Lombardo Associates, Inc.

Representative Nitrogen Removal Project Descriptions

Cluster Applications

- Malibu, CA
- Mashpee, MA
- Eastham, MA
- Chincoteague, VA

Environmental Engineers/Consultants
LOMBARDO ASSOCIATES, INC.
49 Edge Hill Road
Newton, Massachusetts 02467
(617) 964-2924
Portable: (617) 529-4191
Fax: (617) 332-5477
E-mail: pio@LombardoAssociates.com

PROJECT DESCRIPTION – MALIBU CREEK PLAZA, MALIBU, CA

Producing Water Meeting CA Title 22 Unrestricted Water Reuse Standards
Achieving Total Nitrogen <3 mg/l and Turbidity <2 NTU

Project: Malibu Creek Plaza
Shopping Plaza

Design Flow: 16,000 gpd High Strength
Equivalent to ~40,000 gpd
Residential Strength Wastewater
System – approximately 200
homes

Client: Malibu Creek Preservation Co.
c/o Soboroff Partners

Wastewater Engineer: Lombardo Associates, Inc.
Malibu, CA & Boston, MA
www.LombardoAssociates.com

Project Description.

The Malibu Creek Plaza is a shopping plaza consisting of both retail and commercial businesses. It is located in an environmentally sensitive area adjacent to the famous Surfrider Beach in Malibu, California. In 1999 the California Regional Water Quality Control Board (CRWQCB) and the City of Malibu conducted groundwater and surface water sampling at Malibu Creek Plaza and the nearby area and determined that wastewater discharge from the Plaza and other properties using conventional septic systems were causing groundwater pollution, which adversely impacted Malibu Creek and Malibu Lagoon. The CRWQCB required the Plaza to produce the following tertiary quality wastewater effluent:

Lombardo Associates, Inc. (LAI) was retained to engineer a compliant wastewater management system to protect Malibu Lagoon and Surfrider Beach.

The previous system was a conventional system consisting of grease traps, septic tanks and gravel drainfields, which provided insufficient nitrogen and bacteria removal.

LAI designed a cost-effective wastewater management system that employs a septic tank effluent pump (STEP) collection system and treatment system consisting of the Nitrex™ Nitrogen Removal Technology, recirculating media pretreatment of septic tank effluent, and an ozone – UV disinfection system for bacteria removal. Treated effluent is discharged to new high capacity drainfields. The treatment system was designed to treat 16,000 gpd of the high strength wastewater (equivalent to ~40,000 gpd of residential strength wastewater) as 85% of the flow was from the Plaza's popular restaurants.

The Malibu Creek Plaza Wastewater Treatment System has been operational as of July 2007. The Plaza's wastewater treatment effluent quality is compliant with permit requirements as well as California Title 22 unrestricted water reuse requirements as shown below.

Energy use, 67% of which is for disinfection, of the high strength 16,000 gpd facility (equivalent to 200 - 250 homes) is approximately $7,400 per year (135 kwhr/day @$0.15). Operation & Maintenance requirements are monthly visits.

Water Quality Data – Nitrex™ Wastewater System – Malibu Creek Plaza, Malibu, CA

	Constituent	TSS	BOD_5	Turbidity	Total Coliform	Fecal Coliform	Enterococcus	Oil & Grease	TN
	Units	mg/l	mg/l	NTU	MPN/100 ml	MPN/100 ml	MPN/100 ml	mg/l	mg/l
Malibu Creek Plaza	Avg	30	30	10.0		-	24	-	
Effluent Standards	Max	45	45	15.0		200	104	15	
Title 22	Avg			2.0	2.2				
Unrestricted Reuse	Max			10.0	23				
Sept. 2007		*3.2*	*4.9*	*1.76*	*<2*	*<2*	*<1*	*<5*	*5.79*
Oct. 2007		*<5*	*6.9*	*1.08*	*<2*	*1*	*<1*	*<5*	*4.71*
Nov. 2007								*<5*	*3.23*
Dec. 2007		*9.0*	*12.0*	*1.80*	*8*	*2*	*<1*	*<5*	*3.57*
Jan. 2008		*<5*	*6.0*	*1.10*	*50*	*<2*	*<1*	*<5*	*4.73*
Feb. 2009		*<5*	*<5*	*5.40*	*<2*	*<2*	*<1*	*<5*	*5.61*
Mar. 2008		*<5*	*<5*	*1.90*	*<2*	*<2*	*<1*	*<5*	*6.72*
Apr. 2008		*7.0*	*<5*	*2.60*	*23*	*23*	*<1*	*<5*	*9.17*
May 2008		*<5*	*<5*	*1.80*	*1600 **	*350 **	*<1*	*<5*	*7.88*
June 2008		*8.0*	*<5*	*1.40*	*22*	*11*	*11*	*<5*	*7.88*
July 2008		*6.0*	*<5*	*1.40*	*<2*	*<2*	*<1*	*<5*	*9.46*
Aug. 2008		*<5*	*5.3*	*1.73*	*533*	*140*	*<1*	*<5*	*6.22*
Sept. 2008		*<5*	*5.0*	*4.50*	*<2*	*<2*	*1*	*<5*	*6.50*
Oct. 2008		*<5*	*<5*	*1.00*	*30*	*<2*	*<1*	*<5*	*3.17*
Nov. 2008		*<5*	*<5*	*3.70*	*<2*	*<2*	*<1*	*<5*	*3.74*
Dec. 2008		*<5*	*<5*	*0.20*	*<2*	*<2*	*1*	*<5*	*3.54*
Jan. 2009		*6.0*	*<5*	*0.20*	*23*	*<2*	*<1*	*7.00*	*2.68*
Feb. 2009		*<5*	*<5*	*1.45*	*<2*	*<2*	*<1*	*<5*	*2.84*
Mar. 2009		*<5*	*<5*	*0.46*	*4*	*3*	*<1*	*<5*	*2.11*
*Apr. 2009 ***		*12.5*	*14.4*	*11.28*	*813*	*806*	*1*	*<5*	*10.12*
May. 2009		*6.3*	*<5*	*1.78*	*63*	*<2*	*2*	*<5*	*3.22*
June 2009		*<5*	*<5*	*0.78*	*<2*	*<2*	*<1*	*4.63*	*1.95*
July 2009		*<5*	*<5*	*0.40*	*<2*	*<2*	*1*	*2.5*	*1.37*
Average from 9/1/07		4.7	7.8	3.14	138	59	1.1	2.8	5.04
Average from 10/1/08 after Equipment Repairs		4.2	3.7	2.12	94	82	0.8	3.2	3.47
Average from 10/1/08 excluding Operator error data		3.6	2.5	1.03	13	1.2	0.7	3.2	2.54

Notes: (*)Electrical equipment malfunction (**) Operator Error

An additional 125 chemicals are analyzed on a monthly basis. All are within permit requirements. All contaminants of concern are below Detection Limits, typically 5 ppb.

Environmental Engineers/Consultants
LOMBARDO ASSOCIATES, INC.
49 Edge Hill Road
Newton, Massachusetts 02467
(617) 964-2924
Portable: (617) 529-4191
Fax: (617) 332-5477
E-mail: pio@LombardoAssociates.com

PROJECT DESCRIPTION – Chincoteague, Virginia

RESIDENTIAL SYSTEM PRODUCING TOTAL NITROGEN < 3 mg/l

Project: Landing at Water's Edge
Chincoteague, VA

Design Flow: 3,900 gpd

Wastewater Engineer: Pio Lombardo,P.E.
Lombardo Associates, Inc.
Malibu, CA & Boston, MA
617-964-2924
Pio@LombardoAssociates.com
www.LombardoAssociates.com

LAI designed the Nitrex™ component of the wastewater treatment and disposal system for the seasonally used Landings at Water's Edge site in Chincoteague, VA to reduce total nitrogen to less than 10 mg/l in the effluent after pretreatment by a recirculating peat filter aerobic treatment system. The system is designed for sanitary sewage from a residential development with approximately 15 units. The system has been operational since February 2007 and effluent total nitrogen has been <3 mg/l.

The Nitrex™ system is virtually maintenance free. The water quality data is presented below:

Date	Nitrex™ Effluent Total Nitrogen mg/l
Detection	
5/24/2007	3.17
6/6/2007	1.10
6/19/2007	0.96
7/11/2007	0.20
9/26/2007	2.05

Environmental Engineers/Consultants
LOMBARDO ASSOCIATES, INC.
49 Edge Hill Road
Newton, Massachusetts 02467
(617) 964-2924
Portable: (617) 529-4191
Fax: (617) 332-5477
E-mail: pio@LombardoAssociates.com