snow removal, lawn mowing, excavation, etc.), **make sure you advise all those involved,** so they do not damage your septic system. It is recommended to note where of your septic system elements are located.

About your home

Your home must be equipped with an air vent that is in proper working order and all plumbing must comply with the applicable standards of the building code in your location. Every septic tank must be ventilated by an air duct with a diameter of at least 100 mm (4") or be connected to the air vent of the isolated dwelling being served. Premier Tech Aqua strongly recommends using a pipe with a diameter of 100 mm (4") for the air vent.

Any change in the use of your home or any modification to your Ecoflo® Coco Filter-ECDn unit must be authorized by the local authorities, and Premier Tech Aqua must be advised. If this requirement is not fully met, the warranty for your Ecoflo® Coco Filter-ECDn unit will be null and void.

Maintenance

Primary tank

Empty your primary/septic tank every two to four years or if the level of sludge measured exceed the 2/3 of the total height of water in the tank. This helps to keep your septic system in proper working order. Every primary/septic tank and effluent filter shall be inspected and maintained as prescribed by local regulations.

If your home is equipped with a garbage disposal or a sewage pump, we strongly recommend emptying your primary/septic tank more frequently than the frequency noted above. Using this kind of equipment increases the amount of sludge in the primary/septic tank.

To have complete records of the maintenance performed on your septic system, we recommend that you to keep the proof of maintenance (invoice) with this Owner's Manual.

IMPORTANT: Primary tanks can be emptied in several ways that can be classified into two categories: **complete emptying and selective emptying.** Complete emptying, the most common, consists of completely pumping the contents of the primary tank. It's easy to check if the work was properly done because the primary tank will be completely empty when the vacuum truck leaves the site. Selective emptying is divided into two sub-categories: with a filter (or recycled) or without a filter. The method with a filter requires a truck that has been adapted for this type of emptying, that is, one that separates and retains the solids from the wastewater. The mechanically clarified water is then returned to the primary tank. The selective method without a filter allows the solids to settle while in the truck before the water is returned to the primary tank. As such, in an effort to ensure the Ecoflo® Coco Filter-ECDn unit continues to perform optimally, **it is very important that you ensure than the water that is returned to the primary tank has been properly clarified and does not contain or contains very few suspended solids**. We also recommend you to call one of the members of PTA's local partners. He will assist and verify if the work is done according to your specific needs to best protect your Ecoflo® Coco Filter-ECDn unit system.

Effluent filter

Under normal operating conditions, as described in this manual, an effluent filter that complies with local regulations should operate efficiently for many years. It must be cleaned every time the primary tank is emptied, as established or recommended by local authorities.

Ecoflo® Coco Filter-ECDn unit

The owner of a biofiltration system **shall follow the manufacturer's recommendations regarding the maintenance of the system.** For that purpose, he shall at all times have a valid contract with the manufacturer or its local representative and, depending on the local regulations, **a copy of the contract may have to be filed to the authorities**.

Annual maintenance is important to ensure optimal performance of your **Ecoflo® Coco Filter-ECDn unit** and essential to maintain its warranty. Therefore, your biofilter must be serviced annually for the duration of its useful life. According to local regulations, more than 1 visit per year may be required.

The maintenance of your Ecoflo® Coco Filter-ECDn unit shall be carried out by one of our duly trained service providers. This service includes a visual inspection of all components and a verification of the operation, as well as maintenance of the filtering media. **For maintenance purposes and to replace the filtering media, you must ensure that your system's lid is easily accessible at all time.** Never cover or bury the lid of the Ecoflo® Coco Filter-ECDn unit. After each inspection, you will be given a maintenance record. Keep it with this manual in a safe place.

After a minimum of eight (10) years, the filtering media is analyzed by one of our authorized agents. Under normal usage, if the filtering media has not been abused and the operating guidelines have been respected, the filtering media might not have to be replaced and can be used for some additional years. **However, your Ecoflo® Coco Filter-ECDn unit's filtering media must be replaced before the system's treatment capacity and performance begins to deteriorate.** The filtering media is easily pumped out using a truck adapted to emptying primary tanks. The new filtering media is then installed by an authorized agent or the pumper.

To know more about the maintenance of your Ecoflo® Coco Filter-ECDn unit, refer to your Maintenance Agreement. If you need help or more information, please call our Customer Service Department at **1 800 632-6356** or visit our website at **PREMIERTECHAQUA.COM**. Information regarding service of the unit are also available on the dataplate of the unit.

Ecoflo® Coco Filter-ECDn with Pump

Ecoflo® Coco Filters-ECDn unit are equipped with a pump that directs the treated effluent to an appropriate disposal mean according to local regulations and the primary tank via the recirculation line. The electro-mechanical components are included in this system. To learn more about electro-mechanical components, consult the Timed Dosing Units TPA-350DN Installation Guide and Owner's Manual.

Electrical connections

All electrical connections must be done by a **certified electrician** and using seal connectors is mandatory. Premier Tech Aqua recommends installing the power box on top of the pump vault insulating board to avoid humidity problems.

Use two (2) separate circuit-breakers, one to operate the pump and the other to connect the control unit. Do not connect anything else to these circuit-breakers (for example, a household appliance). They must be used exclusively for the pump and the alarm box.

What to do in case of...

An activated alarm

If an alarm is activated, unrelated to a power failure, contact Premier Tech Aqua's After-Sales Service Department so the problem can be identified and corrected.

A prolonged power failure

If a power failure that occurs during winter is prolonged, protect the components of your septic system against freezing. If you have any questions to restart your system, contact Premier Tech Aqua's After-Sales Service Department.

Flooding

Certain sites are prone to flooding or to rises in groundwater levels. This can lead to a malfunction in your septic system or alter the performance of your Ecoflo® Coco Filter-ECDn unit. If this happens, contact Premier Tech Aqua's After-Sales Service Department.

Backflow

Backflow rarely occurs. But if it does happen, the primary tank is usually the cause. Your primary tank installer or primary tank pumper can generally take care of the situation.

Odours

All septic systems are apt to generate gases and odours. The position of the air vent, as well as other factors unrelated to the Ecoflo® Coco Filter-ECDn unit itself, can prevent septic gases from dispersing properly and lead to odours. If this happens, contact Premier Tech Aqua's After-Sales Service Department.

If you have any questions or comments, do not hesitate to contact Premier Tech Aqua at 1 800 632-6356.

PREMIER TECH AQUA

1 800 632-6356
418 862-6642
pta@premiertech.com
PREMIERTECHAQUA.COM

Certificate of Warranty for Ecoflo® Coco Filters

1. PREAMBLE

Premier Tech Technologies Ltd. (hereinafter called "Premier Tech") is proud to provide its customers with an exclusive wastewater treatment system guaranteed by an innovative Warranty.

For the application and interpretation of this Warranty, "Customer" shall mean the person who has purchased an Ecoflo® Coco Filter (hereinafter called "Initial Purchaser"), for a residential installation, as well as any subsequent purchaser (hereinafter called "Subsequent Purchaser(s) "), in accordance with the provisions of section 8 of this Warranty. "Successor(s)" shall mean any other person entitled to exercise the same rights as the Customer under the law.

2. NATURE OF THE WARRANTY

2.1. Ecoflo® Coco Filter

Premier Tech warrants to the Customer that the filtering media of the Ecoflo® Coco Filter shall function properly for a period of eight (10) years from the date of purchase by the Initial Purchaser (proof of purchase required).

Except as provided in sections 2.2 and 2.3 below, Premier Tech also warrants all parts of the Ecoflo® Coco Filter components against any manufacturing defect for a period of ten (10) years from the date of purchase by the Initial Purchaser (proof of purchase required). The first two years of the warranty also cover the labour.

2.2. Concrete

Premier Tech does not offer any additional Warranty on the shell of the concrete Ecoflo® Coco Filter. Accordingly, the Customer shall rely on the local concrete manufacturer's Warranty policy.

2.3. Pump, floats, alarm box and junction box

The pump, floats, alarm box and junction box included with the Ecoflo® Coco Filter are guaranteed for two (2) years (parts only), from the date of purchase by the Initial Purchaser (proof of purchase required). The first year of the warranty also covers the labour.

Premier Tech's conventional Warranty is expressly limited to the text of this Certificate and valid provided the Ecoflo® Coco Filter was installed in accordance with applicable regulations and with the manufacturer's recommendations.

3. NOTICE

For this Warranty to be valid, the Customer must notify Premier Tech in writing immediately upon the appearance of any indication of an anomaly or irregularity in the Ecoflo® Coco Filter.

Such notice shall be mailed to Premier Tech's Head Office at 1, avenue Premier, Rivière-du-Loup, Québec, G5R 6C1, CANADA or by facsimile at (418) 862-6642.

Upon receipt of this notice, Premier Tech shall examine the situation and, if necessary, take appropriate corrective measures in accordance with the terms of this Warranty.

4. GENERAL EXCLUSIONS

The following damages or problems are excluded from the Warranty:

(a) Any damage or problem caused by a fortuitous event or "force majeure", such as, without limiting the generality of the foregoing, an earthquake, a flood, frost, hurricane, landslide, explosion or dynamiting;

(b) Any damage or problem caused by the fault or act of a third party including, without limiting the generality of the foregoing, the execution of landscaping work;

(c) Any damage or problem arising from a defective installation carried out by a person trained by Premier Tech, or any installation, modification, correction or addition carried out by a person not trained by Premier Tech;

(d) Any damage or problem arising from any installation, modification, correction or addition to the treatment system carried out after installation of the Ecoflo® Coco Filter without prior written approval from Premier Tech;

(e) Any damage or problem caused by the use of a septic tank that does not comply with the applicable regulations and/or with Premier Tech's specifications, as described in the Owner's Manual;

(f) Any damage or problem, if it is shown that the usage of the Ecoflo® Coco Filter was not in accordance with the instructions and guidelines described in the Owner's Manual;

(g) Any damage or problem, if the maintenance of the Ecoflo® Coco Filter was not carried out by a person authorized by Premier Tech, in accordance with the Maintenance Agreement;

(h) Any damage or problem caused by an omission or act of the Customer or the Customer's Successors including, without limiting the generality of the foregoing, refusal to allow access to the system for maintenance;

(i) Any damage or problem, if it is found that the Customer or the Customer's Successors have modified or changed the use of the property serviced by the Ecoflo® Coco Filter resulting in the alteration of the nature or quality of wastewater being treated and/or that constitutes a violation of the applicable regulations;

(j) Any damage or problem caused by and/or resulting from the work carried out to access to the Ecoflo® Coco Filter, including, without limiting the generality of the foregoing, excavation, snow removal or demolition;

(k) Any damage or problem resulting from the condition of the site or of the soil and not reported or not properly reported to Premier Tech by the Customer or the person undertaking the site investigation.

5. PARTICULAR EXCLUSIONS

It is further expressly understood that the Customer may not carry out or cause to be carried out any repair or verification of the Ecoflo® Coco Filter sold to him, or attempt to carry out any work or to apply any corrective measures whatsoever to said work, before notifying Premier Tech in accordance with the provisions of section 3 of this Warranty and before Premier Tech has visited the site, within a reasonable time following receipt of said notice, to assess the situation.

If the Customer carries out or causes to be carried out repairs, or attempts to repair or to apply corrective measures of any kind whatsoever to the Ecoflo® Coco Filter sold to him without prior authorization by Premier Tech, this Warranty shall be considered null and void and Premier Tech shall be considered completely discharged from any and all of its obligations under this Warranty.

Certificate of Warranty for Ecoflo® Coco Filters

6. INDEMNITIES AND DAMAGES

Subject to the application of the provisions and exclusions provided for in this Warranty, Premier Tech's liability and obligations regarding any corrective measure carried out or any attempt to correct an indicated problem shall be limited to replacing the filtering media and/or one or several components of the Ecoflo® Coco Filter and to supplying the required labour, if applicable.

7. LIMITATION OF LIABILITY

Premier Tech's compensation or indemnification obligation shall be limited to the provisions of section 6 of this Certificate of Warranty and Premier Tech shall not be held liable for any other damage or loss that may have been suffered or incurred by the Customer or any third party in connection with the Ecoflo® Coco Filter, its parts and/or components which originate thereof.

No additional warranty, express or implied, hence excluding any direct or indirect consequential damages (not limited to but including third parties loss) concerning the design, sale or use of the Ecoflo® Coco Filter and/or services provided by Premier Tech is hereby granted. Premier Tech's liability under its warranty obligation shall in no case exceed the cost of the Ecoflo® Coco Filter.

8. TRANSFER OF OWNERSHIP

In the event of transfer of ownership, sale, assignment or disposal in any way whatsoever of the Customer's property to a third party, this Warranty shall continue to apply if and only if the Subsequent Purchaser or the Successor confirms, by forwarding the attached "Notice of New Property Owner" to Premier Tech within a reasonable delay, that he/she is the new owner of the property, he/she understands and is aware of the content of this Certificate of Warranty and accepts its terms and conditions.

The person who proceeds with the transfer, sale, assignment or disposal of any way whatsoever of the property undertakes to hand over to the Subsequent Purchaser or the Successor the Certificate of Warranty provided upon completion of the work, as well as the Owner's Manual and, if applicable, the Maintenance and Environmental Monitoring Program for the Ecoflo® Coco Filter.

Failure to abide by the terms and conditions of section 8 of this Certificate of Warranty may, at Premier Tech's discretion, render it invalid or to be rejected.

9. INSPECTION

The Customer and/or the Customer's Successors shall allow Premier Tech or its duly authorized representatives to carry out all necessary monitoring and inspections, as required, for implementation of this Warranty.

If the Customer and/or the Customer's Successors notify Premier Tech of an alleged defect or malfunction of the Ecoflo® Coco Filter and that, after inspection, it is found that no such defect or malfunction exists or that such defect or malfunction is excluded from or does not apply to the Warranty, a minimum charge of $150.00 plus direct expenses shall be paid by the Customer and/or the Customer's Successors for the cost of the inspection.

10. INTERPRETATION

The terms and conditions of this Warranty shall be interpreted according to and governed by the provisions of this Warranty and the legislation in effect in the Province of Quebec.

11. PRIORITY OF THE CERTIFICATE OF WARRANTY

This Warranty supersedes any contract or understanding, written or verbal, entered into between the Customer and Premier Tech. In the event of contradiction between this Warranty and any other documents and/or contracts entered into between the Customer and Premier Tech, this Warranty shall prevail.

12. PURCHASERS AND SUCCESSORS

Subject to the provisions of this Warranty and especially those of section 8, this Warranty shall continue to be valid for Subsequent Purchasers and Successors and shall continue to have full effect until the end of the agreed Warranty period provided for in section 2 of this Certificate.

Notice of New Property Owner

Send a copy to Premier Tech Aqua.

Name of previous the owner:_____

I, the undersigned,_____ hereby declare that I have acquired the property located at

_____

Civic Number Street City Province or State

_____ (___)_____

ZIP or Postal Code Phone number

I have read and I understand the Warranty provided by Premier Tech Technologies Ltd for the Ecoflo® Coco Filter. I wish to benefit from this Warranty for the remaining period, if any, and from the date of the transfer of ownership, that is,_____. I accept to be bound by this Warranty and by any and all of the sections, undertakings and conditions set forth therein. I have had the opportunity to examine the Ecoflo® Coco Filter and declare myself satisfied with it at the time of this transfer. I ask Premier Tech Technologies Ltd. to take note of this transfer of ownership.

Signature: _____ Date: _____

Name of new owner: _____
(block letters)

Language preference: ❑ English ❑ French New owner's e-mail address: _____