



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<sup>3</sup>/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<sup>1</sup>.

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<sup>2</sup> (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<sup>2</sup>, and two large divided sheds (approximately 160 m<sup>2</sup> 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.

---

<sup>1</sup> Geotechnical Investigation, Proposed Automotive Dealership and Body Shop, 5254 Bank Street, LRL, November 2019



The theoretical warehouse facility, would have a 200 m<sup>2</sup> 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 m<sup>2</sup>, which would include 120 m<sup>2</sup> for the septic bed and 308 m<sup>2</sup> 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<sup>2</sup> indicates that the overburden consists of stone-poor, sandy silt to silty sand-textured till on Paleozoic terrain. Bedrock mapping<sup>3</sup> 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<sup>4</sup>. 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:

---

<sup>2</sup> Ontario Geological Survey 2010. Surficial geology of Southern Ontario; Ontario Geological Survey, Miscellaneous Release--Data 128-REV.

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

<sup>4</sup> 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 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 m<sup>2</sup> 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<sup>2</sup> 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 m<sup>2</sup> 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<sup>2</sup> 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<sup>2</sup>), 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<sup>2</sup> 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<sup>2</sup>. 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<sup>2</sup>.

This gives a minimum area required for the sand layer of 308 m<sup>2</sup>. 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<sup>2</sup> (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 m<sup>2</sup>, the lot size consideration for lots greater than 10,000 m<sup>2</sup> 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 m<sup>2</sup> 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<sup>2</sup> 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 m<sup>2</sup> 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**

ENGINEERING | INGÉNIÉRIE

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

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

JONAH BONN

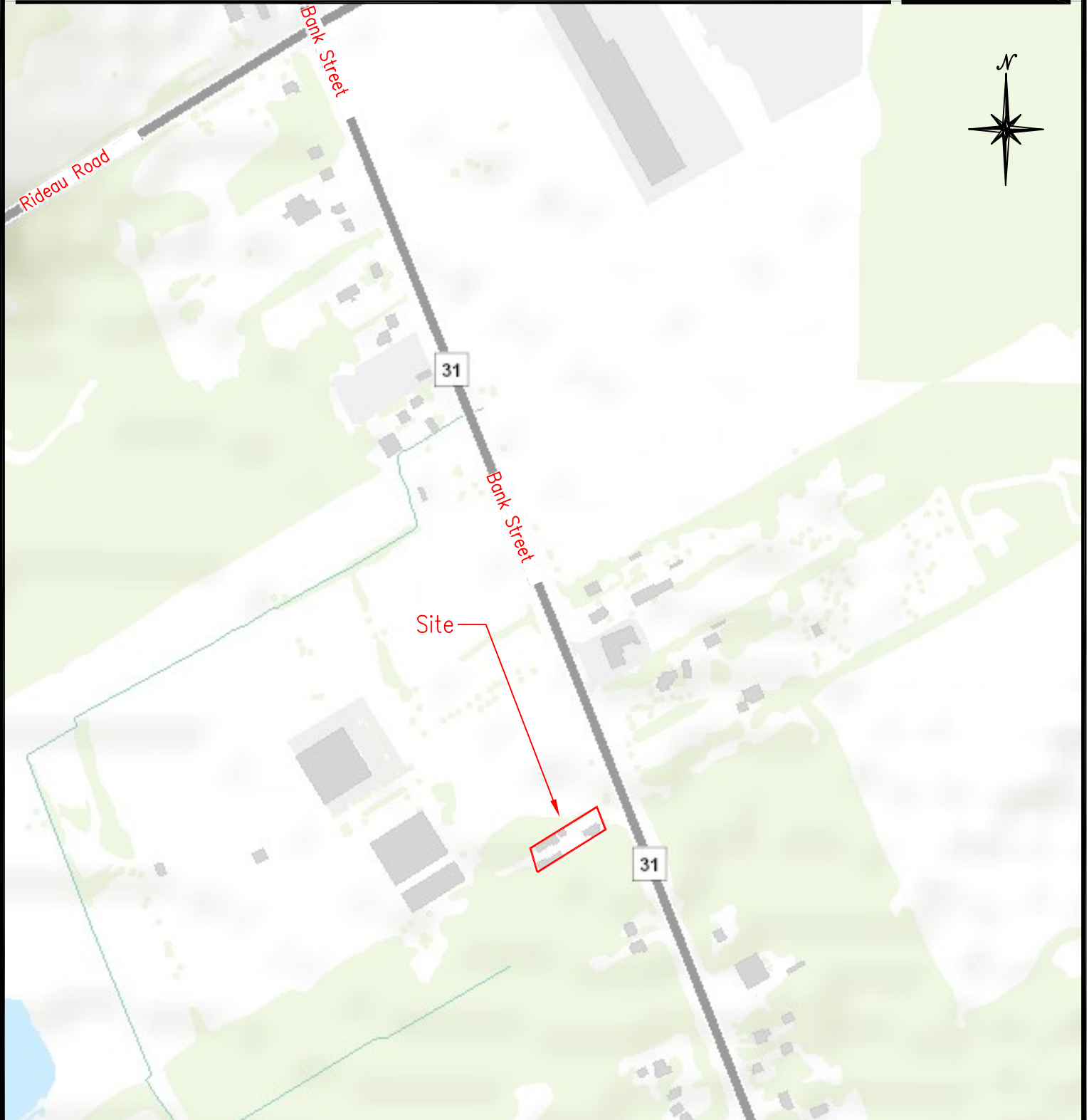
DATE

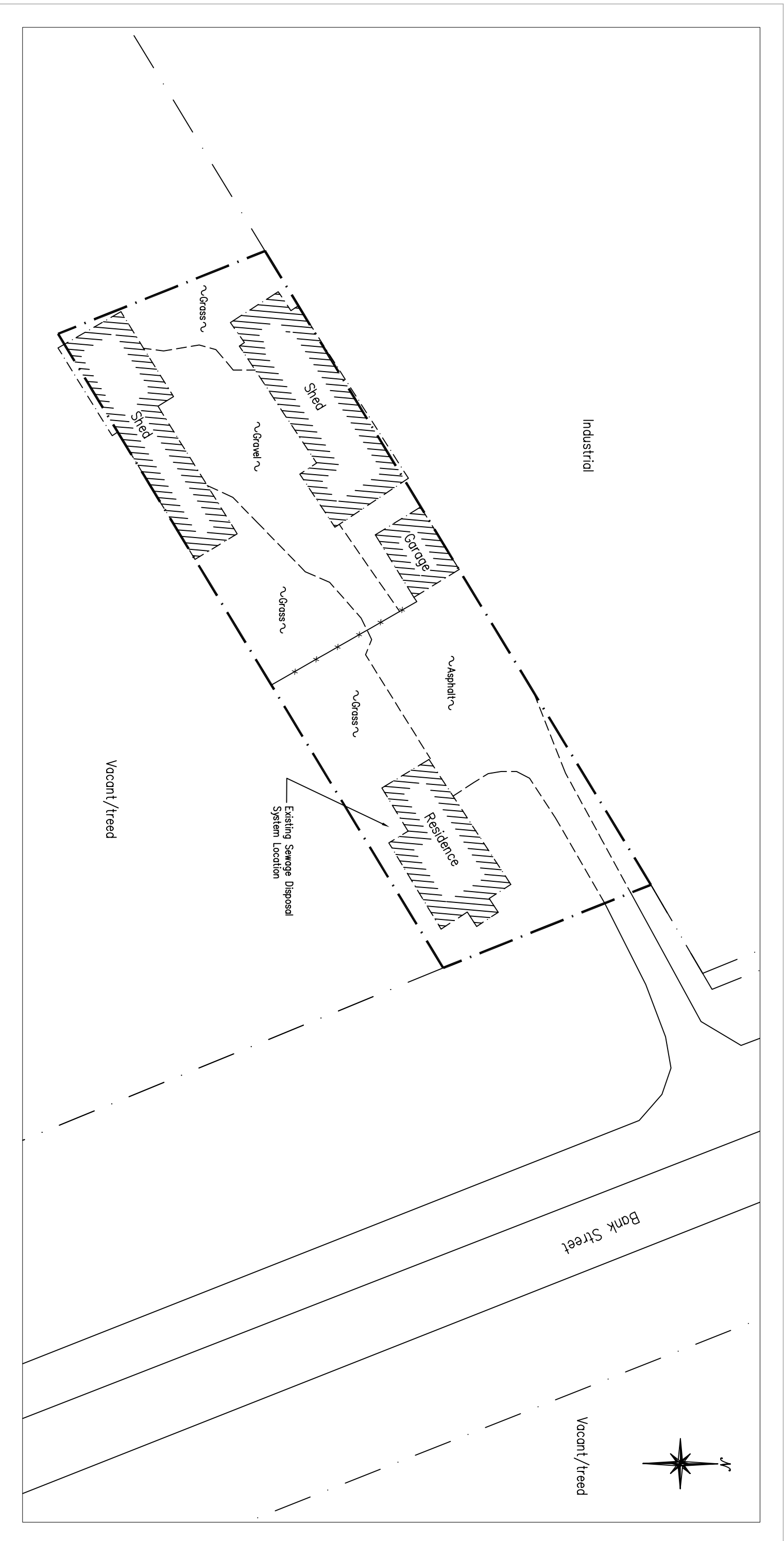
MAY 2021

PROJECT




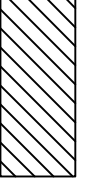
190271

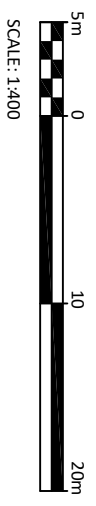
**FIGURE 1**





**LEGEND**

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



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



5450 Carleton Place, ON K4J 9G2  
www.lroj.ca | (905) 842-3434

CLIENT  
**JONAH BONN**

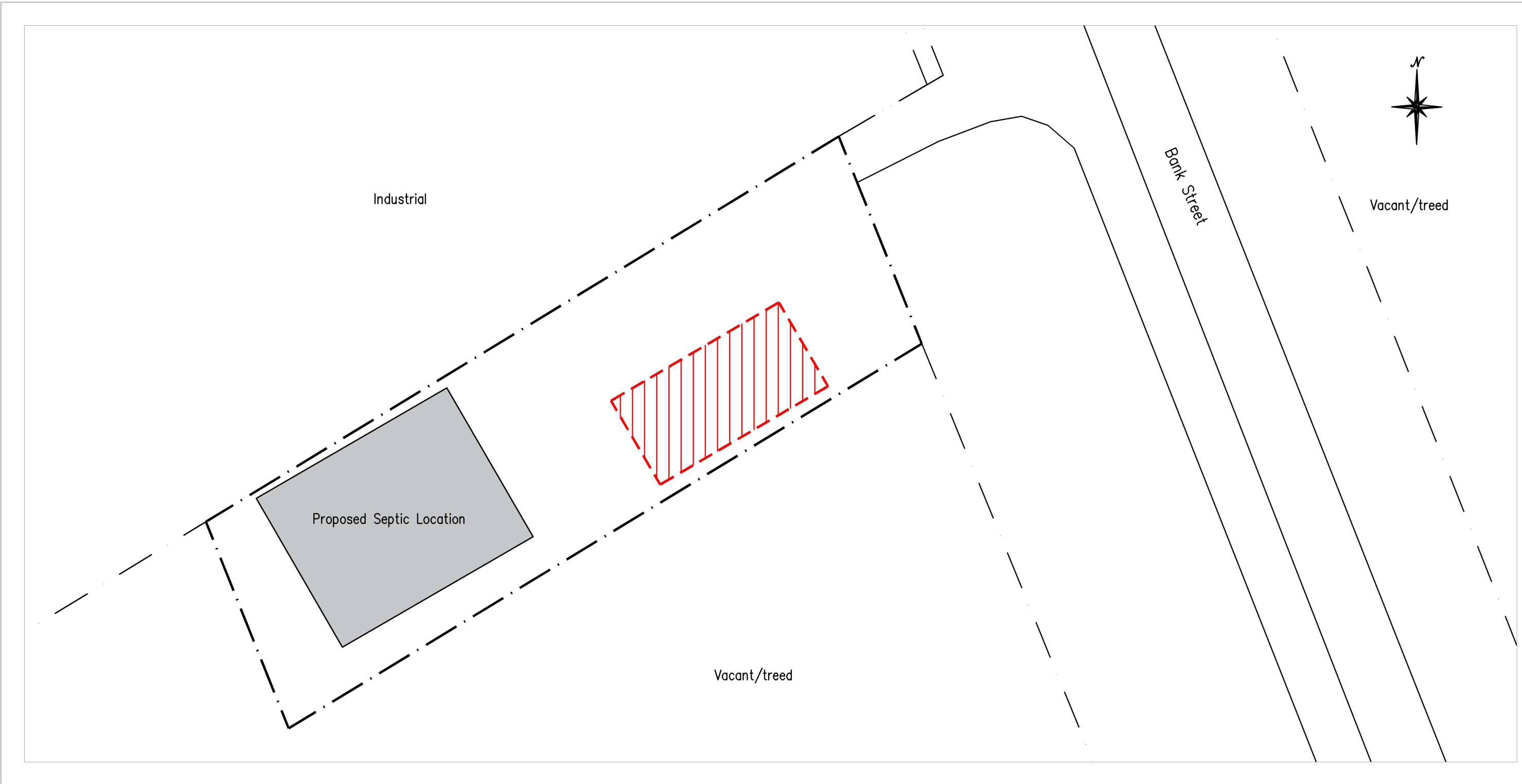
DESIGNED BY: J.A.      DRAWN BY: J.A.      APPROVED BY: A.W.

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



SCALE: 1:400

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



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

CLIENT  
**JONAH BONN**

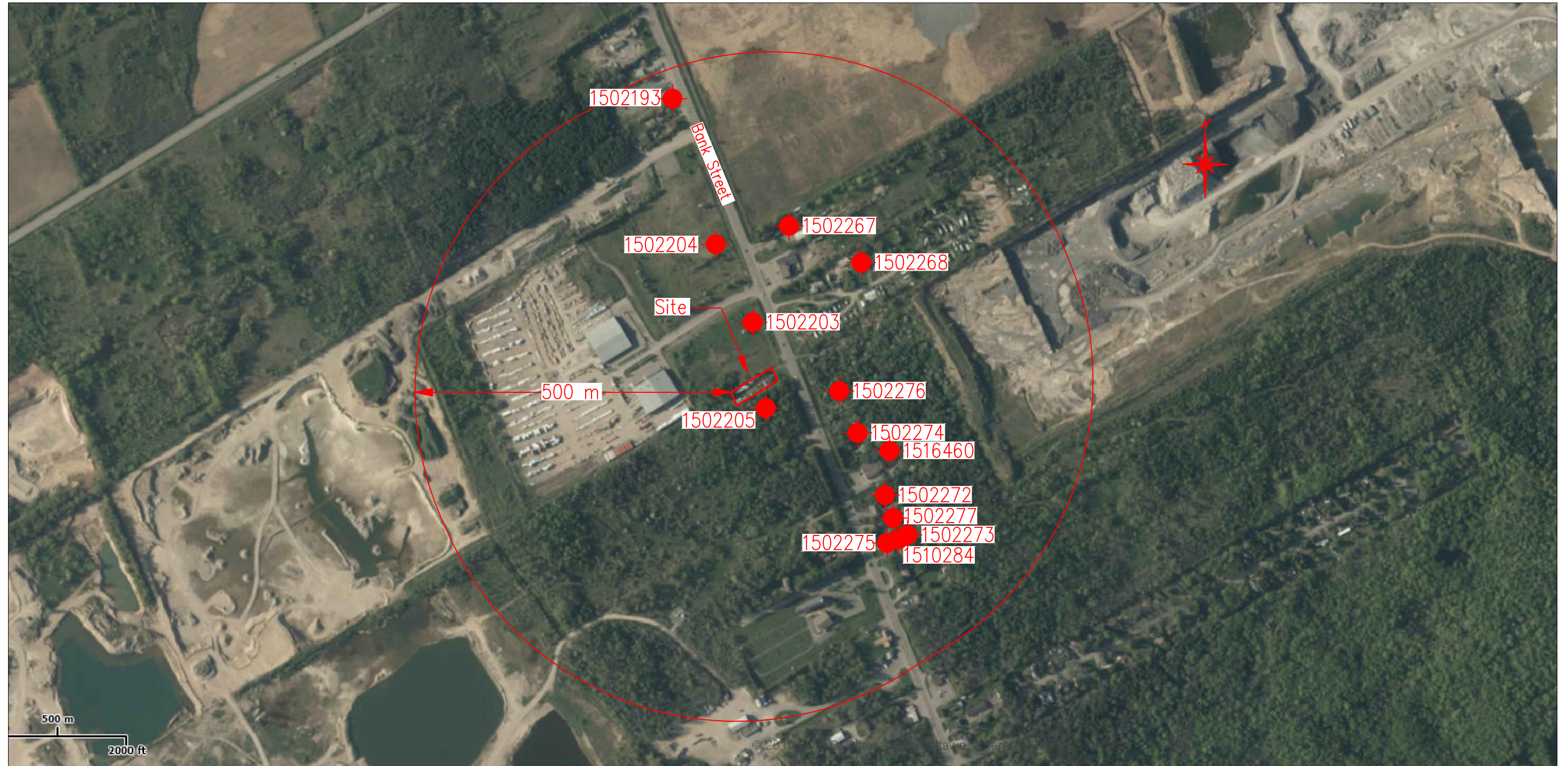
DESIGNED BY: DRAWN BY: APPROVED BY:  
 J.A. A.W.



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
-  WELL RECORD APPROXIMATE LOCATION AND WELL ID

No.	REVISIONS	BY	DATE



CLIENT  
**JONAH BONN**

---

DESIGNED BY: \_\_\_\_\_ DRAWN BY: G.M. APPROVED BY: 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<sup>2</sup>) 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								Potential Infiltration (PI) (IF*MS) (mm)					
No.	Section Area (m <sup>2</sup> )	Infiltration Factor (IF) <sup>1</sup>						Moisture Surplus (MS)				Section	Weighted		
		Topography	Value	Soil	Value	Cover	Value	Total	Ground Cover	Soil Type	Moisture Retention <sup>2</sup> (mm)			Moisture Surplus <sup>3</sup> (mm)	
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	
<b>Total<sup>6</sup></b>														<b>Total</b>	<b>268.8</b>

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

3. Nitrate Dilution Calculations		
Nitrate Concentration of Infiltration <sup>5</sup>	C <sub>i</sub>	0 mg/L
Site Infiltration	Q <sub>i</sub> = A*PI	414 m <sup>3</sup>
Daily Sewage Volume - Proposed Development <sup>6</sup>	Q <sub>d</sub>	1.10 m <sup>3</sup>
Maximum Yearly Sewage Volume - Proposed Development	Q <sub>e</sub> =365*Q <sub>d</sub>	402 m <sup>3</sup>
Nitrate Concentration in Sewage - Proposed Development	C <sub>e</sub>	40 mg/L
Maximum Allowable Nitrate Concentration at Boundary <sup>4</sup>	C <sub>m</sub>	10.0 mg/L
Increase in Nitrate Concentration at Boundaries	C = (Q <sub>e</sub> ,1C <sub>e</sub> ,1+Q <sub>e</sub> ,2C <sub>e</sub> ,2+Q <sub>i</sub> C <sub>i</sub> )/(Q <sub>e</sub> ,1+Q <sub>e</sub> ,2+Q <sub>i</sub> )	<b>19.7 mg/L</b>

**NOTES**

- <sup>1</sup> Table 2: Infiltration Factors, *Hydrological Technical Information Requirements for Land Development Applications*, Ministry of the Energy and Environment, April 1995.
- <sup>2</sup> Thornthwaite and Mather's (1957) Instructions and Tables for Computing Potential Evapotranspiration and the Water Balance.
- <sup>3</sup> Moisture surplus for data for Ottawa ON (Environment Canada Meteorological Service of Canada, 2010).
- <sup>4</sup> As per *Technical Guideline for Individual On-Site Sewage Systems: Water Quality and Impact Risk Assessment*, Ministry of the Energy and Environment, August 1996.
- <sup>5</sup> The nitrate concentration of infiltration is assumed to be 0 mg/L.
- <sup>6</sup> 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<sup>2</sup>) with 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								Potential Infiltration (PI) (IF*MS) (mm)					
No.	Section Area (m <sup>2</sup> )	Infiltration Factor (IF) <sup>1</sup>						Moisture Surplus (MS)				Section	Weighted		
		Topography	Value	Soil	Value	Cover	Value	Total	Ground Cover	Soil Type	Moisture Retention <sup>2</sup> (mm)			Moisture Surplus <sup>3</sup> (mm)	
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	
<b>Total<sup>6</sup></b>														<b>Total</b>	<b>268.8</b>

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

3. Nitrate Dilution Calculations		
Nitrate Concentration of Infiltration <sup>5</sup>	C <sub>i</sub>	0 mg/L
Site Infiltration	Q <sub>i</sub> = A*PI	414 m <sup>3</sup>
Daily Sewage Volume - Proposed Development <sup>6</sup>	Q <sub>d</sub>	1.10 m <sup>3</sup>
Maximum Yearly Sewage Volume - Proposed Development	Q <sub>e</sub> =365*Q <sub>d</sub>	402 m <sup>3</sup>
Nitrate Concentration in Sewage - Proposed Development	C <sub>e</sub>	20 mg/L
Maximum Allowable Nitrate Concentration at Boundary <sup>4</sup>	C <sub>m</sub>	10.0 mg/L
Increase in Nitrate Concentration at Boundaries	C = (Q <sub>e</sub> ,1C <sub>e</sub> ,1+Q <sub>e</sub> ,2C <sub>e</sub> ,2+Q <sub>i</sub> C <sub>i</sub> )/(Q <sub>e</sub> ,1+Q <sub>e</sub> ,2+Q <sub>i</sub> )	<b>9.8 mg/L</b>

**NOTES**

- <sup>1</sup> Table 2: Infiltration Factors, *Hydrological Technical Information Requirements for Land Development Applications*, Ministry of the Energy and Environment, April 1995.
- <sup>2</sup> Thornthwaite and Mather's (1957) Instructions and Tables for Computing Potential Evapotranspiration and the Water Balance.
- <sup>3</sup> Moisture surplus for data for Ottawa ON (Environment Canada Meteorological Service of Canada, 2010).
- <sup>4</sup> As per *Technical Guideline for Individual On-Site Sewage Systems: Water Quality and Impact Risk Assessment*, Ministry of the Energy and Environment, August 1996.
- <sup>5</sup> The nitrate concentration of infiltration is assumed to be 0 mg/L.
- <sup>6</sup> 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**



316/5a

e

UTM 11 8 2 | 4 5 4 5 1 0 | E  
5 R | 5 0 1 1 5 6 0 0 | N



ONTARIO

15 No. 2197  
GROUND WATER BRANCH  
JUN 2 1960  
ONTARIO WATER RESOURCES COMMISSION

Elev. 4 R | 0 5 1 8 1 8 1

The Water-well Drillers Act, 1954  
Department of Mines

Basin 2 5 | | | |

15726

# Water-Well Record

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

Date completed (day) (month) (year)

Pipe and Casing Record		Pumping Test	
Casing diameter (s) <u>5"</u>	Static level <u>7'</u>	Pumping rate <u>30 GPM</u>	Pumping level <u>15'</u>
Length (s) <u>12'</u>	Duration of test <u>1 hour</u>		
Type of screen <u>metal</u>			
Length of screen			

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)
<u>Clay</u>	<u>0'</u>	<u>10'</u>			
<u>Shale</u>	<u>10'</u>	<u>12'</u>	<u>38'</u>	<u>31'</u>	<u>fresh</u>
<u>Limestone</u>	<u>12'</u>	<u>71'</u>			

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? Upland

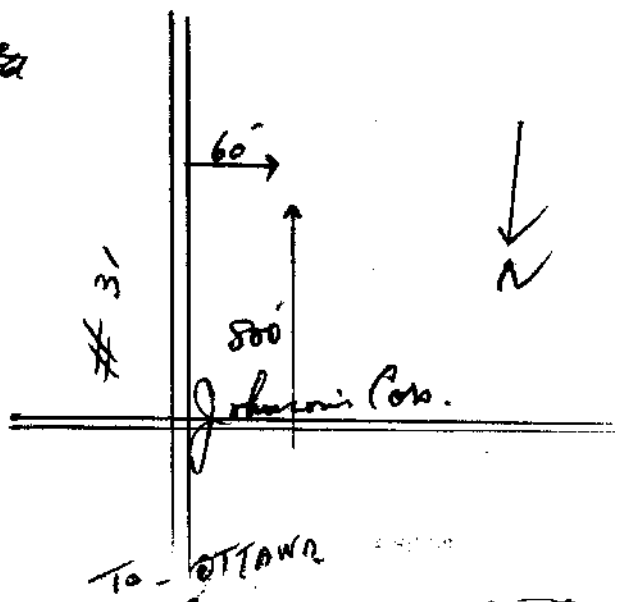
Drilling firm Philip Phillips Drilling Co  
Address Ottawa  
Name of Driller Jim Szepa  
Address Ottawa  
Licence Number 481

I certify that the foregoing statements of fact are true.

Date 2/15/60 Signature of Licensee Philip Phillips

### Location of Well

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





UTM 1187 454680 E

15R S104531010 N

Elev. 438.10

Basin 2527

316/50



GROUND WATER DIVISION  
SEP 0 1959  
15 No  
ONTARIO WATER  
RESOURCES COMMISSION

220

The Ontario Water Resources Commission Act, 1957

# WATER WELL RECORD

County or District CARLETON Township, Village, Town or City GLoucester  
Cor. 4 RP Lot 27 Date completed 30 JULY 59  
(day month year)  
Billings Bridge

### Casing and Screen Record

### Pumping Test

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"

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

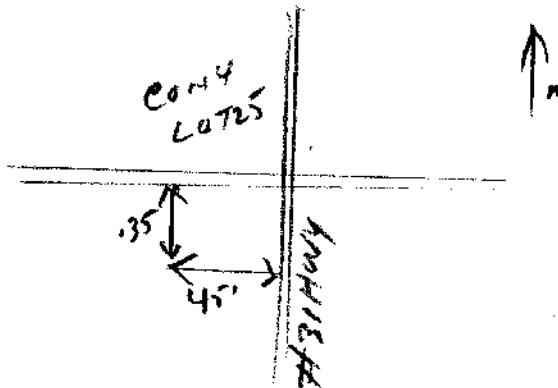
### Water Record

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)
<u>GRAVEL</u>	<u>0</u>	<u>8</u>			
<u>LIMESTONE</u>	<u>8</u>	<u>50</u>	<u>50</u>	<u>42</u>	<u>FRESH</u>

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 249  
Name of Driller same  
Address    
Date 206 31/59  
M. Meagher  
(Signature of Licensed Drilling Contractor)

### Location of Well

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



316/50

UTM 1182 4154171210E  
19R 50115101510N



ONTARIO

15 No 2205

Elev. 19R 0131710

The Water-well Drillers Act, 1954  
Department of Mines

Basin Ridgely Front

Con IV  
10+28

# Water-Well Record

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

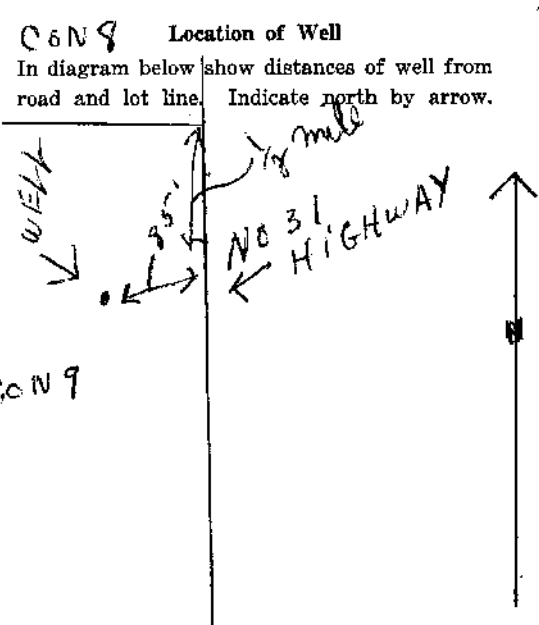
Pipe and Casing Record		Pumping Test	
Casing diameter(s) <u>5in</u>	Length(s) <u>16' ft</u>	Static level <u>8 1/2 ft</u>	Pumping rate <u>800 gph</u>
Type of screen	Length of screen	Pumping level <u>42 ft</u>	Duration of test <u>1 hr</u>

Overburden and Bedrock Record	Well Log		Water Record		
	From ft.	To ft.	Depth (s) at which water (s) found	No. of feet water rises	Kind of water (fresh, salty, or sulphur)
<u>Boulder Till</u>	<u>0</u>	<u>6</u>			
<u>Sandstone</u>	<u>6</u>	<u>163 1/2</u>	<u>155 1/2</u>	<u>146 1/2</u>	<u>fresh</u>

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





31G/52



WATER RESOURCES DIVISION  
15 JAN 19 1964  
ONTARIO WATER RESOURCES COMMISSION

DTM 118 4547910 E

RIDEAU 5 FROM 53210 N

The Ontario Water Resources Commission Act

CON 4 R 4 0 3 9 1 0

# WATER WELL RECORD

Lot 27  
Basin 25  
County or District

Carleton

Township, Village, Town or City Gloucester

Con. V.R.F. Lot SF 27

Date completed 18 Mar 64  
(day month year)

Address 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

### Water Record

#### Overburden and Bedrock Record

Brown sandy loam  
Hard grey limestone  
layers of soft and hard  
whitish grey sandstone

From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
0	4'6"	95	fresh
4'6"	9'4"	162	"
9'4"	23'0"	189	"
		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

71 E. Johnston Dillig  
Box 4134  
Ottawa

Address

Licence Number

1435

Name of Driller or Borer

B. Klatt

Address

Nare

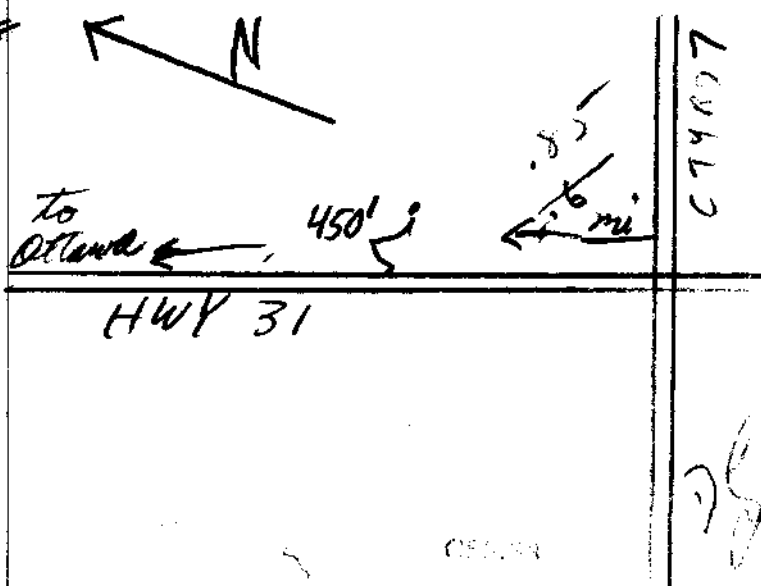
Date

Nov 16/64

Roy W. Penwick  
(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.



316/52



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

UTM 118Z 4549010E

5R 310193240N

The Ontario Water Resources Commission Act

Elev. 4R 931912

# WATER WELL RECORD

Basin 25 | | Carleton  
County or District

Township, Village, Town or City Gloucester

Con. V RF Lot 27

Date completed 8 Nov 61  
(day month year)

Address 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 185  
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

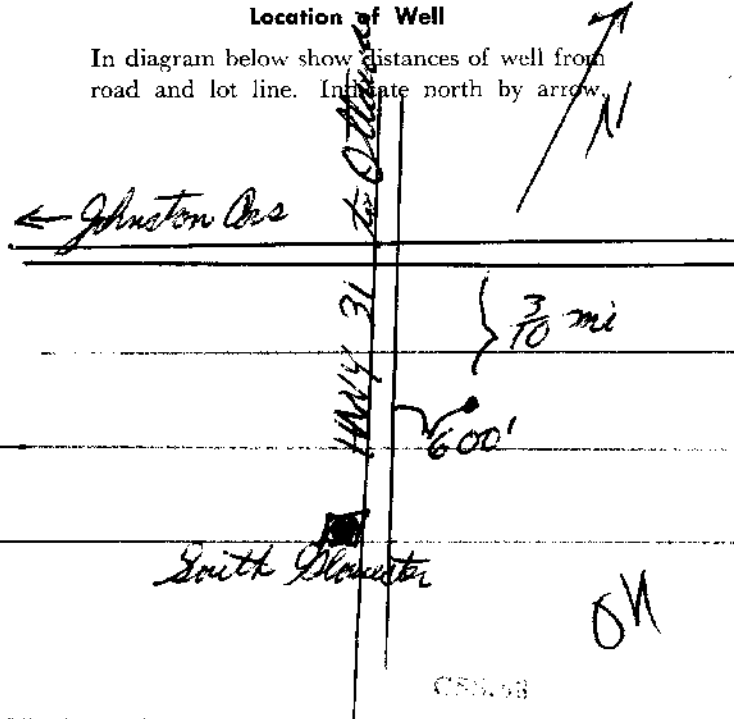
### Water Record

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		
hard sandstone	63'	170'	92	fresh
			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.E. Johnston Dilling Co Ltd  
Address 1340 Bank Ottawa  
Licence Number 240  
Name of Driller or Borer R.W. Reynolds  
Address Parkham  
Date Nov 30/61  
F.E. Johnston Dilling Co Ltd  
(Signature of Licensed Drilling or Boring Contractor)  
Dr. Roy W. Bonwick

### Location of Well

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







316/50



UTM 18 2 4514191710 E

5 R 5101418110 N

Elm 14 R 10 3 8 8 2 1

Basin 2 5 1 28

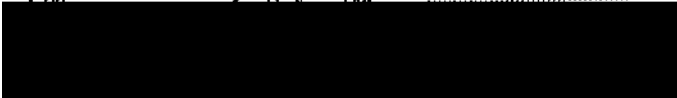
The Ontario Water Resources Commission Act, 1957

15 No. 2273  
GROUND WATER BRANCH  
SEP 7 1960  
ONTARIO WATER RESOURCES COMMISSION

# WATER WELL RECORD

County or District PARLETON Township, Village, Town or City GLoucester

Con SR Lot 28 Date completed 19 July 60  
(day month year)



Address S. Gloucester

### Casing and Screen Record

### Pumping Test

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"

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 SETBACK of 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)
<u>LOAM</u>	<u>0</u>	<u>14</u>			
<u>GRAVEL</u>	<u>14</u>	<u>16</u>			
<u>GRAY LIMESTONE</u>	<u>16</u>	<u>58</u>	<u>58</u>	<u>49</u>	<u>FRESH</u>

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

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

Drilling Firm M. M. ASHICK

Address O. T. MAWA

Licence Number

Name of Driller S. AME

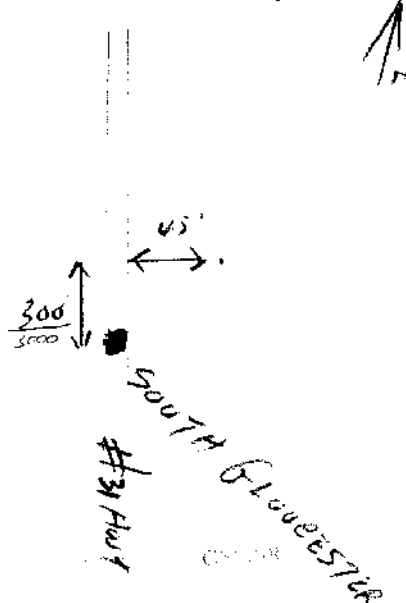
Address

Date AUG 26/60

(Signature of Licensed Drilling Contractor)

### Location of Well

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



UTM 18 2 45 4 8 7 10 E

5 R 5 0 1 1 4 9 1 0 N

Elev. 4 R 10 3 6 5

Basin 28 V

lot 28



15 No 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 on lot 28 Date completed 2 Sept. 1960



Address R.R. 4 Ottawa Ont.

### Casing and Screen Record

### Pumping Test

Inside diameter of casing 4 inch  
Total length of casing 4 inch feet  
Type of screen  
Length of screen  
Depth to top of screen  
Diameter of finished hole 4 inch

Static level 10  
Test-pumping rate 5 G.P.M.  
Pumping level 26  
Duration of test pumping 1 hour  
Water clear or cloudy at end of test clear  
Recommended pumping rate 4 G.P.M.  
with pumping 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)
<u>hard pan</u>	<u>0</u>	<u>4</u>	<u>36"</u>	<u>10</u>	<u>fresh</u>
<u>ind. clay</u>	<u>4'</u>	<u>36'</u>			

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

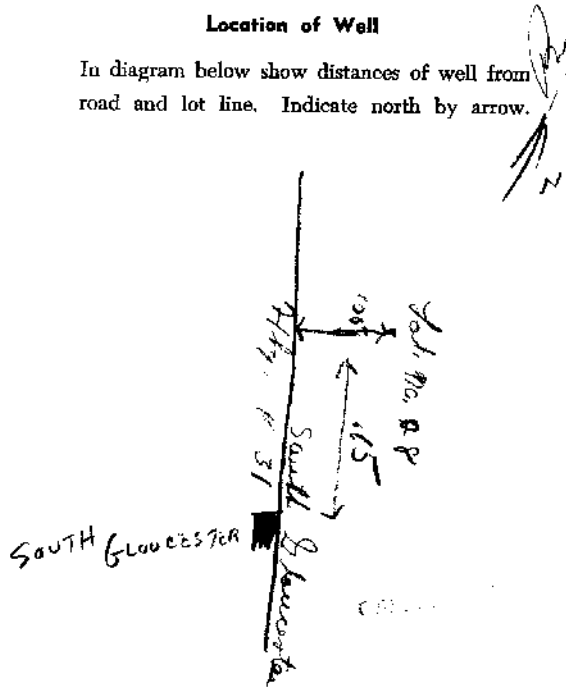
Address St. Albert. Ont.

Date Sept. 2

Maurice Cayen  
(Signature of Licensed Driller Contractor)

### Location of Well

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



319/50



GROUND WATER BRANCH  
156 15 1961 2275  
ONTARIO WATER RESOURCES COMMISSION

UTM 1182 41549310 E

Ripley 5697 418110 N

The Ontario Water Resources Commission Act

Elev. Co. 0350

# WATER WELL RECORD

Basin Lot 28 215

Township, Village, Town or City **GLoucester**

Con. **5 RF** Lot **28**

Date completed **2** **July** **61**  
(day month year)

Address **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 **4** G.P.M.  
Pumping level **8'**  
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 **25'** 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)
<b>GREY Limestone</b>	<b>0</b>	<b>100</b>	<b>100</b>	<b>FRESH</b>

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 **12069/61**

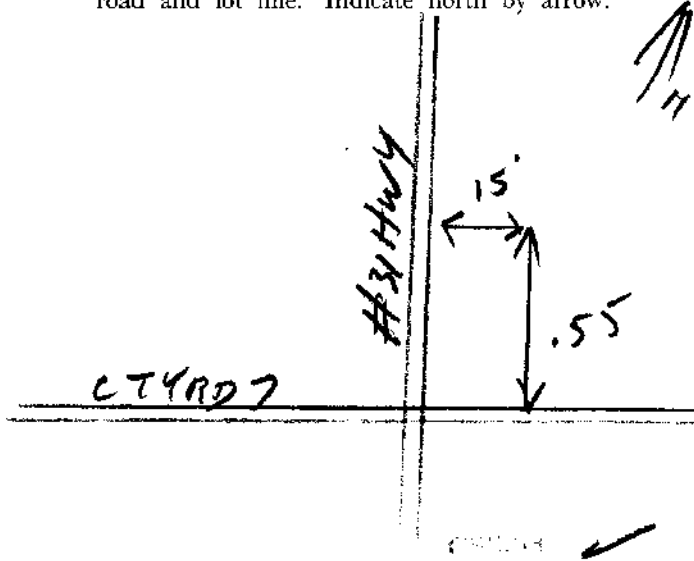
(Signature of Licensed Drilling or Boring Contractor)

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.



31G/52



UTM 1182 4548510 E

15 No 2276

11/82 4548510 E  
5 R 51011501410 N

The Ontario Water Resources Commission Act

Elev. 218 031618

# WATER WELL RECORD

ONTARIO WATER RESOURCES COMMISSION

Basin 215 1 Carl

Township, Village, Town or City Gloucester

Con. 5 RF Lot 24

Date completed 24 Oct 1961  
(day month year)

Address 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

Broken (B) lime  
 Grey lime  
 (H) lined zone with Quartz  
 Sandstone

From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
0	10	70'	fresh
10'	90'	135'	"
90'	100'		
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 Abson Rd Ottawa

Licence Number

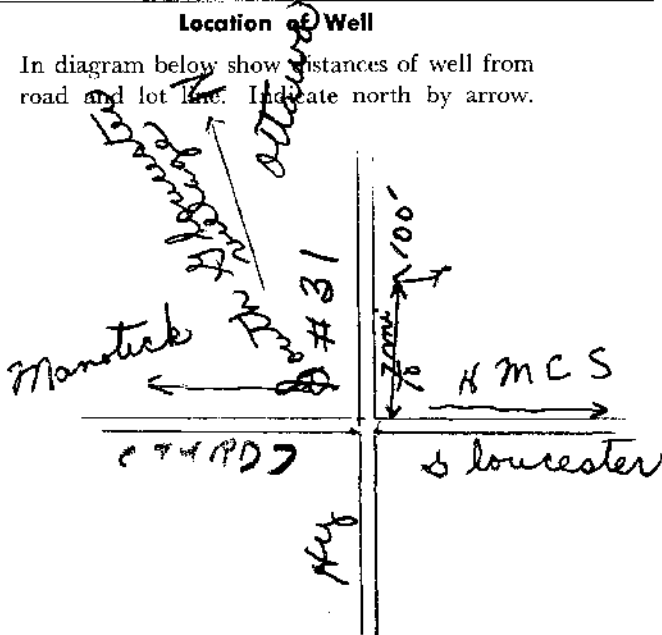
Name of Driller or Borer M Kavanagh

Address Stittsville Ont

Date  
Hatter 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.





31/57



WATER RESOURCES DIVISION  
5 JAN 19 1965  
ONTARIO WATER RESOURCES COMMISSION

UTM 6182 4549410 E

RIDEAU FRONT  
SR 50148510 N

Elev. CON 4 R 28 3516

# WATER WELL RECORD

Basin 215 | Carleton | Township, Village, Town or City Gloucester  
County or District  
Con. 5 R F Lot PT N/2 28 Date completed 8 Oct 1964 (day month year)  
Owner [redacted] Address RR 6 Ottawa

### Casing and Screen Record

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

Top Soil  
Sand  
Lime Stone

From ft.

To ft.

Depth(s) at which water(s) found

Kind of water (fresh, salty, sulphur)

0	4	152	Fresh
4	5		
5	152		

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

House  
Upland

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

Drilling or Boring Firm

J. R. Corsetti

Address

1510 Base line Rd.  
Ottawa

Licence Number

1472

Name of Driller or Borer

Same

Address

Oct 9 - 1964

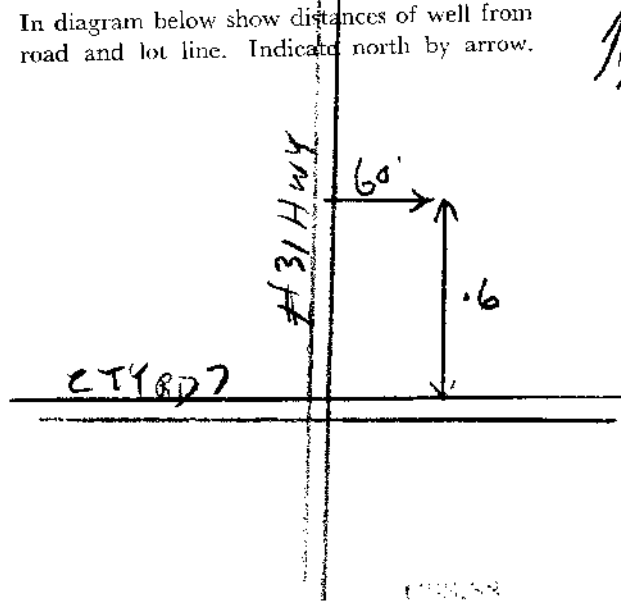
Date

J. R. Corsetti

(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.







Ontario

# WATER WELL RECORD

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

11 1516460

15,002 IRE

05

COUNTY OR DISTRICT: **Gloucester** TOWNSHIP, BOROUGHS, CITY, TOWN, VILLAGE: **Gloucester** CON. BLOCK, TRACT, SURVEY, ETC.: **5** LOT: **028**

DATE COMPLETED: DAY **28** MO **04** YR **78**

ADDRESS: **6 Ottawa, Ontario**

GRID: **14960** **4** **0360** **4** **26**

### LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

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

31 0005028/1379 01358/1573

32

41 WATER RECORD

WATER FOUND AT FEET: 0128

10-14	15-19	20-24	25-29	30-34
1 <input checked="" type="checkbox"/> FRESH 2 <input checked="" type="checkbox"/> SALTY	3 <input type="checkbox"/> SULPHUR 4 <input type="checkbox"/> MINERAL	5 <input type="checkbox"/> SULPHUR 6 <input type="checkbox"/> MINERAL	7 <input type="checkbox"/> SULPHUR 8 <input type="checkbox"/> MINERAL	9 <input type="checkbox"/> SULPHUR 10 <input type="checkbox"/> MINERAL

51 CASING & OPEN HOLE RECORD

10-14	15-19	20-24	25-29	30-34
1 <input checked="" type="checkbox"/> STEEL 2 <input type="checkbox"/> CONCRETE 3 <input type="checkbox"/> OPEN HOLE	4 <input type="checkbox"/> GALVANIZED 5 <input type="checkbox"/> GALVANIZED 6 <input type="checkbox"/> CONCRETE 7 <input type="checkbox"/> OPEN HOLE	8 <input type="checkbox"/> GALVANIZED 9 <input type="checkbox"/> CONCRETE 10 <input type="checkbox"/> OPEN HOLE	11 <input type="checkbox"/> GALVANIZED 12 <input type="checkbox"/> CONCRETE 13 <input type="checkbox"/> OPEN HOLE	14 <input type="checkbox"/> GALVANIZED 15 <input type="checkbox"/> CONCRETE 16 <input type="checkbox"/> OPEN HOLE

06 06 06

61 PLUGGING & SEALING RECORD

10-14	15-19	20-24	25-29	30-34
1 <input type="checkbox"/> SUM 2 <input type="checkbox"/> SEALANT 3 <input type="checkbox"/> SEALANT 4 <input type="checkbox"/> SEALANT	5 <input type="checkbox"/> SEALANT 6 <input type="checkbox"/> SEALANT 7 <input type="checkbox"/> SEALANT 8 <input type="checkbox"/> SEALANT	9 <input type="checkbox"/> SEALANT 10 <input type="checkbox"/> SEALANT 11 <input type="checkbox"/> SEALANT 12 <input type="checkbox"/> SEALANT	13 <input type="checkbox"/> SEALANT 14 <input type="checkbox"/> SEALANT 15 <input type="checkbox"/> SEALANT 16 <input type="checkbox"/> SEALANT	17 <input type="checkbox"/> SEALANT 18 <input type="checkbox"/> SEALANT 19 <input type="checkbox"/> SEALANT 20 <input type="checkbox"/> SEALANT

71 PUMPING TEST

1  PUMP 2  BAFFLE

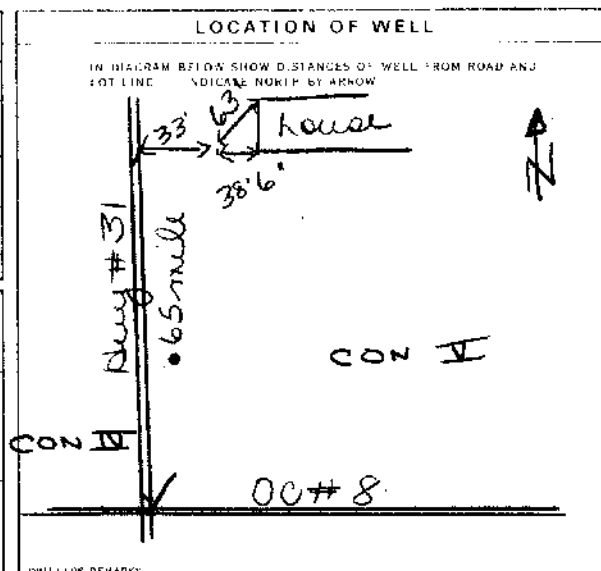
WATER LEVEL: 010

WATER LEVELS DURING PUMPING: 050, 050, 050, 050, 050

RECOMMENDED PUMP TYPE:  DEEP

RECOMMENDED PUMP SETTING: 060

RECOMMENDED PUMPING RATE: 0005



FINAL STATUS OF WELL: 1  WATER SUPPLY

WATER USE: 01  DOMESTIC

METHOD OF DRILLING: 5  AIR PERCUSSION

CONTRACTOR: Capital Water Supply Ltd. 1558

ADDRESS: Box 490 Stittsville, Ontario

NAME OF DRILLER OR BORER: S. Miller

SIGNATURE OF CONTRACTOR: *Halter Kwanagh*

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

**APPENDIX B**  
**Moisture Surplus Printout**

Ottawa Airport, ON                      Ottawa\_50mm\_WBNRMSD.txt  
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                      Ottawa\_75mm\_WBNRMSD.txt  
 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      Ottawa\_100mm\_WBNRMSD.txt  
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      Ottawa\_125mm\_WBNRMSD.txt  
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      Ottawa\_150mm\_WBNRMSD.txt  
 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      Ottawa\_200mm\_WBNRMSD.txt  
 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      Ottawa\_225mm\_WBNRMSD.txt  
 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                      Ottawa\_250mm\_WBNRMSD.txt  
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      Ottawa\_265mm\_WBNRMSD.txt  
 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      Ottawa\_275mm\_WBNRMSD.txt  
 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      Ottawa\_280mm\_WBNRMSD.txt  
 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      Ottawa\_300mm\_WBNRMSD.txt  
 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      Ottawa\_400mm\_WBNRMSD.txt  
 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<sub>5</sub> 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<sub>5</sub> 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

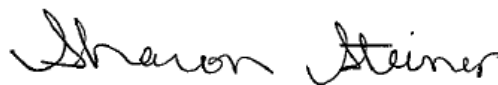
NSF International has determined by performance evaluation under the provisions of NSF/ANSI Standard 245 (revised April 2013) that the Model Number Ecoflo Coco Filter ECDn Model Series manufactured by Premier Tech Aqua has fulfilled the requirements of NSF/ANSI Standard 245. The Ecoflo Coco Filter ECDn 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

	<u>Page</u>
Executive Summary .....	2
Preface .....	3
Certification .....	4
Table of Contents .....	5
1.0 Process Description .....	7
2.0 Performance Evaluation.....	7
2.1 Description of Unit Evaluated.....	7
2.2 Test Protocol .....	8
2.3 Test Chronology.....	9
3.0 Analytical Results .....	9
3.1 Summary .....	10
3.2 Biochemical Oxygen Demand.....	11
3.3 Total Suspended Solids .....	12
3.4 pH.....	13
3.5 Temperature.....	13
3.6 Dissolved Oxygen .....	14
3.7 Alkalinity .....	14
3.8 TKN .....	15
3.9 Ammonia-N .....	16
3.10 Nitrite/nitrate-N .....	17
3.11 Total Nitrogen.....	18
4.0 References.....	19
Appendices	
Appendix A - Plant Specifications and Drawings	
Appendix B - Standard 245 Section 8 - Performance testing and evaluation	
Appendix C - Analytical Results – BOD <sub>5</sub> , CBOD <sub>5</sub> , TSS, pH and Temperature	
Appendix D - Analytical Results – Nitrogen Analyses	
Appendix E - Owner’s Manual	



**This page intentionally blank**

## 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/ft<sup>2</sup> for an 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<sub>5</sub>), 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<sub>5</sub>), 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<sub>5</sub>: 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**

	<u>Average</u>	<u>Std. Dev.</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Median</u>	<u>Interquartile Range</u>
Biochemical Oxygen Demand (mg/L)						
<i>Influent (BOD<sub>5</sub>)</i>	200	88	39	590	200	200-290
<i>Effluent (CBOD<sub>5</sub>)</i>	4	3	1	34	3	3-6
Total Suspended Solids (mg/L)						
<i>Influent</i>	190	83	26	600	180	180-250
<i>Effluent</i>	2	2	1	10	2	2-4
pH						
<i>Influent</i>	-	-	6.8	7.9	7.4	7.3-7.5
<i>Effluent</i>	-	-	6.6	7.3	7.1	7.0-7.2
Temperature (°C)						
<i>Influent</i>	28	3	22	32	28	28-31
<i>Effluent</i>	28	3	20	33	28	28-30
Dissolved Oxygen (mg/L)						
<i>Primary Tank</i>	1.0	1.0	0.2	2.4	0.5	0.4-1.3
<i>Effluent</i>	4.0	2.0	0.5	8.0	4.0	3.9-5.4
Alkalinity (mg/L)						
<i>Influent</i>	320	42	230	420	320	300-350
<i>Effluent</i>	280	42	190	360	270	250-310
Total Kjeldahl Nitrogen						
<i>Influent</i>	40.1	12.6	20.7	76.9	37.8	39.9-47.0
<i>Effluent</i>	14.9	9.3	2.3	33.3	11.5	8.6-21.1
Ammonia-N						
<i>Influent</i>	25.1	8.3	7.1	44.3	24.7	18.4-30.5
<i>Effluent</i>	12.5	8.4	1.0	28.9	10.2	6.8-18.4
Nitrite/nitrate-N (mg/L)						
<i>Influent</i>	0.35	0.46	0.05	2.20	0.10	0.06-0.53
<i>Effluent</i>	3.77	2.01	0.30	8.54	4.20	2.34-5.01
Total Nitrogen						
<i>Influent</i>	40.4	12.6	20.9	77.4	37.9	30.3-47.7
<i>Effluent</i>	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<sub>5</sub> 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<sub>5</sub> 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<sub>5</sub> 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<sub>5</sub>) and five-day carbonaceous biochemical oxygen demand (CBOD<sub>5</sub>) 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<sub>5</sub>:*

Individual influent BOD<sub>5</sub> 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<sub>5</sub> delivered to the treatment unit was within the influent characteristics defined under Section 8.2.1 of NSF/ANSI Standard 245.

#### *Effluent CBOD<sub>5</sub>:*

Effluent CBOD<sub>5</sub> concentrations ranged from 1 to 34 mg/L over the course of the evaluation, with an average and median effluent CBOD<sub>5</sub> concentrations of 4 and 3 mg/L.

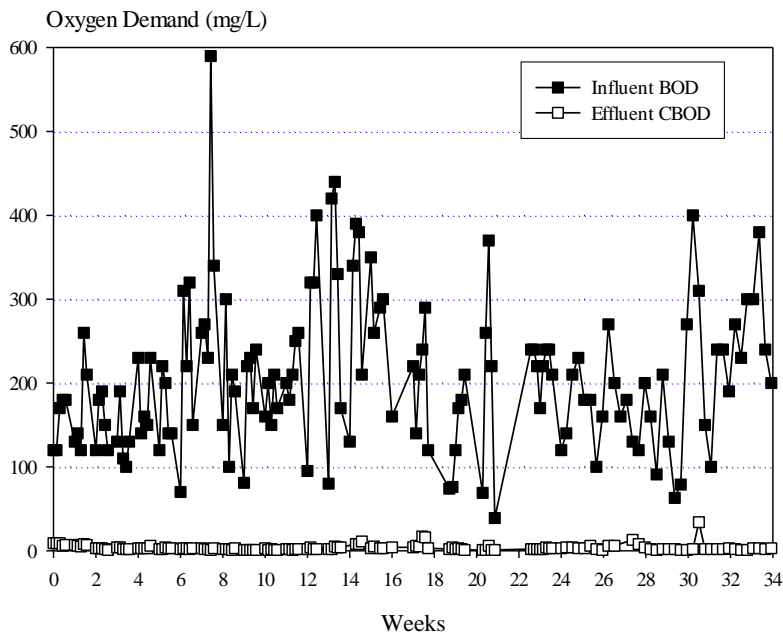


Figure 1. Biochemical Oxygen Demand

### 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.

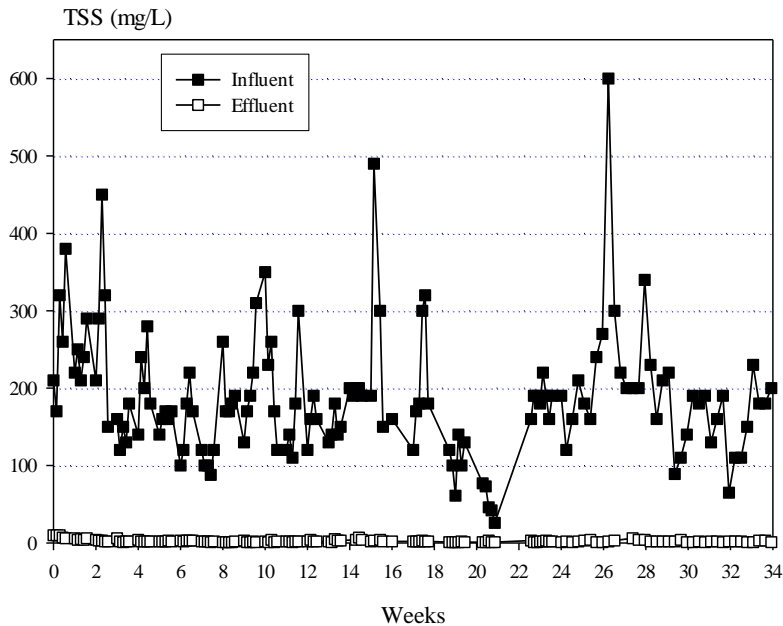


Figure 2. Total Suspended Solids

### 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.

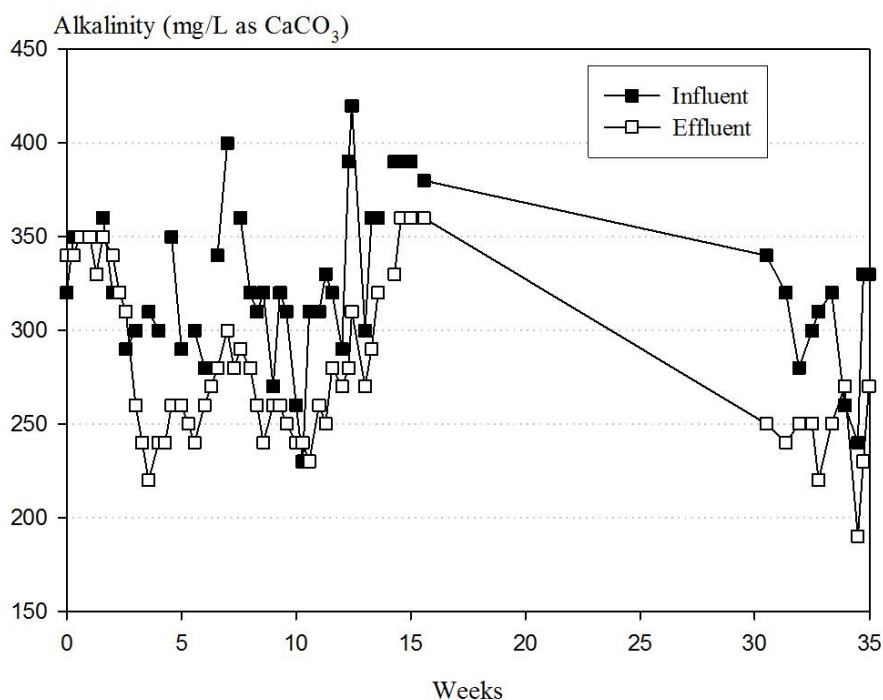


Figure 3: Alkalinity

### 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.

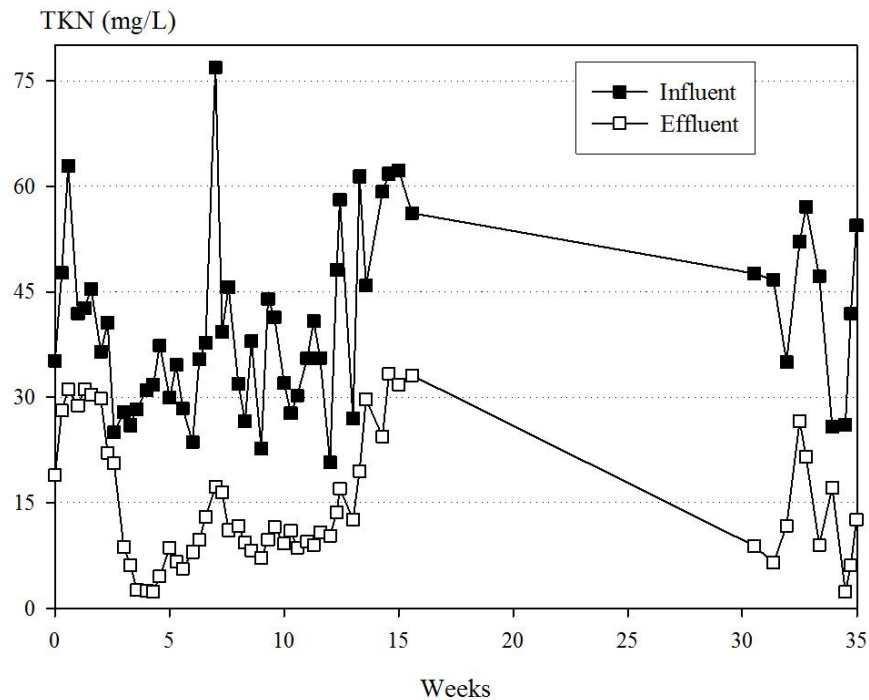


Figure 4: Total Kjeldahl Nitrogen

### 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.

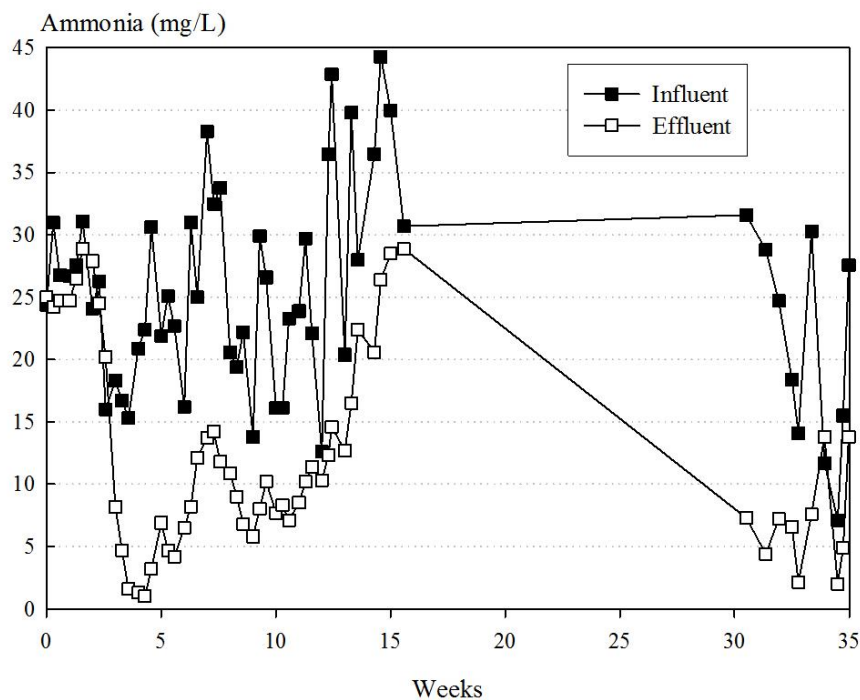


Figure 5: Ammonia

### 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.

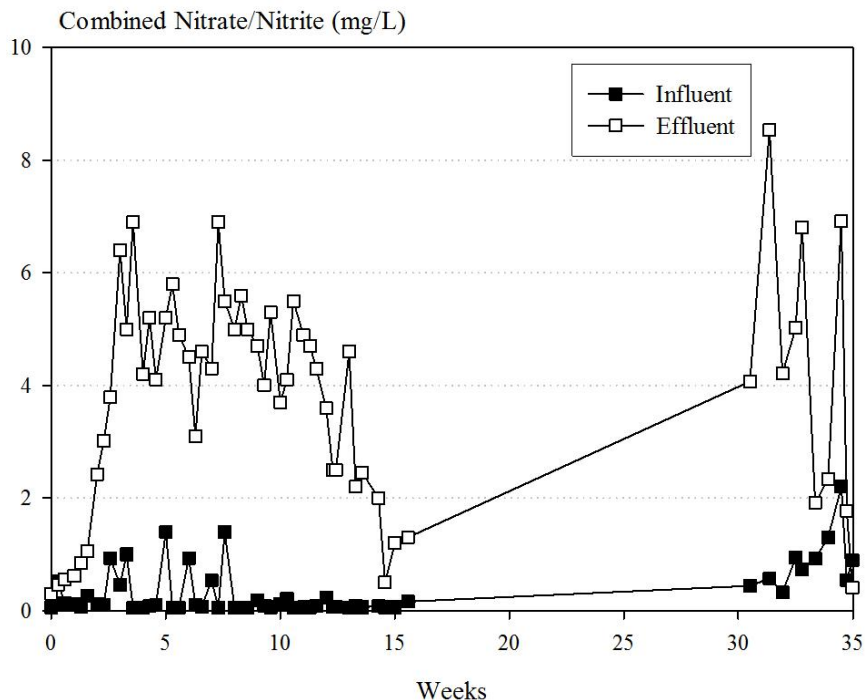


Figure 6: Effluent Nitrate/Nitrite

3.11 Total Nitrogen

Total Nitrogen (TN) is the sum of the total Kjeldahl nitrogen (TKN), nitrite (NO<sub>2</sub>) and nitrate (NO<sub>3</sub>) 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.

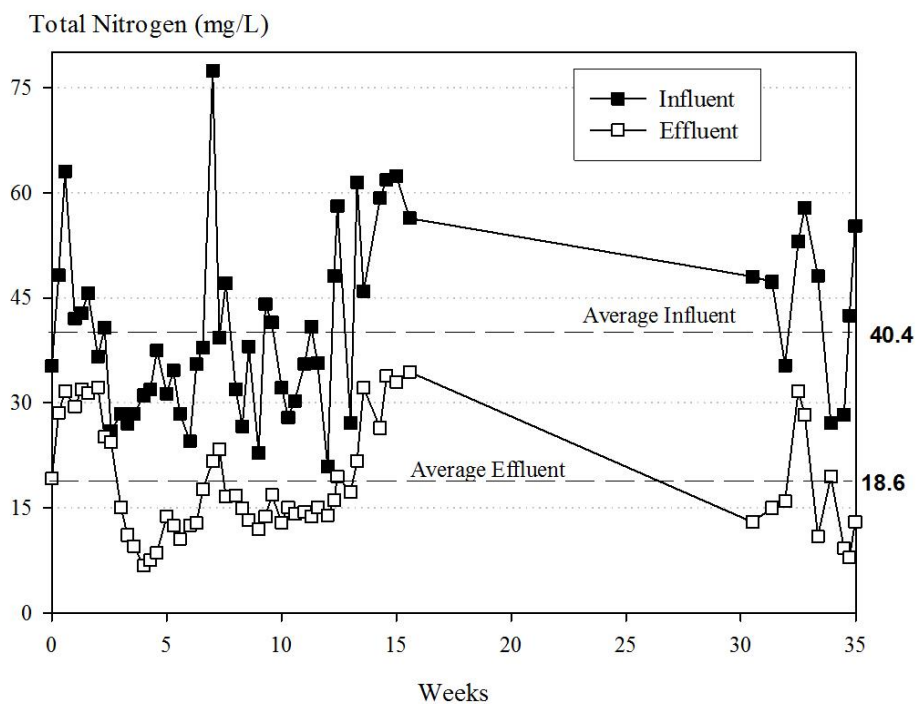


Figure 7: Total Nitrogen

#### 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*, 21<sup>st</sup> 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*

**This page intentionally blank**

**APPENDIX A**  
**PLANT SPECIFICATIONS**





**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,  $\frac{2}{3}$  of the system's capacity shall be filled with water and the remaining  $\frac{1}{3}$  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:

- BOD<sub>5</sub>: 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<sub>3</sub> (alkalinity may be adjusted if inadequate)
- temperature: 10 to 30 °C (50 to 86 °F)
- 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 °C (50 °F), impacting the nitrification process, sample collection may be suspended until the influent temperature returns to 10 °C (50 °F).

### 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  $100\% \pm 10\%$  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:

Parameter	Sample type	Sample location		Testing location
		Raw influent	Treated effluent	
BOD <sub>5</sub>	24 h composite	X		Laboratory
CBOD <sub>5</sub>	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 <sub>3</sub> )	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 <sub>5</sub> )	120	120	170	180	180
	effluent (CBOD <sub>5</sub> )	9	9	9	6	7
Suspended Solids (mg/L)	influent	210	170	320	260	380
	effluent	10	10	10	7	6

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

**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 <sub>5</sub> )	130	140	120	260	210
	effluent (CBOD <sub>5</sub> )	7	6	5	8	7
Suspended Solids (mg/L)	influent	220	250	210	240	290
	effluent	6	4	5	4	6

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

**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

Dosed Volume (gallons)	Monday	Tuesday	Wednesday	Thursday	Friday
Dissolved Oxygen (mg/L)	aeration chamber	0.49	0.36	0.48	0.40
	effluent	4.81	4.87	4.57	5.07
Temperature (C)	influent	22	25	24	25
	aeration chamber	23	23	23	23
pH	influent	22	23	23	23
	aeration chamber	6.8	7.2	6.9	7.2
Biochemical Oxygen Demand (mg/L)	influent	7.2	7.1	7.2	7.1
	effluent	7.1	7.2	7.2	7.2
Suspended Solids (mg/L)	influent	120	190	150	120
	effluent	3	3	3	1
Dosed Volume (gallons)	Monday	460	460	460	460
	Friday	460	460	460	460

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

**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

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

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

**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 Friday 460 gallons

Dosed Volume (gallons)	Monday	Tuesday	Wednesday	Thursday	Friday	
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
pH	influent	24	24	25	25	24
	aeration chamber	6.9	6.8	7.0	7.1	6.9
Biochemical Oxygen Demand (mg/L)	influent	7.1	7.0	7.0	7.0	7.1
	effluent	7.1	7.0	7.0	7.0	7.0
Suspended Solids (mg/L)	influent	230	140	160	150	230
	effluent	3	3	3	3	6
Suspended Solids (mg/L)	influent	140	240	200	280	180
	effluent	4	2	2	2	2

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

**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 Friday 460 gallons

Dosed Volume (gallons)	Monday	Tuesday	Wednesday	Thursday	Friday	
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
pH	influent	25	24	24	24	24
	aeration chamber	7.0	6.9	7.1	6.8	7.0
Biochemical Oxygen Demand (mg/L)	influent	7.1	7.0	7.1	7.0	7.0
	effluent	7.0	7.0	7.1	7.0	7.0
Suspended Solids (mg/L)	influent	120	220	200	140	140
	effluent	2	2	4	3	3
Suspended Solids (mg/L)	influent	140	160	170	160	170
	effluent	2	2	2	3	2

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

**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 Friday 460 gallons

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

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

**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 Friday 460 gallons

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

Notes: No field readings on 5/25 due to the holiday.  
 (a) Site problem  
 (b) Malfunction of system under test  
 (c) Weather problem  
 (d) Other

**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 Friday 460 gallons

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

- (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 Friday 460 gallons

Dosed Volume (gallons)	Monday	Tuesday	Wednesday	Thursday	Friday
Dissolved Oxygen (mg/L)	aeration chamber	0.57	0.46	0.41	0.48
	effluent	4.38	4.30	3.88	4.19
Temperature (C)	influent	27	27	27	27
	aeration chamber	28	28	28	28
pH	effluent	27	25	28	27
	influent	a	a	a	a
Biochemical Oxygen Demand (mg/L)	aeration chamber	a	a	a	a
	effluent	a	a	a	a
Suspended Solids (mg/L)	influent	81	220	230	170
	effluent	1	1	1	1
Temperature (C)	influent	130	170	190	220
	effluent	3	1	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: 14-Jun-15 Plant Code: Premier Tech Coco DN

Weeks Into Test: 11

Weekend Dosing: Sunday 460 gallons Saturday 460 gallons Friday 460 gallons

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

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

**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 Friday 460 gallons

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

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

**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 Friday 460 gallons

Dosed Volume (gallons)	Monday	Tuesday	Wednesday	Thursday	Friday	
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
pH	influent	28	28	28	28	d
	aeration chamber	7.6	7.5	7.6	7.5	d
Biochemical Oxygen Demand (mg/L)	influent	7.0	7.0	7.0	7.0	d
	effluent	7.0	6.9	7.0	7.0	d
Suspended Solids (mg/L)	influent	95	320	320	400	d
	effluent	2	4	2	2	d
Suspended Solids (mg/L)	influent	120	160	190	160	d
	effluent	2	4	2	2	d

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

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

**NSF International**  
**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 Friday 460 gallons

Dosed Volume (gallons)	Monday	Tuesday	Wednesday	Thursday	Friday	
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
pH	influent	29	29	29	29	29
	aeration chamber	7.7	7.7	7.8	7.8	7.9
Biochemical Oxygen Demand (mg/L)	influent	7.1	7.1	7.1	7.1	7.1
	effluent	7.1	7.1	7.1	7.1	7.1
Suspended Solids (mg/L)	influent	80	420	440	330	170
	effluent	2	2	5	4	4
Suspended Solids (mg/L)	influent	130	140	180	140	150
	effluent	2	<1	5	3	3

Notes:

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



**NSF International**  
**Standard 40 - Residential Wastewater Treatment Systems**  
 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 Friday 460 gallons

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

**NSF International**  
**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 460 gallons Saturday 460 gallons Friday 460 gallons

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

**NSF International**  
**Standard 40 - Residential Wastewater Treatment Systems**

Plant Effluent

Plant Code: Premier Tech Coco DN

Week Beginning: 26-Jul-15

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
pH	influent	31	30	30	30	30	30
	aeration chamber	7.4	7.7	7.6	7.4	7.4	7.5
Biochemical Oxygen Demand (mg/L)	influent	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
Suspended Solids (mg/L)	influent	160	170	180	230	160	
	effluent	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.  
 Additional samples were collected on 7/28, 29, and 30 at the request of the manufacturer.

**NSF International**  
**Standard 40 - Residential Wastewater Treatment Systems**

Plant Effluent

Plant Code: Premier Tech Coco DN

Week Beginning: 2-Aug-15

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	1.38	1.40	1.21
	effluent	1.57	1.74	1.68	1.71
Temperature (C)	influent	31	30	30	31
	aeration chamber	31	31	31	31
pH	influent	30	30	31	30
	aeration chamber	7.2	7.6	7.5	7.3
Biochemical Oxygen Demand (mg/L)	influent	7.2	7.2	7.2	7.1
	effluent	7.2	7.2	7.2	7.2
Suspended Solids (mg/L)	influent	220	140	210	240
	effluent	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.

**NSF International**  
**Standard 40 - Residential Wastewater Treatment Systems**  
 Plant Effluent

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

Weeks Into Test: 19

Dosed Volume (gallons)	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Dissolved Oxygen (mg/L)	1.29	1.01	0.47	0.52	0.38	0.37	0.40
Temperature (C)	32	32	32	32	32	32	32
pH	7.3	7.5	7.4	7.4	7.5	7.4	7.4
Biochemical Oxygen Demand (mg/L)	76	160	200	180	180	180	74
Suspended Solids (mg/L)	95	61	<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.  
 Additional samples were collected on 8/11 and 8/13 at the request of the manufacturer.

**NSF International**  
**Standard 40 - Residential Wastewater Treatment Systems**  
 Plant Effluent

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

Weeks Into Test: 20

Dosed Volume (gallons)	Sunday	Monday	Tuesday	Wednesday	Thursday
Dissolved Oxygen (mg/L)	0.42	0.33	0.33	0.36	0.39
Temperature (C)	32	32	32	32	32
pH	7.2	7.2	7.2	7.1	7.1
Biochemical Oxygen Demand (mg/L)	76	120	170	180	210
Suspended Solids (mg/L)	95	61	140	99	130

- (a) Site problem
  - (b) Malfunction of system under test
  - (c) Weather problem
  - (d) Other
- Notes: Power/Equipment Failure Stress 8/20th through 8/22.

**NSF International**  
**Standard 40 - Residential Wastewater Treatment Systems**

Plant Effluent

Plant Code: Premier Tech Coco DN

Week Beginning: 23-Aug-15

Weeks Into Test: 21

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

- Notes: Odor:2 T.O.N were measured on Wed 8/26
- (a) Site problem
  - (b) Malfunction of system under test
  - (c) Weather problem
  - (d) Other

**NSF International**  
**Standard 40 - Residential Wastewater Treatment Systems**

Plant Effluent

Plant Code: Premier Tech Coco DN

Week Beginning: 30-Aug-15

Weeks Into Test: 22

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

- Notes: Vacation Stress started on 8/30.
- (a) Site problem
  - (b) Malfunction of system under test
  - (c) Weather problem
  - (d) Other

**NSF International**  
**Standard 40 - Residential Wastewater Treatment Systems**  
 Plant Effluent

Plant Code: Premier Tech Coco DN

Week Beginning: 6-Sep-15

Weeks Into Test: 23

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

- Notes: Vacation Stress completed on 9/8.
- (a) Site problem
  - (b) Malfunction of system under test
  - (c) Weather problem
  - (d) Other

**NSF International**  
**Standard 40 - Residential Wastewater Treatment Systems**  
 Plant Effluent

Plant Code: Premier Tech Coco DN

Week Beginning: 13-Sep-15

Weeks Into Test: 24

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

- Notes: Odor:5 T.O.N were measured on Wed 9/16
- (a) Site problem
  - (b) Malfunction of system under test
  - (c) Weather problem
  - (d) Other

**NSF International**  
**Standard 40 - Residential Wastewater Treatment Systems**  
 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
	effluent	1.92	1.89	1.97	1.91	1.48	1.94
Temperature (C)	influent	30	30	30	30	29	29
	aeration chamber	30	30	30	30	30	30
	effluent	30	30	30	30	30	30
pH	influent	7.4	7.4	7.4	7.4	7.3	7.3
	aeration chamber	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
Biochemical Oxygen Demand (mg/L)	influent (BOD <sub>5</sub> )	120			260	140	
	effluent (CBOD <sub>5</sub> )	3			7	8	
Suspended Solids (mg/L)	influent	190			220	160	
	effluent	1			2	3	

- (a) Site problem  
 (b) Malfuction 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.

**NSF International**  
**Standard 40 - Residential Wastewater Treatment Systems**  
 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
	effluent	2.05	2.05	3.14	2.11
Temperature (C)	influent	29	29	29	30
	aeration chamber	29	29	29	29
	effluent	30	29	29	29
pH	influent	7.1	7.3	7.6	7.4
	aeration chamber	7.1	7.1	7.2	7.2
	effluent	7.2	7.2	7.2	7.2
Biochemical Oxygen Demand (mg/L)	influent (BOD <sub>5</sub> )	140	210	210	230
	effluent (CBOD <sub>5</sub> )	4	4	4	3
Suspended Solids (mg/L)	influent	120	160	160	210
	effluent	2	1	1	2

- (a) Site problem  
 (b) Malfuction 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

**NSF International**  
**Standard 40 - Residential Wastewater Treatment Systems**  
 Plant Effluent

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

Weeks Into Test: 27

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

- (a) Site problem Notes: No sampling on 10/4 because there was site technical issue with the
- (b) Malfuction of system under test influent on 10/3 and 4, which was resolved on 10/5. Working Parent Stress 10/6 through 10/10.
- (c) Weather problem Additional sampling during the stress was at the request of the manufacturer.
- (d) Other

**NSF International**  
**Standard 40 - Residential Wastewater Treatment Systems**  
 Plant Effluent

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

Weeks Into Test: 28

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

- (a) Site problem 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.
- (b) Malfuction of system under test Color: 40 Pt-Co units
- (c) Weather problem Odor: 10 T.O.N
- (d) Other Oily film and foam: Not detected

**NSF International**  
**Standard 40 - Residential Wastewater Treatment Systems**  
 Plant Effluent

Plant Code: Premier Tech Coco DN

Week Beginning: 18-Oct-15

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	0.36	0.38	0.33
	effluent	2.13	-	-	0.54	3.42	3.67
Temperature (C)	influent	29	-	29	29	29	28
	aeration chamber	28	28	27	28	28	27
	effluent	27	-	-	24	27	28
pH	influent	7.4	-	-	7.3	7.3	7.3
	aeration chamber	7.2	7.2	7.3	7.2	7.2	7.3
	effluent	7.1	-	-	7.1	7.0	7.1
Biochemical Oxygen Demand (mg/L)	influent (BOD <sub>5</sub> )	120					200
	effluent (CBOD <sub>5</sub> )	8					4
Suspended Solids (mg/L)	influent	200					340
	effluent	4					4

- Notes: Power/Equipment Failure Stress 10/18 through 10/20.
- (a) Site problem
  - (b) Malfunction of system under test
  - (c) Weather problem
  - (d) Other

**NSF International**  
**Standard 40 - Residential Wastewater Treatment Systems**  
 Plant Effluent

Plant Code: Premier Tech Coco DN

Week Beginning: 25-Oct-15

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
	effluent	3.84	4.17	1.06	4.22
Temperature (C)	influent	27	27	27	27
	aeration chamber	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
	effluent	7.0	7.0	7.3	7.1
Biochemical Oxygen Demand (mg/L)	influent (BOD <sub>5</sub> )	160	91	210	130
	effluent (CBOD <sub>5</sub> )	2	1	2	2
Suspended Solids (mg/L)	influent	230	160	210	220
	effluent	2	2	2	2

- Notes: Vacation Stress started on 10/28.
- (a) Site problem
  - (b) Malfunction of system under test
  - (c) Weather problem
  - (d) Other



**NSF International**  
**Standard 40 - Residential Wastewater Treatment Systems**

Plant Effluent

Plant Code: Premier Tech Coco DN

Week Beginning: 1-Nov-15

Weeks Into Test: 31

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

- Notes: Vacation Stress completed on 11/6.
- (a) Site problem
  - (b) Malfunction of system under test
  - (c) Weather problem
  - (d) Other

**NSF International**  
**Standard 40 - Residential Wastewater Treatment Systems**

Plant Effluent

Plant Code: Premier Tech Coco DN

Week Beginning: 8-Nov-15

Weeks Into Test: 32

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

- Notes: 11/11 measurements:
- (a) Site problem
  - (b) Malfunction of system under test
  - (c) Weather problem
  - (d) Other
- 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

Plant Code: Premier Tech Coco DN

Week Beginning: 15-Nov-15

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 <sub>5</sub> )	100	240	240	190	270	230
	effluent (CBOD <sub>5</sub> )	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

Plant Code: Premier Tech Coco DN

Week Beginning: 22-Nov-15

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 <sub>5</sub> )	300	300	380	240
	effluent (CBOD <sub>5</sub> )	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	50.93
	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	
	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	
	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	
	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	

50.93

52.27

53.26

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	
week 17-23	08/03/15													
	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	
	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	
	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	
	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	
Week 30	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 31	11/02/15													
	11/04/15													
	11/06/15													

52.22

Extra samples per Premier Tech

Stress data, do not use for 245

Stress data, do not use for 245

wash day stress

working parent stress

power failure stress

vacation stress

Week 33	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
Week 33	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
Week 34	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
Week 35	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

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

**APPENDIX E**  
**OWNERS MANUAL**

*Congratulations on your purchase of an Ecoflo<sup>®</sup> Coco Filter- ECDn unit from Premier Tech Aqua (PTA). The Ecoflo<sup>®</sup> Coco Filter-ECDn unit has been tested and listed under NSF standard 40 & 245 and meets requirements for Class I systems.*

*With the Ecoflo<sup>®</sup> 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<sup>®</sup> 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<sup>®</sup> 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<sup>®</sup> Coco Filter- ECDn unit) with the organic content of the raw wastewater. The recirculation line between the Ecoflo<sup>®</sup> 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<sup>®</sup> 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<sup>®</sup> 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<sup>®</sup> 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<sup>®</sup> 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:

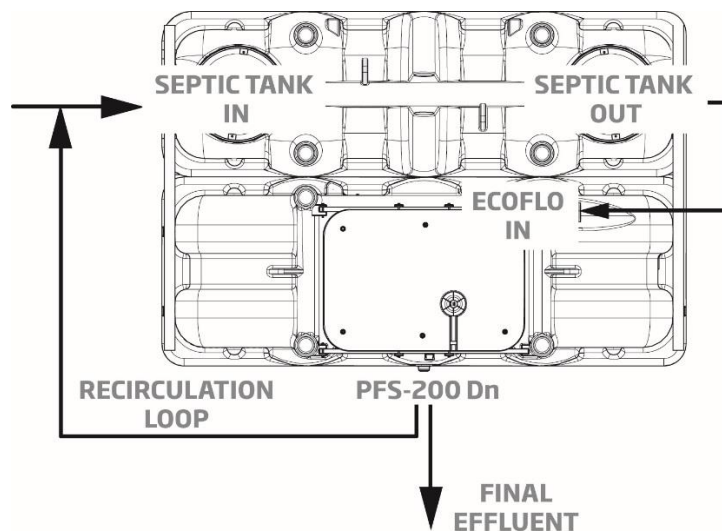
<b>EC</b> refers to the Ecoflo® model	<b>EC</b> = Ecoflo® Coco Filter
<b>Dn</b>	<b>Nitrogen removal product with a maximum applicable HLR 575 L/m<sup>2</sup>-d, i.e. of 14.1 gal /ft<sup>2</sup></b>
<b>500</b> refers to the daily flow capacity	<b>500</b> = Capacity of 500 US gallons per day 600 = Capacity 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
<b>P</b> refers to the material of the shell	<b>C</b> = Concrete <b>P</b> = Plastic (Polyethylene)
<b>PACK</b> refers to configuration of the primary tank and biofilter	<b>PACK</b> = 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.**



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

The information contained in this document is based upon the latest information available at the time of publication and is designed to provide you with a general introduction to our products. We make no warranties or representations as to its accuracy. We are continually updating and improving our products and reserve the right to amend, discontinue, alter or change specifications and prices without prior notice. Ecoflo® is a brand of Premier Tech Ltd. The Ecoflo® Biofilter is protected under patents: CA2499637; US7097768; ES2285173; EP1539325 (BE, FR). Notice issued on 2016-01-12. For current data regarding all patent application(s) and patent(s) for this product or any part thereof, consult the website [patentmarking.premiertech.com](http://patentmarking.premiertech.com) (references: 3685).

© Premier Tech Ltd, 2016

# 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.

