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No Discharge Complete Wastewater Reuse and Roof Runoff Beneficial Reuse

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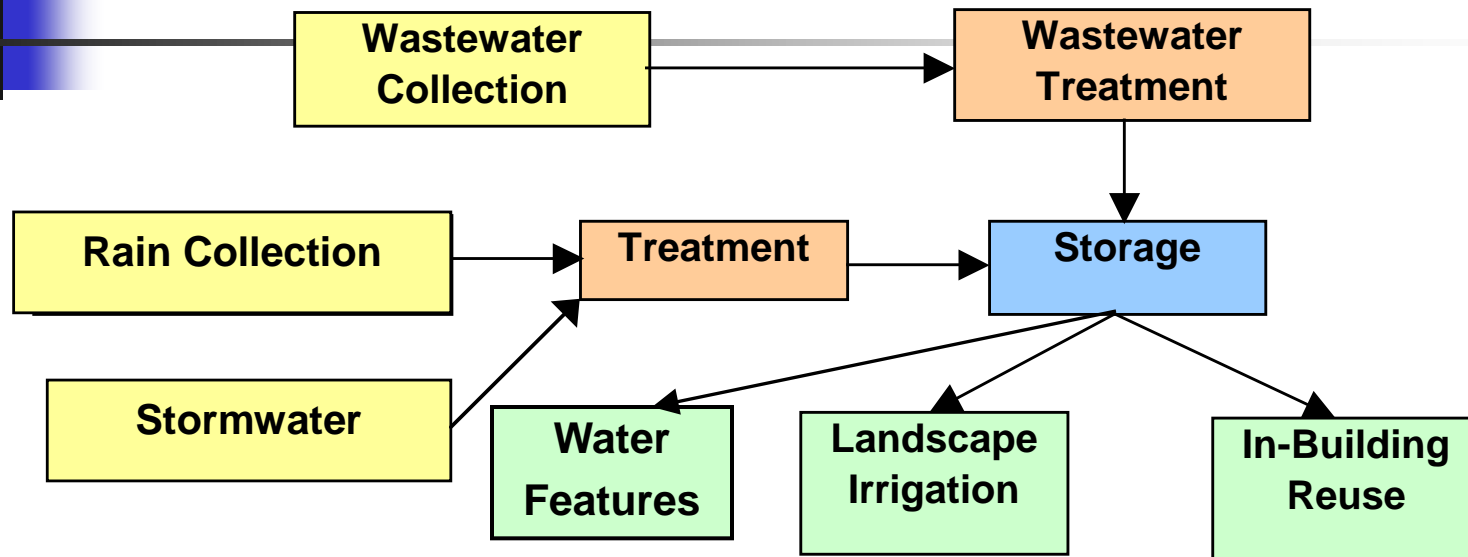
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Water Use Efficiency & Water Reuse



- Minimize Potable Water Demand
- Roof Runoff + Stormwater Reuse
- Wastewater Reuse

No Net Discharge System



- No Net Discharge
- Minimizes Potable Water Demand (50-70% Reduction)

Malibu- Sycamore Village Development Water Reuse – No Discharge System

- **Environmentally Sensitive Area, adjacent to the famous Surfrider Beach in Malibu, CA**
- **Combination of Office & Retail buildings (66,000 sf)**
- **Integrated Wastewater-Stormwater Irrigation System**





Malibu – Sycamore Village

Without Water Reuse:

Potable Water Demand = **26,790 gpd**

With Water Reuse:

Potable Water Demand = **10,022 gpd**

63%
REDUCTION

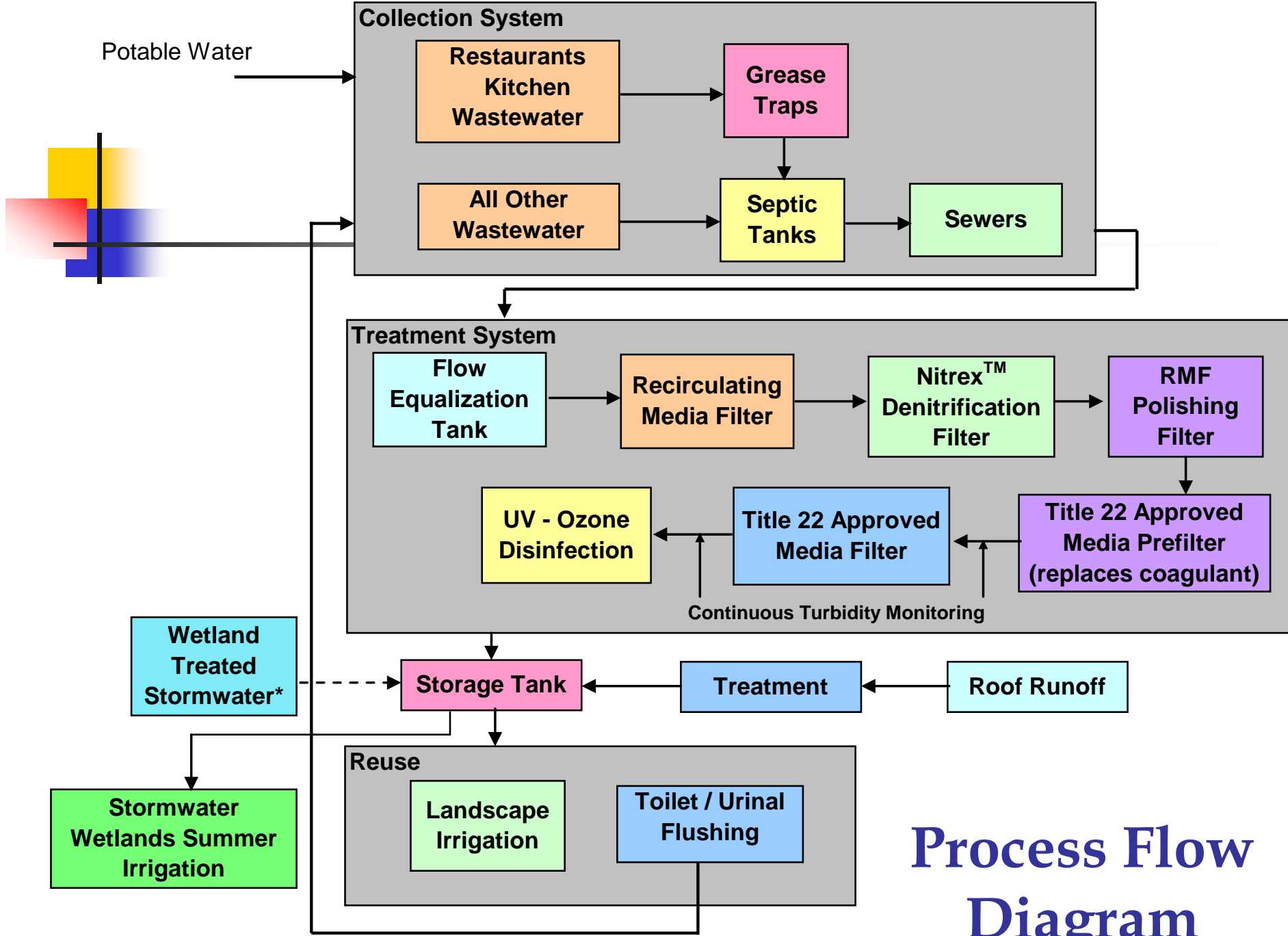
Malibu Sycamore Village Wastewater System

Proposed Malibu Sycamore Village Development Wastewater System

Wastewater Component	Technology
Collection	Grease Traps, Septic Tanks & Effluent Collection System
Equalization Tank	Tank to dampen peak flows
Treatment	Title 22 Compliant System using recirculating media filters, Nitrex™ denitrification filter and UV - Ozone disinfection with influent equalization storage.
Reuse - in buildings	Reuse for toilet flushing with dual piping (purple pipe system)
Reuse - irrigation	Use for landscape irrigation
Irrigation Storage Tank	Discharge storage tank for effluent storage during seasonal low ET periods
Emergency Discharge	Drainfield for Emergency Discharge per CA DPH requirements

Proposed Malibu Sycamore Village Development Roof Runoff

Wastewater Component	Technology
Collection	Dedicated roof runoff Collection system
Detention	Detention tank for 1 inch
Treatment	CADPH Title 22 Approval Filter & UV disinfection
Storage	Irrigation Storage Tank
Disposal	Excess flows to Civic Center Stormwater Management System



Process Flow Diagram

*Capability to be provided for potential future use.

Urban – Mixed Use Development Wastewater Treatment Plant Reuse Plan



Dense Urban Development Wastewater Treatment Plant Reuse Plan

Westwood Station On-Site Wastewater System

Preliminary Economic Analysis

prepared by Lombardo Associates, Inc. - November 9, 2006

Design Flow

50,000 gpd
18,250,000 gallons per year (gpy)
18,250 1,000 gpy

Annual Cost with Sewer Connection

2005 Westwood Water Use Rate	\$	3.97	per hundred cubic feet (HCF)
2005 Westwood Sewer Use Rate	\$	<u>13.95</u>	per hundred cubic feet
	\$	17.92	per HCF
	\$	23.96	per 1,000 gallons

1. Annual Water & Sewer Use Avoidance Costs	50,000	gpd
	18,250	1,000 gpy

Annual Water Use Cost	\$	96,862
Annual Sewer Use Cost	\$	<u>340,358</u>
Annual Total Water & Sewer Cost	\$	437,219

Dense Urban Development Wastewater Treatment Plant Reuse Plan

On-Site Wastewater Reuse System

	Range of Estimated Annual O&M Costs	
	Achievable Low End	Safe High End
1. Annual O&M Costs - Est. Budget Range	\$ 100,000	\$ 150,000
2. Estimated Net Annual Savings	\$ 337,219	\$ 287,219
3. Simple Payback Period	10 years	
4. "Maximum Allowable" Capital Cost of Reuse System	\$ 3,372,193	\$ 2,872,193
5. Can reuse system be implemented for less than Allowable Capital Cost ?	Initial Capital Cost estimate = \$3,025,000	

Notes:

1. Amenity value of greenhouse not considered
2. Impact of continuing rising MWRA rates - 9.8% for 2006 - not considered
3. Value of LEED points not considered



Other Water Reuse Projects

- Malibu – La Paz Development
- Malibu Creek Plaza

Malibu- La Paz Development Water Reuse – No Discharge System

The No Wastewater Discharge is achieved by:

- **In-Building Reuse – Toilet Flushing**
- **Landscape Irrigation – Roof Runoff & Stormwater Reuse**

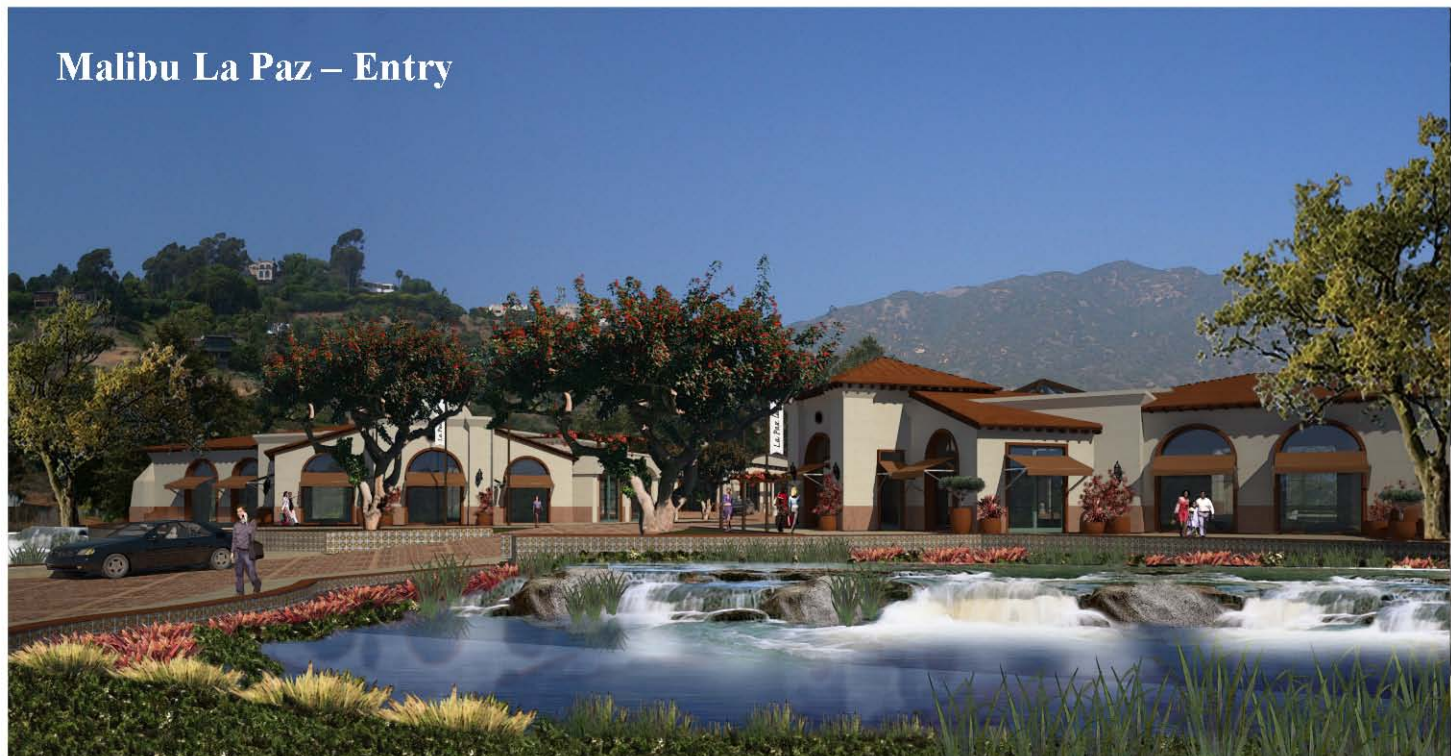
- **11 Commercial Buildings**
- **2 Restaurants (175 seats/each)**
- **Proposed New City Hall**



Malibu- La Paz Development

Design Flow: 28,000 gpd / 23,000 gpd

**With the Water Reuse, Potable Water Demand
will be 14,200 gpd... a 60% Reduction**



Malibu Creek Plaza





Malibu Operating System

- Location: Malibu Creek Plaza
 - Shopping Plaza – Retail & Commercial
 - Including: movie theater, 3 restaurants, ice cream parlor, dry cleaner, bank, pet store
 - Environmentally Sensitive Area
 - Malibu Lagoon is ~ 200 ft South
 - Pacific Ocean is ~ 1,400 ft South

Site Location





Regulatory Requirements

Monthly Constituent	Unit	Average	Maximum
BOD ₅	mg/L	30	45
Suspended solids	mg/L	30	45
Turbidity	NTU	10	15
Oil and Grease	mg/L	-	15
TDS	mg/L	-	2,000
Sulfate	mg/L	-	500
Chloride	mg/L	-	500
Total Nitrogen	mg/L	-	10
Fecal Coliform ^(a)	MPN/100 mL	-	200
Enterococcus ^(b)	MPN/100 mL	24	104



Previous System

- Conventional System
 - Grease Traps, Septic Tanks & Gravel Drainfields
 - Three 1,500 gallon Grease traps
 - Insufficient capacity
 - Ten Septic Tanks = 42,000 gallons
 - Inadequate capacity
 - Eleven Drainfields = ~ 30,000sf
 - Ponding and in Failure

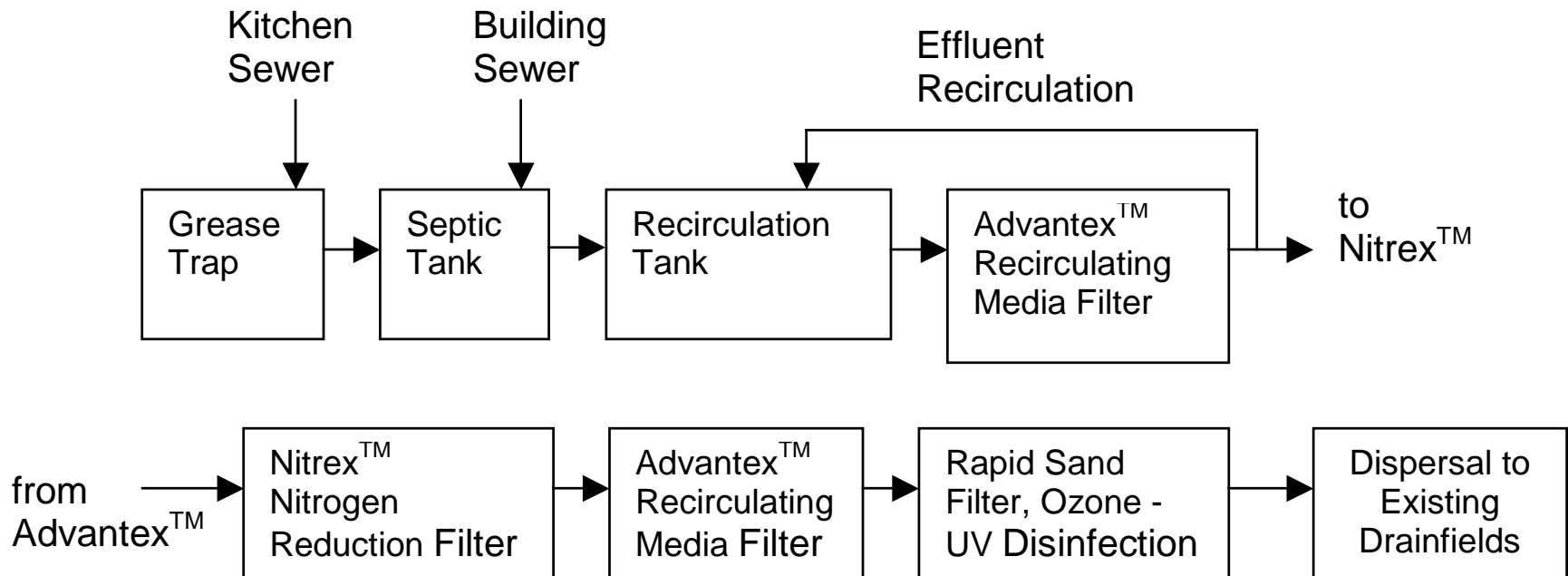


New LAI System

- Collect, Treat and Disperse the Wastewater generated in the Plaza
- Base Flow = 12,000 gpd
- Peak Flow and Growth Allowance = 4,000 gpd
- Total Design Flow = 16,000 gpd



Process Flow Diagram



Nitrex™ Tanks Malibu Creek Plaza





Performance

Average:

BOD	<5	mg/l
TSS	<5	mg/l
Total Nitrogen	<3	mg/l
Turbidity	<2	NTU



Performance

- An additional 125 chemicals are analyzed on a monthly basis. All are within permit requirements. 99% of all contaminants of concern are below Detection Limits, typically 5 ppb.
- Treatment for removal of pharmaceuticals and emerging contaminants



Questions or Comments?

Environmental Engineers/Consultants

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