HALIFAX
REGIONAL MUNICIPALITY

PO Box 1749
Halifax, Nova Scotia
B3J 3A5

M E M O R A N D U M

To: Chair and Members of Halifax Watershed Advisory Board

From: Jillian MacLellan, Planner

Date: June 20, 2012

Subject: **Case 17362: Application by Genivar for the lands of Cobalt Properties Ltd. to enter into a development agreement for a commercial development greater than 697 square metres (7,500 square feet) at 5210 St Margarets Bay Road, Upper Tantallon.**

Synopsis of Proposal:
An application has been received from Genivar for the development of 3 commercial buildings at 5210 St. Margaret's Bay Road through a development agreement.

An Irving gas station currently exists on the property. Including the gross floor area of the existing gas station, the development of the proposed 3 commercial buildings would create a commercial gross floor area of 2,390.4 square meters (25,730 square feet). As of April 2009, all commercial developments or expansions exceeding 697 square meters (7,500 square feet) in the Mixed Use A or B designation can only be considered through a development agreement pursuant to the criteria of Policy MU-16(A) of the Municipal Planning Strategy.

Site Features:

- The properties is approximately 5.8 hectares in size
- Proposed access to the site is from St. Margaret's Bay Road and Peggy's Cove Road
- The site is adjacent to a wet area located south of the property
- The site is generally flat with a hill located in the north-western corner of the property.

Planning Process:
The subject property is located at 5210 St. Margaret's Bay Road (PID 41074923), within the Planning Districts 1 & 3 (St. Margaret's Bay) Planning Area. The property is zoned MU-2 (Mixed Use) and is designated Mixed Use B under the Land Use Bylaw (LUB) and Municipal Planning Strategy (MPS) for Planning Districts 1 & 3. The property is also designated Rural Commuter under the Regional Plan.

A public information meeting was held on April 12, 2012. The applicant is currently undergoing a Stage II Hydrogeological Assessment to determine if there is adequate groundwater for the development. Once all appropriate studies are complete a development agreement will be negotiated and staff will provide recommendation on the application to the Western Region Community Council

Input Sought from the Halifax Watershed Advisory Board:

Pursuant to the Board's terms of reference, Staff seek the Board's input with respect to the potential impact of this development on the surrounding wetlands and watercourses and the associated watershed in relation to the proposed Stormwater Management Plan. HWAB's recommendation and specific comments will be included with the staff report to Western Region Community Council.

Attachments:

Attachment A:	Proposed Site Plan;
Attachment B:	Proposed Site/Stormwater Management Plan;
Attachment C:	Conceptual Wastewater Treatment Facility
Attachment D:	Air Photo

EXISTING PYLON SIGN

CENTRE LINE OF EXISTING DITCH

PROPOSED SHARED PYLON SIGN

PROPOSED PATHWAY SUBJECT TO D.O.T. APPROVAL

ST. MARGARETS BAY ROAD (TRUNK 3)

POTENTIAL GATEWAY FEATURE SUBJECT TO D.O.T. APPROVAL

PROPOSED PATHWAY

NSPI EASEMENT

RE-LOCATE EXISTING FUEL VENT

EXISTING UNDERGROUND FUEL TANKS

PATIO

PAVERS

PROPOSED CRU #4
1st FLR 2,200 SF
2nd FLR 2,200 SF

PAVERS

IRVING STATION
3,720 SF

PROPOSED CRU #3
5,122 SF

PROPOSED CRU #2
10,488 SF

PROPOSED CRU #1
2,000 SF

OVERHEAD WIRES TO BE RE-LOCATED

PROPOSED SHARED PYLON SIGN

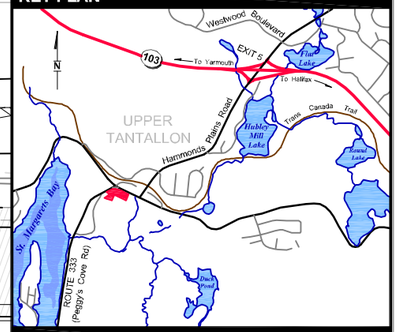
ROUTE 333

PROPOSED SEPTIC BED
(SIZE AND LOCATION APPROXIMATE)

NSPI EASEMENT

SUPERSTORE

KEY PLAN



LEGEND

Site Boundary

SITE SUMMARY:

SITE AREA: 5.83 ACRES
EXISTING ZONE: MIXED USE (MU-2)

	FLOOR AREA	PARKING	
		PROVIDED	RATIO
IRVING	3,720 SF	—	—
CRU #1	2,000 SF	—	—
CRU #2	10,488 SF	—	—
CRU # 3	5,122 SF	—	—
CRU #4	4,400 SF	—	—
TOTAL	25,730 SF	133	5.2

NOTES:

- Site subject to detailed landscape design.

SOURCES:

- Terrain survey plan 'D09393500.dwg' dated December 4, 2009.

Designer: Iain.grant
Planner: Greg Zwicker

VERSION 135

CONCEPT PLAN

TANTALLON, NOVA SCOTIA

cobalt

March 7, 2012 D09393-135

SCALE

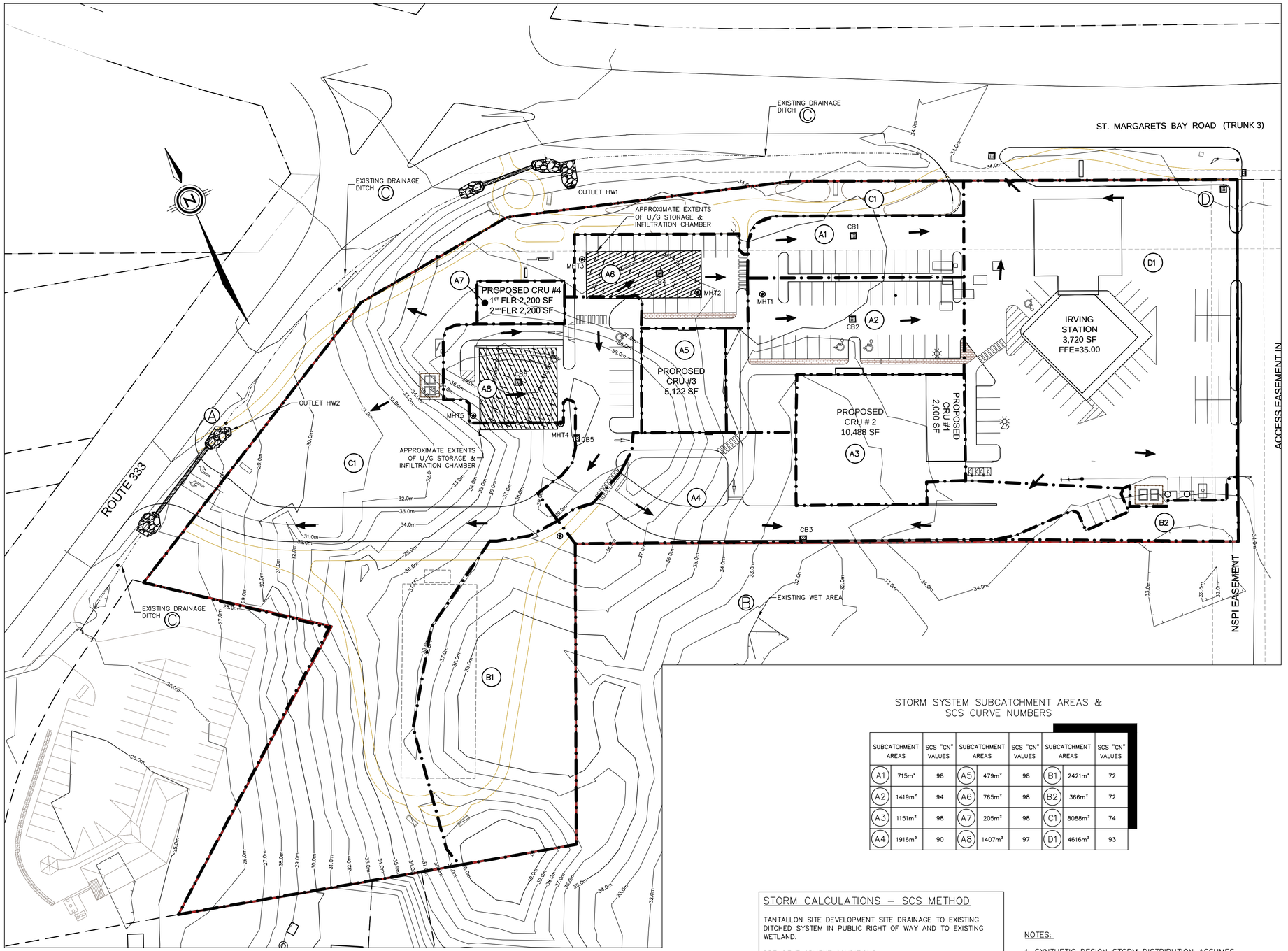
15 10 5 0 25 m

1 : 1,000

NORTH

GENIVAR

1 SPECTACLE LAKE DRIVE
DARTMOUTH, NOVA SCOTIA
CANADA, B3B 1X7
PHONE: 902 835-9955 ~ FAX: 902 835-1645
WWW.GENIVAR.COM



STORM SYSTEM SUBCATCHMENT AREAS & SCS CURVE NUMBERS

SUBCATCHMENT AREAS		SCS "CN" VALUES	SUBCATCHMENT AREAS		SCS "CN" VALUES	SUBCATCHMENT AREAS		SCS "CN" VALUES
A1	715m²	98	A5	479m²	98	B1	2421m²	72
A2	1419m²	94	A6	765m²	98	B2	366m²	72
A3	1151m²	98	A7	205m²	98	C1	8088m²	74
A4	1916m²	90	A8	1407m²	97	D1	4616m²	93

STORM CALCULATIONS – SCS METHOD

TANTALLON SITE DEVELOPMENT SITE DRAINAGE TO EXISTING DITCHED SYSTEM IN PUBLIC RIGHT OF WAY AND TO EXISTING WETLAND.

PRE-DEVELOPMENT CONDITIONS
DRAINAGE AREA = 23592 m²±
CN = 77
PRE-DEVELOPMENT PEAK DISCHARGE = 0.444 m³/s ± (100YR)
PRE-DEVELOPMENT PEAK DISCHARGE = 0.203 m³/s ± (5YR)

POST-DEVELOPMENT CONDITIONS (WITH STORAGE)
DRAINAGE AREA = 23592 m²±
CN = 86
POST-DEVELOPMENT PEAK DISCHARGE = 0.379 m³/s ± (100YR)
POST-DEVELOPMENT PEAK DISCHARGE = 0.194 m³/s ± (5YR)

NOTES:

1. SYNTHETIC DESIGN STORM DISTRIBUTION ASSUMES ANNUAL HALIFAX STORM OF 24 HOUR DURATION, 5 MINUTE INCREMENT: 123mm (5yr), 241mm (100yr).
2. PIPE CAPACITY BASED ON MANNING'S EQUATION: n=0.013 FOR CONC (GREATER THAN OR EQUAL TO 450mmø), n=0.010 FOR PVC (LESS THAN 450mmø).
3. STORMTECH CHAMBER HAS BEEN DESIGNED TO HANDLE THE 1 IN 100yr STORM.

GENIVAR
1 SPECTACLE LAKE DRIVE
DARTMOUTH, NOVA SCOTIA
CANADA, B3B 1X7
PHONE: 902 835-9955 ~ FAX: 902 835-1645
WWW.GENIVAR.COM

SEAL:

KEY PLAN:

LEGEND:
DRAINAGE AREA
APPROX. 5 YR FLOOD LIMIT (5 YR — MA 5)
APPROX. 100 YR FLOOD LIMIT (100 YR — MA 00T)
MAJOR DRAIN
FLOW FROM POINT (X 1)
FLOW TO POINT (A)
DRAINAGE AREA (A1)

REVISION:

NO.	DATE YYYY/MM/DD	DESCRIPTION
0	2012/04/12	ISSUED FOR PUBLIC MEETING

PROJECT NO: DA09393
DATE: (YYYY/MM/DD) 2012/04/12
ORIGINAL SCALE: HORIZONTAL: 1:500 VERTICAL: N/A
IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE. 25mm
DESIGNED BY: M.WALLACE, E.I.T.
DRAWN BY: M.WALLACE, E.I.T.
CHECKED BY: R.BARKHOUSE, P.ENG
SCALE: 1:500 METRIC
10 8 6 4 2 0 10 20 30

CLIENT: cobalt PROPERTIES
CLIENT REF. #:

PROJECT:

TANTALLON SITE DEVELOPMENT

TANTALLON, NOVA SCOTIA

TITLE:

CONCEPTUAL DRAINAGE PLAN

SHEET NUMBER: 3
SHEET #: 3 OF 5

ISSUE: ISSUED FOR PUBLIC MEETING
DATE OF: 2012/04/12
REV # 0

XREFS: K:\DARTMOUTH\2009\DA09393\DWG\ENG\EXTERNAL REFERENCES\DA09393_BASE.DWG

K:\DARTMOUTH\2009\DA09393\DWG\ENG\ENGINEER CONCEPT DRAWINGS FOR PW\CONCEPTUAL DRAINAGE PLAN.DWG PRINTED: 8:19 AM 2012/04/12 BY: RYAN.BARKHOUSE
GENIVAR REF. NO.: ----- CONCEPT DRAINAGE PLAN

GENIVAR

Ref. No. DA09393

October 7, 2011

Mr. Marc Gosselin
Cobalt Properties Limited
55 Union Street, Suite 700
Saint John, New Brunswick. E2L 5B7

Dear Sir:

Re: Conceptual Wastewater Treatment Facility
Cobalt Development – Tantallon, NS

1. Introduction

Cobalt Properties Limited (Cobalt) proposes to construct an on-site wastewater treatment facility (WWTF) to service a new commercial complex to be built at the intersection of Highway 333 and the Saint Margarets Bay Road in Tantallon, NS. The commercial complex will include four (4) commercial retail units (CRU) including a Subway Restaurant, Shoppers Drug Mart, a branch of TD Bank, and an Irving gas bar/convenience store. This letter is intended to provide a concise description of the proposed on-site wastewater treatment facility and a brief description of the environmental permitting process that will apply.

2. Existing Site Conditions

The proposed on-site WWTF will treat domestic and kitchen wastewater from the commercial complex, disinfect the treated effluent and discharge it via an engineered dispersal system into the soil. A geotechnical investigation has been completed at the proposed site by GENIVAR. The proposed location for the WWTF and dispersal system is underlain by a glacial till that is suitable for the construction of the proposed treated effluent dispersal system. The site of the proposed WWTF is well drained and adequately offset from neighbouring properties, wetlands, and water courses.

3. Conceptual WWTF Design

An Advantex wastewater treatment system, manufactured by Orenco Systems Ltd and represented in Atlantic Canada by Atlantic Purification Systems (APS) Limited, is proposed to treat the wastewater and a Geoflow Effluent Dispersal System is proposed to dispose of the treated effluent from the treatment system. Due to the relatively high concentrations of fats, oils and grease (FOG) that may be discharged by the Subway Restaurant, adequate oil separation tankage will be required to pre-treat the wastewater before it is introduced into the WWTF. Some technical information on the Advantex and the Geoflow systems are attached to this letter.

While other types of on-site wastewater treatment facilities may be utilized for this type of development, the Advantex system is considered the most suitable for the current application. Due to the potential for FOG entering the treatment facility and blinding off the treatment media resulting in anaerobic conditions and odour, it is recommended that the WWTF be easily rehabilitated and brought back to original specifications. The fabric media

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in the Advantex system is easily removed and replaced should it become contaminated with fats, oils and grease.

The relatively confined nature of the proposed Cobalt development favours the use of a compact, modular treatment system, such as Advantex. The modular design of this system allows for easy expansion should it become necessary in the future.

4. Environmental Regulatory Approval

The design and operation of on-site wastewater treatment and disposal systems in the Province is regulated by Nova Scotia Environment. While the proposed Advantex treatment system has been installed in a number of similar situations in the past two years or so, NSE still requires that the application for a Permit to Operate must be accompanied by a proper design brief and a set of detailed design drawings before a permit can be issued. We have spoken with representatives of NSE regarding the proposed WWTF and have been given to understand that such a system designed by an experienced municipal engineer should be suitable for the proposed application. Nevertheless, until the permit application form with the appropriate supporting detailed design information has been submitted, NSE cannot comment specifically on the proposed WWTF system.

At the current stage of the Development Agreement process, it is our opinion that it is premature to complete the detailed design of the proposed on-site WWTF, bearing in mind the upcoming public consultation process may result in changes to the configuration and layout of the proposed development. Further, this procedure provides no guarantees of approval.

5. Closing

GENIVAR is pleased to recommend the proposed Advantex wastewater Treatment System and Geoflow Effluent Dispersal System to service the new Tantallon commercial development by Cobalt Properties Limited. We trust that this information is sufficient for your needs at this time.

Yours truly,

GENIVAR Inc.

Richard Stephenson, P.Eng.
Senior Water Resources Engineer

Attachments

AdvanTex® Design Criteria

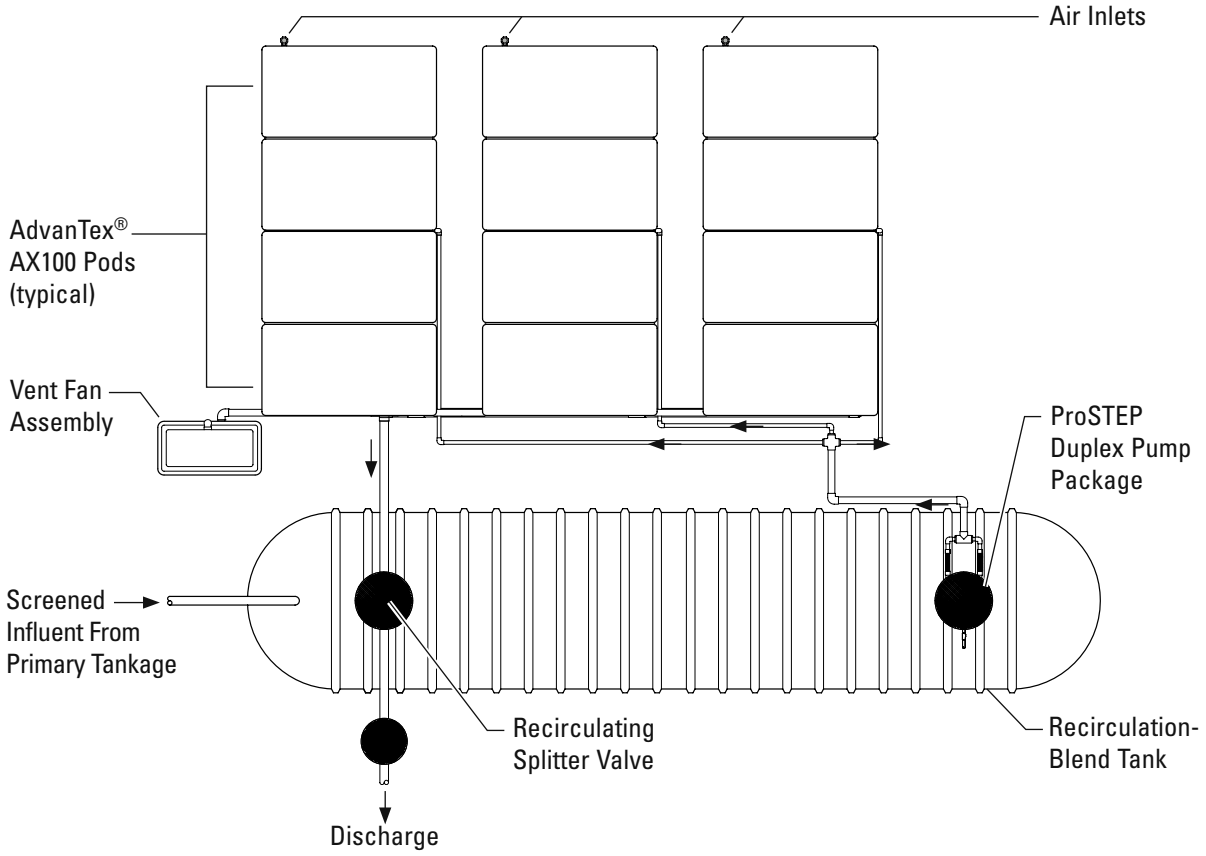
Orenco Systems® Incorporated
800-348-9843

For Commercial and Multi-Family Applications: AX100 and AX20 Models

System Description and Treatment Process

Commercial AdvanTex® AX100 and AX20 Treatment Systems are a multiple-pass, packed bed aerobic wastewater treatment technology specifically designed and engineered for long-term processing of domestic strength wastewater. AdvanTex Treatment Systems are capable of processing typical domestic influent wastewater (see Table 1) to "better than secondary treatment standards." Excellent results with regard to $cBOD_5$ and TSS should be achieved, and total nitrogen reduction will typically exceed 60% on average, assuming sufficient alkalinity is available. Figure 1 shows a standard layout for a commercial AdvanTex AX100 treatment system. (Primary treatment and dispersal not shown.)

Figure 1. Standard Commercial AdvanTex Treatment System: Top View (AX100 Shown)



Prior to the AdvanTex Treatment System, primary treatment of raw sewage is accomplished through appropriately-sized primary septic tanks. After primary treatment, the effluent enters the recirc-blend tank, where it blends with the contents of the tank. ProSTEP™ pump packages in the recirc-blend tank transport blended effluent to a distribution manifold in the AdvanTex filter pod. Effluent percolates down through the textile media, where it is treated by naturally-occurring microorganisms that populate the filter. After passing through the filter media, the treated effluent flows out of the filter pod through the filtrate return line that returns the effluent to the recirculating valve (RSV or MM). The valve automatically splits or diverts the flow between the recirc-blend tank and the final discharge and controls the liquid level within the tank. During extended periods of low forward flow into the system, 100% of the treated effluent is returned to the recirc-blend tank. The recirc-blend tank is set up so that incoming effluent from the primary septic tanks and filtrate from the AdvanTex system pods enter opposite the pump discharge to the pods so that mixing, blending, and dilution of the effluent occurs before being dosed onto the AdvanTex filter pods.

AdvanTex® AX100 & AX20 Commercial Design Criteria

System Selection: Size and Configuration

Commercial AdvanTex Treatment Systems are typically configured as shown in Figure 1. For smaller systems, AX20 pods can be arranged in a similar configuration. If additional nitrogen reduction is desired, a specialty mode in which a portion of the filtrate is routed to recirculate through the primary tank may be considered. This option allows for improved denitrification to enhance the overall nutrient removal. There are several other factors that influence the nitrogen process, and each of these should be considered when developing a plan for achieving significant reductions in this area.

System Requirements: Typical Commercial AdvanTex Influent Wastewater Strength

Wastewater strengths for commercial AdvanTex systems must remain within typical influent limits as shown in Table 1, below. Consult Orenco or an authorized Dealer for applications involving higher-than-domestic waste strength.

Table 1. Typical Commercial AdvanTex Influent Wastewater Strength*

Characteristic	Average (mg/L) †	Weekly Peak (mg/L)	Rarely Exceed (mg/L)
BOD_5	150	250	500
TSS	40	75	150
TKN	65	75	150
G&O	20	25	30
pH	7	6.5 to 7.5	6 to 9
Alkalinity	250-100 (desired) ‡	—	—

** "Typical Commercial AdvanTex Influent Wastewater Strength" is the maximum allowable wastewater strength entering the recirc-blend tank of an AdvanTex Treatment System.*

† Commercial systems will occasionally vary in strength based upon changes in flow characteristics or ownership. As the average influent strength approaches 80% of the weekly peak levels, consideration must be given to providing supplemental pre-treatment, additional treatment units, or process oversight.

‡ Wastewater alkalinity should rarely drop below these levels if nitrogen reduction is necessary.

System Requirements: Recommended Primary Tankage

Typical primary tank sizing will be based on Preferred HRTs (Hydraulic Retention Times) as described in the *Primary Tank Sizing Chart* (NDA-TNK-1) provided as an Appendix to this document. For subdivisions, recommendations assume that design maximum daily flows are typically two times design average daily flows. For commercial establishments such as schools, churches, restaurants, highway rest areas, etc., design maximum daily flows may be much larger than the design average daily flow. Designers should consult local regulations, as well as use their own experience, when estimating flows from these sources. Obtaining flow records from similar existing establishments can be valuable. Also, please feel free to contact Orenco at 800-348-9843 or +1-541-459-4449.

In the primary tank(s), the raw sewage separates into three distinct zones: a scum layer, a sludge layer, and a clear zone. Heavy solids settle to the bottom to form the sludge layer, while the lighter material floats to the top to create the scum layer. Facultative and anaerobic digestion converts the organic matter to volatile organic acids while strict anaerobes ferment the volatile organic acids to gases (methane, carbon dioxide, etc.). Effluent from the clear zone is then passed through a Biotube® effluent filter before being transported to the recirc-blend tank. (See Figure 2.) For the system to operate properly, all tanks must meet minimum structural requirements, be completely watertight, and pass a watertight test including the riser/tank connection. For detailed specifications, see structural and watertightness criteria in Orenco's *Material Specifications* (NDA-ATX-COMM-SPECS-1).

Figure 2. Typical Primary Tank

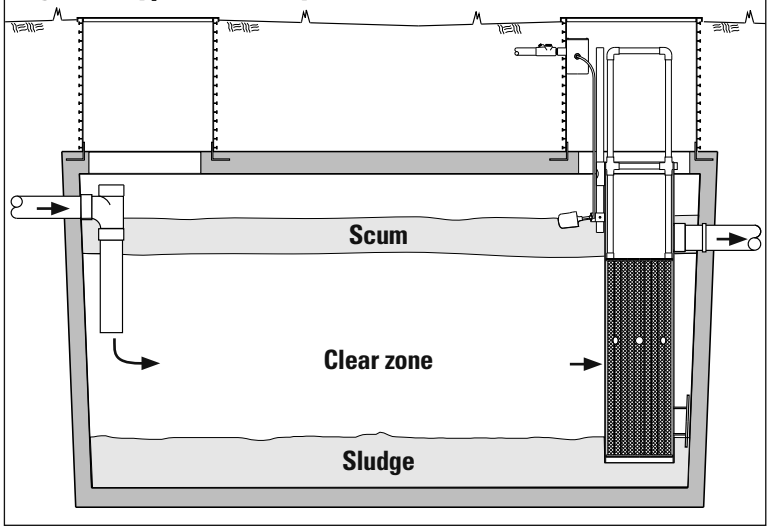


Figure 3. Typical Primary Tanks: Single- and Multiple-Tank Configurations

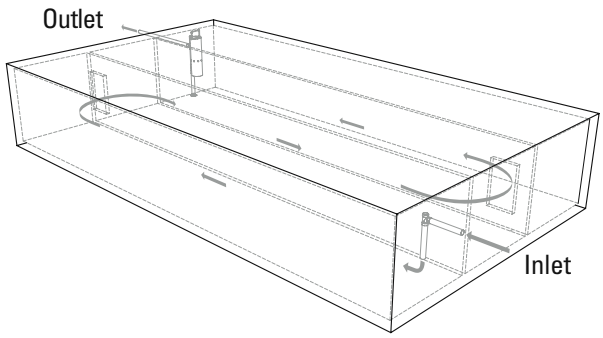


Fig. 3a: Cast-in-Place Primary Meander Tank

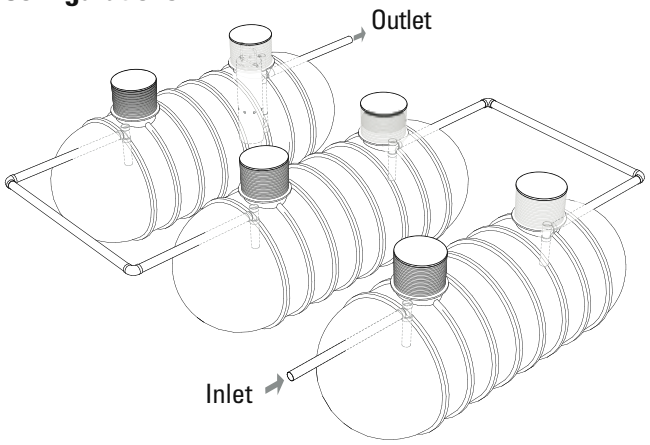


Fig. 3b: Multiple Primary FRP Tanks

When the required tank size exceeds available premanufactured tank capacities, cast-in-place, meander, or multiple FRP or precast tanks (as shown in Figures 3a and 3b) are preferred configurations. Two separate documents, *Septic Tank Sizing for Large Flows*, (NTP-TNK-TRB-2) and *Design and Performance of Septic Tanks*, (NTP-TNK-TRB-3), provide significant background information specific to the primary tank design and configuration.

Recirculation-Blend Tankage

The recirculation-blend tank is sized to equal at least 80% of the design maximum daily flow. A larger tank may be recommended based on the expected organic or peak design hydraulic loads, or to accommodate special surge capacities or operator response capabilities.

For nitrogen-sensitive areas requiring greater than 60% nitrogen reduction, the recirc-blend tankage is sized to equal at least 100% of the peak flow and greater primary tankage is recommended. Where access to a primary waste source is unavailable, this may be provided as two separate tanks, typically an 80% recirc-blend preceded by a 20% denitrification tank. Contact Orenco for details.

Design Loading Rates

Typical loading rates are based on the *AdvanTex Loading Chart for Commercial and Multi-Family Applications*, (NDA-ATX-4) provided as Appendix 3 to this document. Orenco's suggested design loading rates are based on typical per capita flow rates and average strength characteristics expected as listed in Table 1. Performance is a function of the expected typical loads with periodic weekly peaks. The packed bed media filter used in Orenco's AdvanTex AX100 Treatment Systems is configured in the same manner as our AX20 Treatment Systems, which are NSF/ANSI Standard 40 Class I-approved. Typically, the daily mass loading is based on the expected daily flows and parameter strength. Figure 4 shows average loading capacity at 95% confidence level.

The base nominal hydraulic loading rate (HLR) for an AdvanTex Treatment System is 25 gpd/ft^2 with a base organic loading rate (OLR) of 0.04 lbs BOD/ft^2 · day (0.2 kg BOD/m^2 · day). The AdvanTex AX100 has a nominal (plan view) surface area of 100 ft^2/pod (9.3 m^2/pod) and the AdvanTex AX20 (sometimes used in small commercial applications) has a nominal surface area of 20 ft^2/pod (1.9 m^2/pod).

At these loading rates, design criteria target a 10/10 effluent quality in the discharge effluent. Discharge levels may be projected at a 95% confidence level relative to the hydraulic loading rate. Peak HLR's of 50 gpd/ft^2 (2000 Lpd/m^2) or peak OLR's of 0.08 lbs BOD/ft^2 · day (0.4 kg BOD/m^2 · day) can be handled for short periods of time with little effect on performance. Higher loading rates may be applicable relative to higher discharge limits or sufficient operating documentation, but would not be allowed to exceed 50 gpd/ft^2 (2000 Lpd/m^2) at the typical average characteristics presented in Table 1. A thorough evaluation of all the typical wastewater characteristics will guide design limits. High oil and grease concentrations may require pretreatment to ensure maintenance frequencies are not excessive.

If the loading rate (or mass load) needs to be reduced to meet discharge limits, it's a simple matter of adding additional modular units. Operationally, the module's flexible and easily serviceable features make AdvanTex units an ideal, efficient, and effective solution for all wastewater treatment applications with domestic waste characteristics.

Ventilation

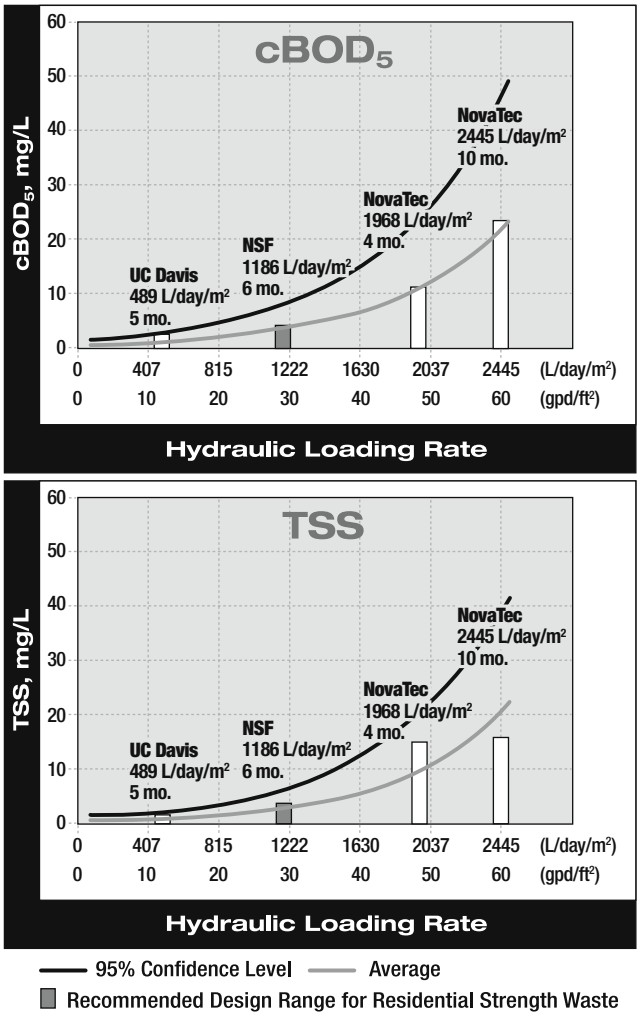
Commercial AdvanTex filters may come with either an active or passive vent system, depending on application type and desired treatment levels. An active vent system utilizing a low wattage fan will typically be used, except for small systems with residential quality influent waste strengths. The internal volume of an AX100 is about 350 ft^3 (10 m^3); typically, air changes occur every other hour. AX20 units typically use passive ventilation.

The inlet plumbing to the recirc-blend tank should allow for natural ventilation back through the building sewer and vent stack. Building sewer lines provide a natural conduit for air movement and exchange throughout the recirc-blend tank and treatment system.

The passive vent provided contains a carbon filter material to mitigate odors. However, a small amount of odor may still occur during a dosing event, as air from the pod is displaced by the dosed effluent. This should be taken into consideration before siting or locating a passive ventilated system in areas where this occasional odor may be perceived as a nuisance.

Figure 4.
Effluent Quality vs. Hydraulic Loading Rates*

(ANSI/NSF Standard 40 and Other Third Party Testing Results)



** Influent concentrations of 162 mg/L BOD_5 and 291 mg/L TSS, with peak influent concentrations of 550 mg/L BOD_5, and 1600 mg/L TSS.*

Typical Effluent Quality

Effluent quality is dependent on a number of factors, including influent characteristics and loading rates. Third party NSF/ANSI Standard 40 testing results are shown in Figure 4. The results demonstrate that low-to-moderate loading rates can produce cBOD and TSS of <5 mg/L, while higher loading rates produce cBOD and TSS in the range of 15-25 mg/L.

Nitrogen reduction in the standard configuration will typically exceed 60 percent. Using a specialty mode, nitrogen reduction will typically exceed 70 percent, depending on wastewater strength and other characteristics like BOD_5, grease and oils, pH, tankage (HRT), temperature, and alkalinity concentrations. Nitrification can be inhibited if the natural buffering capacity (alkalinity) is too low. On a theoretical basis, 7.14 mg/L of alkalinity as $CaCO_3$ is needed to nitrify 1 mg/L of NH_4-N. For more information on nitrogen reducing systems, contact Orenco.

Pumping Equipment

The integrated treatment package includes an Orenco ProSTEP™ pump package. Typically a single pump is necessary to energize the distribution manifold in the an AdvanTex treatment pod. For the AX100, there are four laterals in each filter with two spray nozzles per lateral. The flow can be varied by adjusting the pressure at the pod inlet; however, our baseline operational flow is about 6.0 gpm per nozzle, which puts the pumping rate at about 48.0 gpm per each AX100. Orenco pump models PF5005, PF5007, PF5010, and PF7510 are used for the AX100 units. Duplex or sufficient multiple pumps are required in all commercial applications to ensure operational integrity with one or more pumps out of commission.

Distributing Valves (Optional)

Automatic distributing valve assemblies are used to alternate doses to up to three AX100 pods utilizing a duplex ProSTEP pump package. Orenco often recommends designing without automatic distribution valves if possible, to eliminate extra moving parts in the system. Other configuration options could include a single pump per pod, or two PF5007 pumps coupled to dose three pods simultaneously.

Distribution valves allow for a 4:1 recirc-blend ratio during periods of design maximum daily hydraulic loading without exceeding the maximum daily cycle rating of the pumps. Orenco automatic distributing valve assemblies should be located at the high point between the recirc-blend tank and the AdvanTex pod(s) to ensure proper operation of the valve. For more details on this product, please refer to Orenco *Automatic Distributing Valve Assemblies for Wastewater Effluent Systems* (NTP-VA-1).

Residual Pressures

The residual pressure will typically be set to 3.0 psi (20.7 kPa) to attain the desired 6 gpm (0.38 Lps) per nozzle. Each AX100 pod is supplied with a gauge tap and valve assembly to allow for pressure measurement at the pod inlet.

Recirculation-Blend Ratios and Timer Settings

Typical operating recirculation-blend ratios will vary between 2:1 and 4:1, and the "off" time varies as a function of the recirc-blend ratio. The AdvanTex Treatment System controls are initially set to a 4:1 recirc-blend ratio, and initial timer settings are established based on the design average daily flow. A typical dose event will vary between 1 and 2 minutes and will deliver about 6 to 12 gallons (23 to 45 liters) per nozzle per dose. If, after startup, the actual measured flows vary significantly from estimated design flows, timer settings should be recalculated.

AdvanTex Control System

The method in which the effluent is loaded onto the AdvanTex filter is critical to the successful performance of the AdvanTex Treatment System. Over the past three decades, timer-controlled applications have proven to play an essential role in optimizing the performance of both fixed and suspended growth biological systems. A timer-controlled pump in the recirc-blend chamber periodically doses effluent to a distribution system on top of the AdvanTex filter media. Each time the filter is dosed, effluent slowly percolates through the filter media and is treated by naturally-occurring microorganisms that populate the filter. During periods of high flow, a timer override float will temporarily adjust the timer settings to process the additional flow. The controller can also be programmed to change to an energy economy mode during extended periods of low inflow.

A telemetry-based panel — which can be connected to a land line, cellular service, internet, or satellite service — controls all equipment. Remote telemetry control panels are an integral part of all commercial AdvanTex Treatment System equipment packages. The remote telemetry feature provides real-time operator monitoring and control over system components, as well as data collection of key operational parameters and events. If additional equipment for pretreatment, tertiary treatment, or disinfection are required, the controls for each component can easily be incorporated into the telemetry control panel. This also allows the manufacturer to contact the panel directly to assist the operator in system evaluation and troubleshooting or to manually override operations. Remote telemetry control panels also provide additional alarm functions to automatically page the operator in the event that trend data indicate potential problem conditions (e.g. high flows). Orenco control panels can also integrate into existing SCADA systems.

Surge Volume

AdvanTex tankage design is consistent with that of other packed bed filters. Flow equalization should be designed into the primary tanks with controlled (metered) feed to the recirc-blend tank. If surging needs to be done in the recirc-blend tank, then sizing and timer controls will be programmed to optimize performance and surge capacity. Churches, schools, and assembly halls are typical applications where weekly surge control practices provide optimum filter sizing.

Other Design Considerations

AdvanTex pods are designed for installation in areas that are free of water. If a project requires placement of the pod in a high-water area, contact Orenco for options.

For cold weather applications, AX units are available with insulation attached to the bottom of the lid (1-inch thick; R-5 or 0.2 BTUs/hr/ft^2/°F/inch thickness). Installing insulation around the sides of the filter pods themselves is optional and is done onsite as needed.

Other cold weather considerations include standard practices used with most onsite pump systems, such as allowing all lines to drain, insulating processing tank lids, and backfilling risers with pea gravel if frost-heave is a concern. For extreme climates with long periods of subfreezing weather, a warm air source may be required. Contact Orenco if supplementary options need to be considered.

Appendix 1: Primary Tank Sizing

At Orenco Systems, we believe a structurally sound, watertight, and well-maintained septic tank is one of the most effective and economical wastewater treatment devices available. Adequate septic tankage will anaerobically digest organic material, remove settleable and floatable solids, help modulate flow, and consistently discharge effluent that meets "primary treatment" standards.

The Primary Tank Sizing Chart on the next page lists Orenco's tank sizing recommendations for various applications. The table includes minimum and preferred tankages for a dozen common types of facilities. We acknowledge that both the minimum and preferred tankages listed exceed EPA minimum sizes. After conducting extensive research on septic tankage, we are convinced that the smaller tankage arrived at using the EPA formula will result in suboptimal performance. Moreover, although smaller tanks may cost less initially, long-term cost of ownership is greater when their higher maintenance costs are taken into consideration. From an economic standpoint, ensuring adequate tankage of onsite wastewater treatment systems is an effective way to reduce operational costs. Consequently, we base our numbers on long-term performance satisfaction with regard to nominal quality ("minimum" tankage) and high quality ("preferred tankage") effluent.

Here are a few tips on how to use this chart:

- To calculate the appropriate tank size for your job, multiply the design maximum daily flow in gallons per day specified by your regulatory commission (according to facility type) by the hydraulic retention time (HRT) in days, listed in the Minimum and Preferred columns. For example, if local regulations require a 10,000 gpd system design for an office facility, Orenco recommends primary tankage of 30,000 gpd (minimum) or 40,000 gpd (preferred).
- Because grease and oil can inhibit microbial action and seal the pores in a packed bed filter or soil absorption system, Orenco recommends a grease tank for any facility with a commercial kitchen. A grease tank, which provides the longer retention time required to cool grease and oil to a point at which separation is possible, is an economical means of cooling and removing grease and oil before integrating the kitchen flow into the primary tankage.
- Several types of facilities — such as churches, schools, weekend campsites, etc. — may experience large fluctuations in daily flow; some may even receive all of their weekly flow over the course of one or two days. For facilities like these that need surge control, flow equalization should be included in the tank design.
- For facilities in the upper section of the table (those with restrooms and kitchens), primary tankage volume is determined by multiplying the sum of the design maximum daily flows of the restrooms and kitchens combined by the factor in the Primary Tankage cell. For larger facilities, such as the bottom three categories on the chart, the values are intended to be cumulative.

This table should be used as a general guideline for decentralized wastewater treatment designs. If you have questions about special cases where larger tankage or other measures may be necessary, or if you have general questions about flow equalization, please call Orenco Systems at (800) 348-9843 or +1-541-459-4449.

Primary Tank Sizing Chart

Facility	Minimum		Preferred	
	Grease Tankage[1] HRT (days)	Primary Tankage[2] HRT (days)	Grease Tankage[1] HRT (days)	Primary Tankage[2] HRT (days)
Office/Manufacturing/Light Industrial				
a) restrooms only	n/a	3	n/a	4
Restaurant/Deli				
a) restrooms and kitchen	3	4	5	5
Convenience Store/Gas Station				
a) restrooms only	n/a	3	n/a	4
b) restrooms and kitchen/deli	2	3[3]	4	4[3]
Hotel/Motel/Multiple Dwelling Units				
a) restrooms and kitchens	n/a	3	n/a	4
b) restrooms and restaurant/kitchen	3	3[3]	5	4[3]
Church				
a) restrooms only	n/a	2.5 + Surge[4]	n/a	4 + Surge[4]
b) restrooms and kitchen	2	2.5 + Surge[3,4]	4	4 + Surge[3,4]
School				
a) restrooms only	n/a	3 + Surge[4]	n/a	4 + Surge[4]
b) restrooms and kitchen	3	3 + Surge[3,4]	5	4 + Surge[3,4]
Dog Kennel/Veterinary Clinic				
a) restrooms only	n/a	3	n/a	4
b) restrooms and floor drains	n/a	3 + Surge[3,4,5]	n/a	4 + Surge[3,4,5]
RV Park				
a) RV spaces	n/a	3	n/a	4
b) dump station	n/a	8	n/a	10
Casino				
a) gaming floor	n/a	3	n/a	4
b) hotel/motel	n/a	3	n/a	4
c) restaurant/deli	3	4	5	5
Resort/Camp				
a) bunk houses	n/a	3	n/a	4
b) main houses	n/a	3	n/a	4
c) kitchen	2	3	4	4

1. Grease tankage HRT is based on a separate **kitchen design maximum daily flow**, which is integrated into the main flow prior to the primary septic tanks.
2. Primary tankage HRT is based on the **sum of the design maximum daily flows from all sources**.
3. For facilities with restrooms and kitchen, primary tankage volume is determined by multiplying the sum of the design maximum daily flows of the restrooms and kitchen combined by the factor in the primary tankage cell.
4. To determine surge volume for flow equalization purposes, please call **Orenco Systems** at **(800) 348-9843** or **+1-541-459-4449** for assistance.
5. To reduce septage pumping in these and other specialized applications, we recommend using multiple tanks: The first should be small (0.5 to 0.75 HRT); subsequent tanks should provide the remaining HRT requirements.

Note: Tankages are based on long-term performance satisfaction (with respect to septage removal) and nominal quality (minimum) to high-quality (preferred) effluent. If effluent strength is higher than the expected level or if a higher level of treatment is required, greater tankage will be necessary. To enhance total nitrogen reduction, primary tankage should be increased for AdvanTex Mode 3 Systems. Contact Orenco for specifics.

Appendix 3: AdvanTex® Loading

For Commercial and Multi-Family Applications

At Orenco Systems, we have spent more than two decades researching packed bed filters, a proven wastewater technology. Based on our research, we developed the AdvanTex Treatment System, which has been in use since the mid-1990s. AdvanTex Treatment Systems work like recirculating sand/gravel filters, which treat wastewater through a combination of physical, chemical, and biological processes. AdvanTex produces effluent that exceeds "secondary" treatment standards.

The difference between AdvanTex and sand/gravel filters is AdvanTex Treatment Systems use an inert nonwoven textile material instead of granular media such as sand or gravel. Textile has several advantages over granular media:

- Textile has a larger surface area—five times greater than an equivalent volume of sand—so installations have a much smaller footprint than sand filter systems.
- Textile's higher absorption capacity allows loading rates five-to-twenty times higher than sand (as high as 50 gpd/sq ft).
- Textile media weighs considerably less than granular media, so AdvanTex systems can be prepackaged, which results in reduced installation costs.
- Textile media is washable, allowing for a relatively quick and easy rejuvenation of the treatment system in case of abuse or overloading.

Designing an AdvanTex Treatment System is similar to designing a recirculating sand filter (RSF). Most commercial AdvanTex systems also require a ventilation fan (typically rated at 90 watts). However, the power required to operate this fan twenty-four hours per day is significantly less than the power required to operate packaged treatment systems.

In areas that are not nitrogen-sensitive, the recommended size of the recirculation-blend tank for the AdvanTex system is one that provides an HRT based upon eighty percent (80%) of the maximum daily design flow. For nitrogen-sensitive areas, the recommended size of the recirculation-blend tank is one that provides HRT based upon 100% of the maximum daily design flow.

AdvanTex systems have performed well in residential applications where nitrogen removal is necessary. In commercial applications, nitrogen reduction is much more complex than BOD and TSS reduction, and consequently harder to predict. Nitrogen reduction will be dependent on incoming TKN levels, water and air temperatures, alkalinity, pH, and a number of other factors. While commercial AdvanTex systems can be optimized for nitrogen removal, meeting stringent nitrogen limits on a continuous basis cannot be guaranteed.

The AdvanTex Loading Chart on the next page lists Orenco's loading rate recommendations for various applications. It includes loading rates for both design average daily flow and design maximum daily flow for AdvanTex filters used in commercial and multi-family applications. The loading rates used in the table are based on screened primary-treated residential strength effluent from properly sized septic tanks.

This table should be used as a general guideline for decentralized wastewater treatment designs. If you have questions about special cases where different loading rates or other measures may be necessary, or if you have general questions about the AdvanTex Treatment System, please call Orenco Systems at (800) 348-9843 or +1-541-459-4449

AdvanTex System Loading

Facility	Recommended Commercial AdvanTex Loading Rate[1]	
	Design Average Daily Flow[2] (gpd/sq ft)	Design Maximum Daily Flow[3] (gpd/sqft)
Subdivisions/Multiple Dwelling Units	25	50
Office/Manufacturing/Light Industrial		
a) restrooms only	25	50
Restaurant/Deli		
a) restrooms and kitchen	10	25
Convenience Store/Gas Station		
a) restrooms only	15	40
b) restrooms and kitchen/deli	10	25
Hotel/Motel/Multiple Dwelling Units		
a) restrooms and kitchens	25	50
b) restrooms and restaurant/kitchen	15	35
Church		
a) restrooms only	25	50
b) restrooms and kitchen	15	40
School		
a) restrooms only	25	50
b) restrooms and kitchen	15	40
Dog Kennel/Veterinary Clinic		
a) restrooms only	25	50
b) restrooms and floor drains	15	40
RV Park		
a) RV spaces	25	50
b) dump station	Not recommended	Not recommended
Casino		
a) gaming floor	25	50
b) hotel/motel	25	50
c) restaurant/deli	10	25
Resort/Camp		
a) bunk houses	25	50
b) main houses	25	50
c) kitchen	10	25

1. AdvanTex loading rates assume properly sized primary tankage, as outlined in the Orenco Design Aid, *Primary Tank Sizing*, (NDA-TNK-1). Loading rates are based on nominal wastewater characteristics as described earlier in this document.
2. Design average daily flow is the expected daily flow based on a 30-day average.
3. Design maximum daily flow is the maximum daily flow a facility is expected to produce over a week's time.

Note: Loading rates shown are for systems expected to perform to secondary standards such as ANSI/NSF 40. Higher performance systems require special review and generally feature lower loading rates.

And this is a wastewater dispersal field.

No Worries.

GEOFLOW

SUBSURFACE DRIP SYSTEMS

Geoflow WASTEFLOW®

Geoflow's subsurface drip systems solve many of the problems that plague traditional methods of wastewater dispersal. Since the effluent is dispersed underground where it is absorbed in the biologically active soil layer, there is no surface contamination, no ponding, no run-off problems, no bad smells.

Issues such as overspray and aerosol drift are eliminated, dose scheduling is unaffected by land use or weather, and it is a politically and environmentally favorable means of dispersing wastewater.

With subsurface drip, secondary reclaimed wastewater can be used, eliminating the ongoing cost of additional effluent treatment.

Geoflow drip dispersal is recommended for commercial, municipal, industrial, residential and agricultural applications.

Subdivision in Minnesota.

How It Works

The WASTEFLOW dripline has factory-installed emitters evenly spaced along the tubing. The dripline is usually installed six to ten inches below the surface, directly into the biologically active soil horizon where the treated effluent can be absorbed by the plants, animal life, and soil.

Wastewater is pumped to the dripfield on a time-activated dose cycle. The slow, even application of effluent with resting periods is key to the drip system's success.

Easy To Install — New or Retrofit

Geoflow subsurface systems are simple to install. The tubing can be laid on a graded parcel then covered with topsoil or installed using a tubing plow or trencher.

Subsurface drip also solves the problem of small or odd-shaped areas, such as property edges and around buildings and other structures. The flexible tubing can easily be fit to uneven spaces. Since the wetted area is within close proximity of each emitter, run-off problems are easily eliminated.

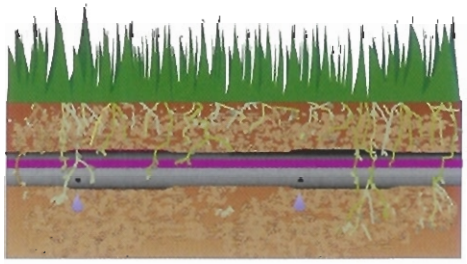
Plow single or multiple driplines at a time.

But What About...?

Clogging — Geoflow drip systems are installed with self-cleaning filters to keep large particles from entering the drip field.

WASTEFLOW emitters are also self-cleaning and have been used for over 15 years in actual onsite applications. They are made with large orifices, raised entry ports, and turbulent flow paths to keep smaller particles from collecting in the emitters.

Root intrusion — Each emitter features ROOTGUARD®, patented protection against roots entering the emitters. The non-toxic active ingredient, Treflan®, directs root growth away from the emitters. Treflan is impregnated into the emitters during the molding process.



Rootguard keeps roots from penetrating and clogging the emitters.

Bacterial growth — Geoflow's WASTEFLOW dripline is coated inside with the anti-bacterial, *Ultra-Fresh*® to inhibit bacterial growth on the walls of the tube and in the emitters. *Ultra-Fresh* has been found to be effective in preventing slime build-up inside the tube, even with effluent that has very high BOD.

Look for the anti-bacterial turquoise lining.

This eliminates the need to scour the dripline with high flush velocities.

There is virtually no discharge into the environment because the active ingredient, TBT-maleate, does not migrate readily through plastic (Note: Ultra-Fresh does not treat the water flowing through the tube.)

Freezing climates — Geoflow systems can be used year round, even in freezing conditions. The polyethylene dripline is flexible enough so as not to crack when it freezes. The dripline self-drains through the emitters every time the system is turned off, and will not hold water. Sound design, including drainback of the system, air vacuum breakers and insulation of the more rigid parts of the system keep the system working even in the coldest climates.

Difficult sites — Geoflow systems can be effective in areas with

- tight soils,
- rocky terrains,
- steep slopes,
- high water tables.

Design guidelines are available directly from Geoflow and at www.geoflow.com.

A steep slope installation in California — 65% slope.

Testimonials

Higgins Corner Retail Development
Nevada County, California

"The Geoflow dripline system proved to be successful in four areas: Foremost, there was a tremendous cost saving in installing the Geoflow system. Secondly, the time and effort saved in installing Geoflow as compared to the construction of deep absorption trenches was also a benefit. Thirdly, one and a half acres of land could be used for other monetary-inducing projects; and fourth, the final disposal site looks like the original untouched property. Neighbors are pleasantly surprised at the final effluent disposal field."

Mark Kahl, Design Engineer
7H Technical Services Group Inc.

Higgins Corner, Nevada County, CA.

Ocala Airport
Ocala, Florida

"The [44-acre] site has operated successfully at an average of 500,000 gpd over a three-year period. Monitoring data reveals that groundwater quality has not been adversely effected despite high loading rates... The cost to operate and maintain a subsurface reuse system is much less than a conventional irrigation system..."

Ed T. Earnest, P.E. Utility Engineer.
City of Ocala Engineering Dept.

Ocala Airport.

Omaha Beach Golf Course
Matakana, New Zealand

"As part of the construction of the new 9-holes the developer installed a new subsurface drip irrigation system on some of the new fairways to act as part of the overall community treated effluent disposal system... We are extremely pleased with the system, which gives a very even deep green appearance to the fairways where it was been installed. The fairways that are irrigated with the subsurface drip system are in better condition than those that do not yet have the system."

Allan Anderson,
Head Greenkeeper

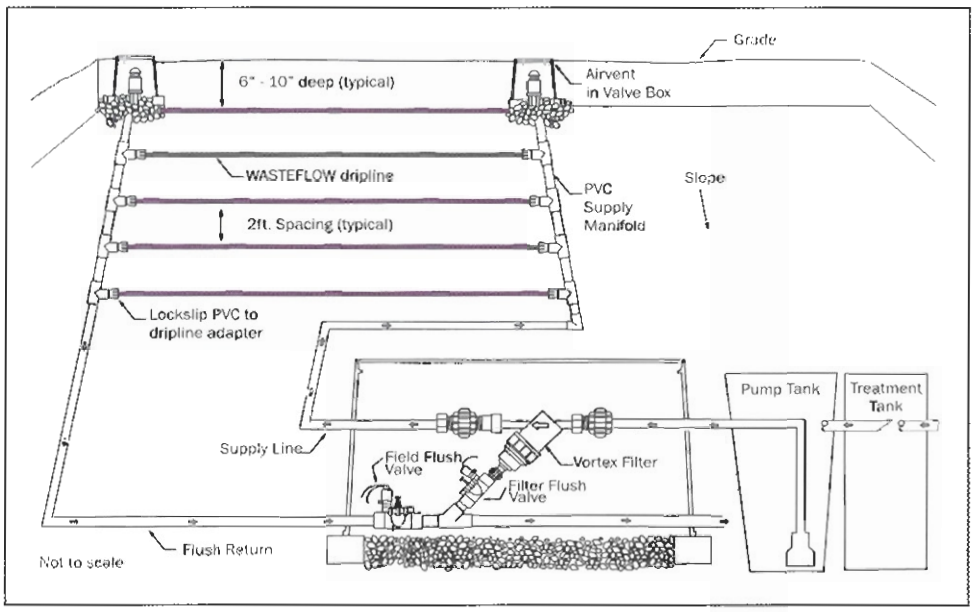
Omaha Beach Golf Course, N.Z.

Typical Layout

WASTEFLOW dripline is made of flexible ½" polyethylene tubing coated on the inside with an anti-bacterial lining to inhibit bacterial growth. The factory-installed emitters are spaced evenly along the tubing.

The dripline is placed six to ten inches below the surface, directly into the biologically active soil horizon. Effluent is pumped on a time-activated dose cycle through a self-cleaning filter out to the dripfield, providing slow, even application of effluent.

The system returns back to the pump tank or treatment tank in a closed loop, and is kept clean with regular flushing.



Typical disposal field elements and layout

The Drip Emitters

Geoflow offers two different emitters, the Classic and the PC.

WASTEFLOW Classic

WASTEFLOW PC

Each dripper has a filter built in at the entry port to to keep particles out.

Turbulent flow path

Effluent travels through a turbulent flow path that helps keep any fine particles from settling inside the dripper.

CUTAWAY OF THE PC EMITTER

Dose mode – When pressurized, the rubber diaphragm flexes across the compensating chamber to regulate flow across 7 to 60 psi.

Flushing mode – As the pump is powered on and off again, the rubber diaphragm relaxes across the exit hole enabling the dripper to self-flush every cycle.

Geoflow Team

The people at Geoflow are the subsurface drip *experts*. We offer training, answers to your questions, and support every step of the way from concept through design and installation.

Geoflow dripline comes with an unprecedented 10-year limited warranty for root intrusion, workmanship and materials.

GEOFLOW, INC.
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Corte Madera, CA 94925
www.geoflow.com

Tel: (800) 828-3388
Fax: (415) 927-0120

GEOFLOW
SUBSURFACE DRIP SYSTEMS

Look for the purple stripe on the tubing to be sure you are getting Geoflow!


Dannys Lane
French Village Station Rd
Sonnys Rd
Hammonds Plains Rd
St Margarets Bay Rd
Chandler Rd
Peggys Cove Rd
Old School Rd